



**The United Republic of Tanzania  
MINISTRY OF NATURAL RESOURCES AND  
TOURISM**



**CARE International (Tz)**

**Uluguru Mountains Environmental Management  
and Conservation Project (UMEMCP)**

**Strategy for the Agriculture and Agroforestry  
Component**

Prepared by

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# 1 Introduction

## 1.1 Background to the Study

The Uluguru Mountains Environmental Management and Conservation Project (UMEMCP) is a component of the Conservation and Management of the Eastern Arc Forests Project (GEF/UNDP: URT/01/G32), which is implemented by the Forest and Beekeeping Division of the Ministry of Natural Resources and Tourism, and funded by the Global Environment Facility (GEF) through the United Nations Development Programme. UMEMCP focuses primarily on the southern section of the Uluguru Mountains Catchment Forest Reserve.

CARE International in Tanzania (CARE) implements the UMEMCP component under the terms of an agreed *Memorandum of Understanding* with the Forest and Beekeeping Division that was signed on the 12<sup>th</sup> August 2003. Locally, the UMEMCP works in partnership with: the District Councils of Morogoro and Mvomero Districts; the Morogoro Regional Catchment Forestry Office, Morogoro; The Tanzania Forest Conservation Group (TFCG); The Wildlife Conservation Society of Tanzania (WCST); and the Uluguru Mountains Agricultural Development Project (UMADEP).

The immediate objective of UMEMCP is defined as follows (to be achieved by the end of year six):

*Improved forest management and conservation and improved land husbandry practices in the Uluguru Mountain forests and adjacent villages implemented by local communities, government authorities and other stakeholders.*

UMEMCP has been designed with an integrated conservation and development (ICD) approach – that is a core of interventions addressing forest management with community participation supported by a range of livelihood interventions that are specifically designed to enhance forest conservation as well as deliver increased livelihood benefits to local communities. These livelihood interventions fall under two categories which are reflected in the structure of the project outputs:

- Agriculture and agroforestry: *capacity of local communities in sustainable land use management is enhanced*
- Small enterprise and marketing: *selected opportunities for income generation in the Uluguru Mountains developed*

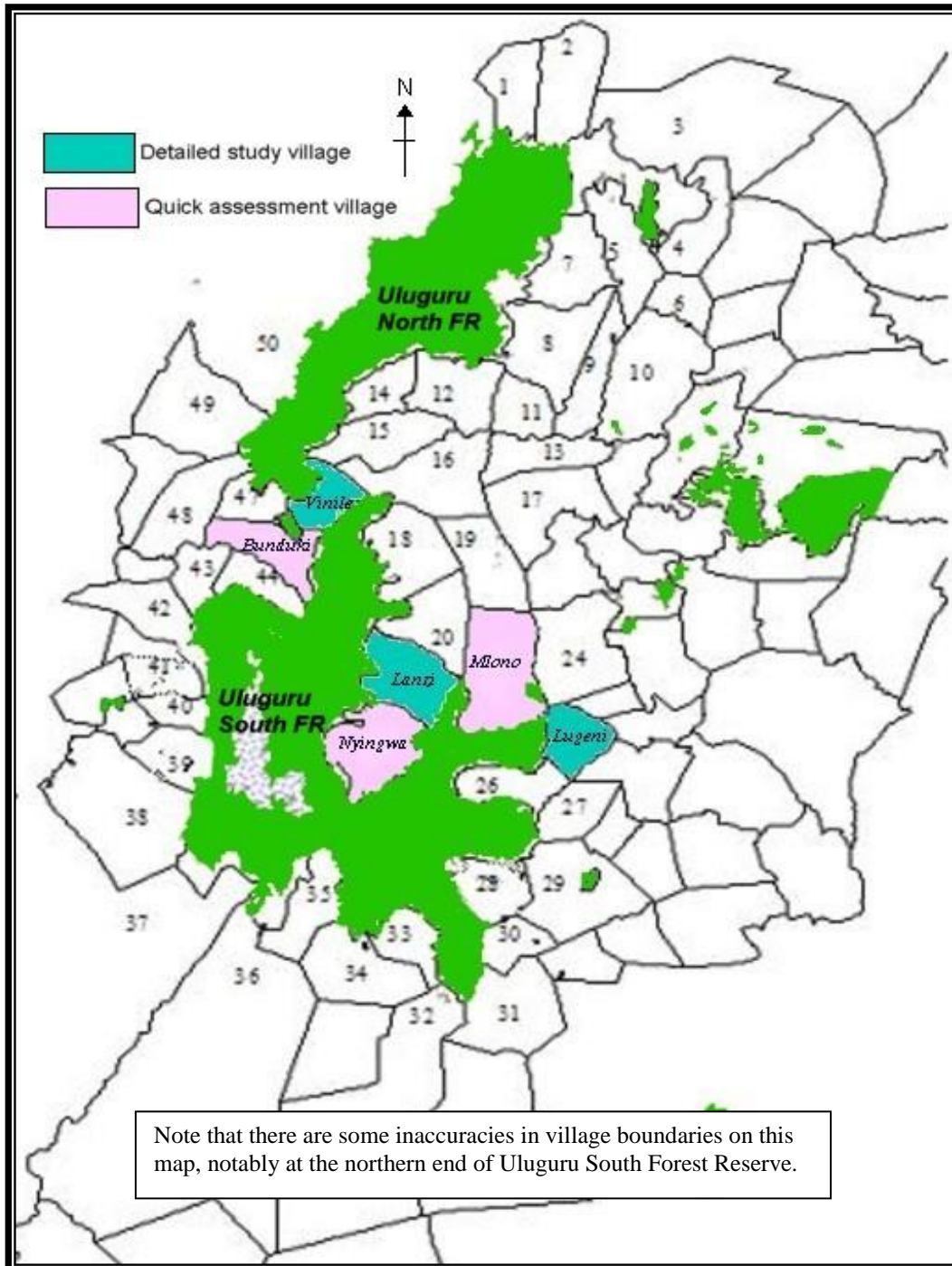
The detailed strategies for implementation of these two components were not specified in the project document as it was considered more logical and realistic to leave this strategy development process to the start of the project, allowing the exercise to be informed by an appropriate diagnostic study. This diagnostic study was planned in October 2004<sup>5</sup> and the findings are presented in a companion report<sup>6</sup>.

This document addresses the strategy of the agriculture and agroforestry component of UMEMCP, which is to be focused on villages adjacent to Uluguru South Catchment Reserve. The objective is to provide the UMEMCP with a clear direction (and plan) for intervention into the current agricultural development scenario in the southern section of the Uluguru Mountains such that the specified output can be achieved within a 5-year time frame. The strategy outlined in this document is based on a detailed diagnostic study in three communities followed by a process of analysis.

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<sup>5</sup> Hussein A Mansoor, Kenneth FG Mansuki and Phil Franks (2004). Detailed Plan for Conducting a Diagnostic Study for Agricultural Improvement Programme in South Uluguru Mountains. Unpublished Report MNRT CMEAMF: Uluguru Component

<sup>6</sup> Hussein A Mansoor, Joel Meliyo, Sosthenes Ruheza and Phil Franks (2004). Report of a Diagnostic Study for Agricultural Improvement Programme conducted at Lanzi, Lugeni and Vinile Villages in South Uluguru Mountains. Unpublished Report MNRT CMEAMF: Uluguru Component.



The strategy presented in this document should not be considered a definitive strategy for the remaining five years of the programme. Rather it is a starting point for a strategy that must evolve over time as the partners involved gain a better understanding of the agricultural system and the link between support for agriculture and agroforestry, and forest conservation.

Uluguru South Forest Reserve is surrounded by 30 villages (see map above). Roughly one third (?) of these 30 villages currently benefit from agricultural extension activities provided by the District and UMADEP, although not within an ICD framework and therefore not specifically designed to contribute to conservation objectives. The budget of the agricultural and agroforestry activities of the project is approximately \$30,000 per year. The strategy presented in this document is based on the assumption that these resources will be sufficient to working in up to 10 of the 30 forest adjacent villages by the mid point of the project (from January 2008), but starting with just 3 in 2005.

Initial scoping visits to the forest adjacent villages conducted by the project in 2004 suggested that villages can be clustered into ten different clusters according to land use and farming system. Differences in land use and farming system appear to be primarily determined by altitude, rainfall (higher on the east side) and market access.

It was proposed that the project target one village in each of three different clusters (marked in blue on the map) with a view to starting implementation in these three villages in early 2005 and then expanding to a second village in the same cluster in 2006. Thus in addition to the detailed diagnostic study in three villages (4 days each) there was a quick (one day) assessment in three other villages within the same clusters (marked in pink on the map) with the aim of verifying the clustering model.

The choice of the three villages for detailed study was based on three criteria:

- Level of pressure on forest resources (that might be alleviated by agriculture interventions)
- Degree of support already received from other initiatives (e.g. from UMADEP)
- Potential cost effectiveness of agricultural extension services, i.e. where we might get the biggest “bang for the buck” (less in the southern villages which are inaccessible by road).

## 1.2 Key Considerations Guiding Strategy Development

### Conservation-Development Linkage

As a component of an integrated conservation and development (ICD) project, and a project funded by the GEF, the agriculture and agroforestry component of UMEMCP must support conservation of the Uluguru forests as well as delivering livelihood benefits. Many ICD projects have been designed with the simple assumption that measures to reduce poverty in forest adjacent communities will “reduce pressure on forest resources” and hence support conservation. With respect to tree planting the assumption is usually more specific – that planting trees outside the forest will reduce demand for tree products – but again there are many cases now where this assumption has turned out to be invalid, often because products from on-farm trees are sold for income (usually by men) whilst “illegal” harvesting of fuelwood and minor forest products continues as before (often by women).

The general lesson is that to design agriculture and agroforestry interventions that have forest conservation impact we need a better understanding of the human activity that is, or is likely to be, damaging from a conservation perspective (“threats”), local livelihood strategies, and the contribution of forest resources to these strategies. Based on this understanding we must then define more precisely the hypothesis for how a certain type of agriculture/agroforestry intervention is expected to reduce the use of forest resources (which we might describe as “pathways to conservation impact”). Then, as the project proceeds, we have to monitor changes in attitudes and behaviour and correlation to agriculture and agroforestry interventions to verify whether the hypothesis is actually correct.

In broad terms there are three different types of pathway to conservation impact:

- Substitution of materials, e.g.
  - increased production of livestock *may* reduce illegal hunting
  - tree planting *may* reduce harvesting of fuelwood and other wood products
  - intensification of agricultural land use *may* reduce forest encroachment
- Substitution of income, e.g.
  - Increased income from agriculture/livestock *may* reduce exploitation of forest resources for income
- Goodwill
  - Any development intervention that is seen as helpful to the community, and that is seen to be brought to the community because of the forest, *may* result in improved cooperation with forest authorities and improved attitudes to the forest (and so counter political pressures for damaging development activities).

The ‘goodwill’ pathway operates in parallel with the other pathways, i.e. conservation impact may be achieved through a combination of substitution and goodwill effects. But it is important to note that the significance of the ‘goodwill’ pathway is crucially dependent on communities being aware of the link between the extension services they receive and conservation of the forest. To maximise the impact of this pathway it is essential that communities are clearly aware that the services provided are brought to them because of national and global interests in conservation of the forest. This pathway can be very effective in terms of conservation impact if there are politically motivated threats to the forest and thus the level of public support is an important issue, or where a confidence-building entry point is needed to facilitate dialogue on forest management. Note, however, that the conservation impact of this “goodwill” pathway will reduce over time once the project ends whilst the impact of substitution interventions may continue so long as farmers continue to practice the intervention.

A key consideration that applies to all pathways is the issue of targeting. The role of forest resources in the livelihoods of local people varies greatly within a community, within a household, and over time (i.e. forest resources are far more important at certain times of the year). Agriculture and agroforestry interventions will only deliver conservation impact if targeted at the relevant people, and if they deliver benefits at the relevant time. Thus it is crucial to understand who the relevant people are and then select interventions that are appropriate to the conditions of these people, and extension approaches that effectively reach these people. Very often it is the poorer and more vulnerable households that are the main source of pressure on forest resources, but adoption of agriculture and agroforestry interventions generally tends to be skewed to wealthier households who have more land and are willing to take more risk. Specific measures must therefore be taken to counter this type of bias. Such measures may mean lower levels of uptake and higher cost of service delivery per farmer.

Finally it should be emphasised that the agriculture/agroforestry interventions of an integrated conservation and development project will only deliver conservation impact if accompanied by measures to increase *legal* access to forest resources (at sustainable levels) and a reasonably effective system of law enforcement that is able to increase the cost of engaging in illegal activities. This law enforcement system may be based primarily on law enforcement by government authorities, law enforcement by communities themselves (as in CBFM), or a combination of the two (as in JFM). This does not exist at the present time in the Ulugurus but it is assumed that such a system will be developed over the course of the next 4 years. Is this a realistic assumption? If not then it is likely that the agriculture component will fail to deliver the expected conservation impact (i.e. we have a “killer assumption” in the project design).

### **Extension Approach**

Approaches to agricultural and agroforestry extension have changed greatly over the last 25 years, evolving from a “technology transfer model” to models based on facilitating farmer experimentation where the farmer him/herself becomes the centre of the agricultural development process. Linked to this has been the evolution from the “contact farmer” approach where an extensionist worked with a small number of selected (often elite) farmers to the “group approach” where extensionists work with groups of community members who share a common interests in a particular intervention. This “group approach” is now standard practice in Tanzania.

Another key consideration is the nature of the extensionist him/herself. Recent years have seen a strong move towards the idea of “para-professionals” – members of the community who are given basic technical training to provide extension services to their own community. With this approach the role of the professionals (trained staff of government and NGOs) changes to a coordinating and technical back-stopping role. Naturally this approach appears more cost effective but there are major issues of sustainability - para-professionals won’t work for long on a voluntary basis. That said, this approach has great potential where incentive mechanisms can be established, for example a small profit on the supply of improved seed and other inputs. Crucial to the success of this approach is the process of selecting the para-professionals. Projects that select these people at the start of the programme tend to end up with the wrong type of people, attracted to the job for the wrong reasons.

“State of the art” extension approaches aim to offer farmers a “basket of choice” with which to experiment rather than a limited menu of “proven technologies”. The “basket of choice” will comprise a range of interventions (e.g. composting, improved maize production) and also within some of these interventions a range of options (e.g. different varieties of maize). However there must be limits on the size of the basket since every new option has a cost in terms of training of extensionists, provision of any necessary inputs and associated management time. Thus in the interest of efficiency and cost effectiveness there must be a process for defining what is to be included in the basket, and what is excluded. That said, the contents of the basket should change over time in response to growing experience of what works (and what doesn’t), and the increasing understanding by farmers and extensionists of constraints and new opportunities.

In selecting agricultural interventions to include in the basket two criteria merit particular emphasis in addition to the obvious agricultural criteria. Firstly, in a new programme such as this it is important to prioritise interventions that produce “rapid, recognisable success” which build confidence and motivation. So in developing the basket of choice vegetable production should get higher priority than soil conservation which takes years to generate significant, tangible benefits.

Secondly there is the question of target groups. Where agricultural and agroforestry interventions are expected to have a positive impact on forest conservation the project must prioritise interventions that are most relevant to the individuals and households that have been identified as priority target group(s) from a forest conservation perspective, and extension approaches that are most likely to reach these target groups.

Although the use of para-professionals and promotion of farmer experimentation are not yet standard practice in Tanzania many organisations are currently engaged in evaluating these approaches, including UMADEP.

## 2 Diagnostic Study Methodology

The diagnostic study was carried out over a five week period in November and early December 2004. The methodology for the detailed assessments in three villages was based on that developed by the African Highlands initiative for similar studies in the West Usambara mountains, and is described in detail in Mansoor et al (2004) – see footnote 5. The following table gives a summary of tools used.

Table 1: Summary of Tools used in the Diagnostic Study

DAY 1	<ul style="list-style-type: none"> <li>- community meeting to introduce the study and then parallel sessions on:</li> <li>- wealth ranking</li> <li>- resource mapping</li> <li>- transect walk</li> <li>- organisational analysis</li> </ul>
DAY 2	<ul style="list-style-type: none"> <li>- focus group discussions on cropping systems, agricultural production constraints, coping strategies, and soil nutrient flows using a range of PRA tools (with 4 groups working in parallel: wealthier men, poorer men, wealthier women, poorer women)</li> </ul>
DAY 3	<ul style="list-style-type: none"> <li>- community meeting to discuss markets, new technologies, forest resource use, land tenure, characteristics of sustainable NRM and related constraints</li> </ul>
DAY 4 (1/2 day)	<ul style="list-style-type: none"> <li>- presentation of findings by community members to the community as a whole</li> <li>- discussion of findings</li> </ul>

A check list of key issues was developed prior to the start of fieldwork which helped guide the design of the assessment and the subsequent analysis of findings (see annex 1).

The study was conducted by a team comprising nine members (not all present at every location):



Table 2: Members of the Field/ Diagnostic Team

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Badi Juma	Extension Officer	UMADEP, Morogoro
Joseph Mayengela	Agricultural Officer	Morogoro Municipal
Abbas Rehani	Extension Officer	Morogoro Municipal

### **3 Summary of Findings of the Diagnostic Survey**

Table 3 summarises some key findings of the diagnostic study presented under categories defined in the checklist (Annex 1). Details are provided in the full report of the study by Mansoor et al (2004).

### **4 Interventions Identified from the Diagnostic Survey**

The following sections identify agricultural and agroforestry interventions identified directly from the diagnostic survey and the subsequent analysis of survey results at a meeting of the researchers held in Morogoro in December 2004 (which defined the categories under which interventions are grouped).

#### **4.1 Lanzi Village**

##### **On-farm tree planting**

The lack of trees around Lanzi is striking. Shortage of fuelwood seems worse than in any of the other villages studied - hence a strong case for tree-planting for fuelwood for almost all types of household. The best strategy might be to start with people having plenty of land, encouraging them to establish private plantations, especially on steeper slopes. As this might help improve water catchment there might be possibilities for financing through payments for environmental services. To specifically address the needs of poorer households there should also be an emphasis on agroforestry species that can grow around houses, and with crops (also improving soil fertility). Over the longer term the project should investigate underlying tenure issues to explore whether existing customary practice could be modified to facilitate investment in the land by farmers using land under the Ngoto system.

##### **Land Husbandry**

Terracing such as seen in Mgeta will not work in Lanzi where economic returns will not justify the effort (less high value crops, very hard sub-soils) - so should not be promoted. That said there is a serious need for measures to reduce erosion on steeper slopes and enhance soil fertility. For erosion control natural barriers such as lines of grass and pineapples are suggested. For soil fertility management the most important interventions are to reduce/eliminate burning of crop residues and weeds, and composting of crop residues and weeds with manure, targeting fields nearer the house where higher value crops may be grown, i.e. where there is maximum return to labour. Increased use of inorganic fertiliser is needed but bearing in mind that this is mainly appropriate for wealthier households project intervention should be limited to simply advising on better use of fertiliser.

Table 3: Key findings of the Diagnostic Study

	<b>Lanzi</b>	<b>Lugeni</b>	<b>Vinile</b>
<b>General</b>	<ul style="list-style-type: none"> <li>• In a steeply sided valley with forest on the hill-tops on both sides. Key water catchment.</li> <li>• Village was established in 1975. Road access to the village.</li> <li>• 272 households with 30.5% female headed. Principally a matrilineal system.</li> </ul>	<ul style="list-style-type: none"> <li>• In a highly dissected portion of the Uluguru mountains with slopes exceeding 60o in places.</li> <li>• Small patches of natural forest remain outside the catchment reserve.</li> <li>• No road access. Problems with access during rains due to large river that must be crossed.</li> <li>• 217 households with 14.3% female headed. Principally a matrilineal system.</li> </ul>	<ul style="list-style-type: none"> <li>• A traditional village bordering Uluguru South Catchment Reserve on the south and east sides.</li> <li>• Easier access to the forest than in Lanzi and Lugeni (shorter and less steep slopes).</li> <li>• Road access to Langali and Mgeta markets, but impassable at times during the rain season.</li> <li>• 190 households with 14.3% female headed. Principally a matrilineal system.</li> </ul>
<b>Poverty Status</b>	<ul style="list-style-type: none"> <li>• Wealth ranking based on land holding and whether people pay or receive “ngoto” (small gifts as payment for borrowing a piece of land)</li> <li>• 61.4% in low resource (poorest) category, 29.3% medium resource, 9.3% high resource</li> </ul>	<ul style="list-style-type: none"> <li>• Wealth ranking based on land holding, materials used to construct the home, livestock ownership and range of agricultural crops grown.</li> <li>• 75% in low resource (poorest) category, 11% medium resource, 14% high resource</li> <li>• In terms of food security there is more dependence on purchase of staple food items from outside the village than in Lanzi (i.e. less self-provisioning).</li> </ul>	<ul style="list-style-type: none"> <li>• Wealth ranking based on land holding, materials used to construct the home, livestock ownership and whether the household has any off-farm business/enterprise.</li> <li>• 61% in low resource (poorest) category, 39% in medium and high resource categories.</li> <li>• Food security: Vinile is more like Lanzi than Lugeni in supplying more of its food.</li> </ul>
<b>Forest Benefits and Costs</b>	<ul style="list-style-type: none"> <li>• Benefits: hunting, honey, medicinal plants, water, fuelwood, poles. All illegal as there is no-one to ask for permission.</li> <li>• Forest resource use is largely by poorer households for domestic use which implies that they must be considered the priority target group.</li> <li>• Costs: animals destroying crops and killing livestock. Many households are affected.</li> </ul>	<ul style="list-style-type: none"> <li>• Benefits: hunting, honey, medicinal plants, water, fuelwood, poles for building, increased local rainfall, reduced soil erosion. Hunting and poles considered illegal.</li> <li>• Forest resource use is largely by younger people who are fit enough and energetic enough to climb steep slopes to the forest – i.e. this is a priority target group. Products mostly sold for income. The few forest adjacent households harvest forest products for domestic use.</li> </ul>	<ul style="list-style-type: none"> <li>• Benefits: hunting, honey, medicinal plants, water, fuelwood, poles for building, increased local rainfall, tourism (nearby waterfalls).</li> <li>• Collection of dead wood is allowed by the local catchment officer but other resource harvesting is considered to be illegal.</li> <li>• As in Lanzi forest resource use is largely by poorer households for domestic use, i.e. this is the priority target group (to be confirmed)</li> <li>• Costs: animals destroying crops.</li> </ul>

	<b>Lanzi</b>	<b>Lugeni</b>	<b>Vinile</b>
		<ul style="list-style-type: none"> <li>Costs: monkeys destroying crops and unknown animal killing livestock (which has resulted in people bringing goats to the household rather than leaving them tethered in the forest).</li> </ul>	<ul style="list-style-type: none"> <li>Widespread recognition of signs of forest degradation – increased time to collect resources, declining water levels in rivers, disappearance of some species of wild animals and plants.</li> </ul>
<b>Land Tenure</b>	<ul style="list-style-type: none"> <li>Most land is controlled by three clans. No village government land.</li> <li>All households have some land around their house (allocated in 1974)</li> <li>Up to 40% of households (ie most of poorer households) borrow land under ngoto system.</li> </ul>	<ul style="list-style-type: none"> <li>Land shortage perceived to be a major problem (more than Lanzi and Vinile).</li> <li>Land fragmentation– commonly people own 3-10 small plots (Lugeni is an old village)</li> <li>Land is under customary ownership, mainly matrilineal. No village government land.</li> <li>“nobody is landless” as they all have small pieces, (but some in-migrants are apparently landless)</li> <li>Households with little land rent land for 3000 Tsh/acre or borrow under ngoto system.</li> </ul>	<ul style="list-style-type: none"> <li>More availability of land than in Lanzi and Lugeni although land scarcity is still considered to be a serious problem – partly because serious soil degradation.</li> <li>Land is under customary ownership, dominated by the matrilineal system. Most land under the control of a few powerful clans with other clans having almost no land.</li> <li>Households with little land rent land, or borrow under ngoto system</li> <li>Purchase of land is more common than in Lanzi and Lugeni.</li> </ul>
<b>Fuelwood</b>	<ul style="list-style-type: none"> <li>Mostly from the forest. Takes 2 hours walking each way, mostly by men who sell it</li> <li>Very few trees outside the forest.</li> <li>Women collect crop residues for fuel which implies significant shortage.</li> <li>No improved cooking stoves</li> </ul>	<ul style="list-style-type: none"> <li>Relatively large numbers of trees on farm so most fuelwood is collected locally.</li> <li>Crop residues rarely used which implies less shortage than in Lanzi.</li> <li>No improved cooking stoves</li> </ul>	<ul style="list-style-type: none"> <li>Since households are allowed to collect dead fuelwood from the forest there is no great concern over fuelwood shortages.</li> <li>No improved cooking stoves</li> </ul>
<b>Agricultural Production</b>	<ul style="list-style-type: none"> <li>For low resource (poorest) households: <ul style="list-style-type: none"> <li>Cash crops (men): banana, beans, sorghum (in order of importance)</li> <li>Cash crops (women): cassava, bananas, sorghum (in order of importance)</li> <li>Food crops (men): cassava, maize, pigeon pea (in order of importance)</li> <li>Food crops (women): cassava, maize, cocoyams (in order of importance)</li> </ul> </li> <li>Principle market in Mtamba (on the main</li> </ul>	<ul style="list-style-type: none"> <li>A wide range of cash crops, notably spices-cardamom, cloves, black pepper, cinnamon</li> <li>For low resource (poorest) households: <ul style="list-style-type: none"> <li>Cash crops (men): banana, cloves, cocoyam (in order of importance)</li> <li>Cash crops (women): banana, cocoyam, tomatoes (in order of importance)</li> <li>Food crops (men): cassava, maize, rice (in order of importance)</li> <li>Food crops (women): cassava, maize, rice</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>For low resource (poorest) households: <ul style="list-style-type: none"> <li>Cash crops (men): peas, beans, banana,</li> <li>Cash crops (women): beans, yams, banana (in order of importance)</li> <li>Food crops (men and women): maize, beans, banana (in order of importance)</li> </ul> </li> <li>Markets in Langali and Bunduki are relatively accessible</li> <li>Livestock: chicken, goat, pigs (in order of importance)</li> </ul>

	<b>Lanzi</b>	<b>Lugeni</b>	<b>Vinile</b>
	<p>road about 12km away)</p> <ul style="list-style-type: none"> <li>• Livestock: chicken, goat, pigs (in order)</li> <li>• Major constraints to production: soil degradation, lack of market, lack of extension service</li> </ul>	<ul style="list-style-type: none"> <li>• Markets in Mtombozi and Mtamba are relatively near but often inaccessible due to a river crossing that is often impassable</li> <li>• Livestock: chicken, goat, pigs (in order)</li> <li>• Major constraints to production: lack of extension service, weeds (especially striga and ferns), poor soils, pests and diseases</li> </ul>	<ul style="list-style-type: none"> <li>• Major constraints to production: lack of extension service, poor soils, limited capital</li> <li>• More evidence of agricultural innovation, e.g. tomato and irish potato production, improved pig production, improved banana varieties, use of inorganic fertiliser..</li> </ul>
<b>Tree-planting</b>	<ul style="list-style-type: none"> <li>• Tree planting constrained by small size of land around households and the fact that you can't plant trees on borrowed land (which thus particularly constrains poorer households)</li> <li>• Most popular trees: black wattle, jack fruit, eucalyptus (in order of importance)</li> </ul>	<ul style="list-style-type: none"> <li>• Tree planting constrained by small size of land around households and reluctance to plant trees on borrowed land (which thus particularly constrains poorer households)</li> <li>• Shortage of seedlings of Khaya anotheca also identified as a constraint</li> <li>• Nonetheless many more trees than in Lanzi, partly because of the importance of trees for production of black pepper, and nearby markets for fruit.</li> <li>• Most popular trees: Senna spectabilis, jack fruit, mango (in order of importance)</li> </ul>	<ul style="list-style-type: none"> <li>• Very little tree planting (like Lanzi)</li> <li>• Tree planting constrained by small size of land around households and the fact that you can't plant trees on borrowed land (which thus particularly constrains poorer households)</li> <li>• Shortage of seedlings also identified as a constraint</li> <li>• Popular trees: black wattle, grevillea, peaches, guava, Senna siamea (in order of importance)</li> </ul>
<b>Land quality</b>	<ul style="list-style-type: none"> <li>• Soil degradation is a serious issue on all lands but particularly on steep slopes (20% of all land) which are now severely eroded. Some cultivated land is as steep as 60°.</li> <li>• Fallow cycles generally too short for nutrient recovery.</li> <li>• Soil fertility management by fallowing, intercropping and rotation. No use of manure.</li> <li>• Burning of weeds and crop residues (to reduce pests) is a major source of nutrient loss</li> </ul>	<ul style="list-style-type: none"> <li>• Soil degradation is a serious issue on all lands but particularly on steep slopes (20% of all land) which are now severely eroded. Some cultivated land is as steep as 60°.</li> <li>• Fallow cycles generally too short for nutrient recovery, and many farmers unable to fallow land due to land shortage.</li> <li>• Soil fertility management by fallowing, intercropping and rotation.</li> <li>• Some use of manure but most nutrients lost due to poor technique.</li> <li>• Burning of weeds and crop residues (to reduce pests) is a major source of nutrient loss</li> </ul>	<ul style="list-style-type: none"> <li>• Soil degradation is a serious issue on all lands, and in general land seems more degraded than in Lanzi (since farmed for longer). c 20% of land is "abandoned".</li> <li>• Fallow cycles generally too short for nutrient recovery.</li> <li>• Soil fertility management by fallowing, intercropping and rotation.</li> <li>• Very little use of manure and most nutrients lost due to poor technique.</li> <li>• Significant usage of imported fertiliser (largely inorganic but also chicken manure?)</li> <li>• Burning of weeds/crop residues (to reduce pests) is a major source of nutrient loss</li> </ul>

### **Crop Husbandry**

There is great potential for use of natural products (botanicals) for pest and disease control, learning from experience of work in the Usambara Mountains and northern Ulugurus. Supplying improved planting materials for evaluation by farmers is also important as it seems farmers in Lanzi have had very little access to such materials. Prioritise bananas, cassava, maize and beans.

### **Home-gardening**

Very important for poorer households and women, and thus a top priority. Key elements of a home-gardening should be improved banana production, fruit trees, composting and vegetable growing.

### **Livestock**

Since chicken is the most important form of livestock for poorer households the priority should be improved chicken production emphasising control of Newcastles disease and diseases of chicks. Second priority would be improved goat and pig production emphasising use of botanicals. Fish-farming should not be considered because of the threat to natural fish stocks.

### **Energy-saving Stoves**

Could be introduced on an experimental basis with a range of different types offered for evaluation, but bear in mind the need for space heating as Lanzi is cold.

## **4.2 Lugen Village**

### **On-farm tree planting**

As there is relatively little fuelwood shortage in Lugen the strategy should be different from Lanzi. Here the emphasis should be on two interventions: a) encouraging the existing practice of planting agroforestry trees on farm, and b) woodlots on steep slopes for those having ample land (as much for water catchment and soil conservation as fuelwood supply). However attention needs to be given to the risk that such woodlots could remove valuable ngoto land from the farming cycle on which poorer households depend.

### **Land Husbandry**

Bench terracing was promoted in the colonial era and rejected. As in Lanzi it remains the case that bench terracing is not appropriate since economic returns will not justify the effort (within the timeframe that is of interest to farmers), and so should not be promoted. However soil degradation through accelerated erosion on steep slopes and the more generalised problem of nutrient mining is a major constraint to agricultural production that must be addressed. Biological barriers such as lines of grass and pineapples appear to be the most appropriate soil conservation measures. For improved soil fertility management the emphasis should be on reducing burning of crop residues and weeds, composting of weeds and residues for fields nearer the house where higher value crops may be grown (i.e. where there is maximum return to labour), and use of the indigenous plant vernonia which provides substantial quantities of nitrogen.

### **Crop Husbandry**

As in Lanzi there is great potential for use of natural products (botanicals) for pest and disease control. Supplying improved planting materials for evaluation by farmers is also important with the emphasis on bananas, cassava, and maize (same as Lanzi). There is apparently substantial market potential to increase production of spices (although this should be verified). Assuming this to be the case, extension efforts should aim to engage poorer households, and particularly the youths of these households, in on-farm spice production, notably cardamom, black pepper and cloves. Specific measures may be needed to ensure that interest in cardamom production does not extend to cultivation of cardamom in the forest (a serious threat to forest conservation in other areas of the Eastern Arc)

### **Home-gardening**

Very important for poorer households and women, and thus a top priority. Key elements of a home-gardening should be improved banana production, fruit trees, composting and vegetable growing (as in Lanzi) plus support for palm oil production (which is already fairly common in neighbouring areas around Uluguru North Forest Reserve).

### **Livestock**

Since chicken is the most important form of livestock for poorer households the priority should be improved chicken production emphasising control of Newcastle's disease and diseases of chicks. Second priority would be improved goat and pig production including use of natural products for pest and disease control. Fish-farming should not be considered because of threats to natural fish stocks.

### **Energy-saving Stoves**

Probably less potential than in Lanzi due to greater availability of fuelwood, although other benefits are also important (such as reduced smoke).. So it might be best to focus on Lanzi where there appears to be the greatest chance of success, and then extend to Lugeni at a later stage.

### **General**

The lack of a bridge across the river is a major constraint to all forms of cash crop production, and this is considered a top development priority. UMEMCP does not have the resources to address this problem itself (and to try to find the resources from within the project budget would set an unsustainable precedent), but the project could assist the community to find the necessary resources – ideally from a source of funds that is seen to be linked to the forest (e.g. the Eastern Arc Trust Fund) – but this “linkage” function must be handled with care to avoid raising expectations and then getting blamed for the failure of other actors to deliver.

## **4.3 Vinile Village**

### **On-farm tree planting**

As with Lanzi, the lack of trees outside the forest reserves is striking. However with supplies of fuelwood available from the forest the perceived need for tree-planting for fuelwood is lower than in the other villages. That said, it is likely that off-take from the forest is currently unsustainable and so there is still a need for on-farm tree-planting for fuelwood. To address the needs of poorer households there should be an emphasis on agroforestry species that can grow with crops and around houses. As in Lanzi the project might, over the longer term, start to look at measures to promote longer term tenure over ngoto and rented lands that would allow for agroforestry and/or woodlots on these lands, but this is clearly a not an issue to start with.

### **Land Husbandry**

Unlike Lanzi and Lugeni, Vinile is an area where physical terracing might work since this is practiced in nearby villages which have similar conditions of soil, and agricultural production and marketing. However farmer interest should be verified through farmer cross visits. Natural soil barriers could also be promoted, but using vetiver grass rather than pineapples which would not grow well at the altitude of Vinile. For improving soil fertility the emphasis should be on reducing burning of crop residues and weeds, composting of weeds and residues for fields nearer the house where higher value crops may be grown, use of manure, and use of the indigenous plant vernonia which provides substantial quantities of nitrogen. Since use of inorganic fertiliser is fairly common the programme in Vinile should also provide technical advice on how to get the best results with these inputs.

### **Crop Husbandry**

As in the other villages there is great potential for use of natural products for pest and disease control. Supplying improved planting materials for evaluation by farmers is also important with an emphasis on tomatoes and potatoes (first priority), and bananas, beans, peas and maize (second priority).

### **Home-gardening**

Very important for poorer households and women, and thus a top priority. Key elements of a home-gardening should be fruit trees (apples, plums and peaches), composting and vegetable growing.

### **Livestock**

Since chicken is the most important form of livestock for poorer households the priority should be improved chicken production emphasising control of Newcastle disease and diseases of chicks. Second priority would be improved goat and pig production emphasising use of botanicals. Fish-farming should not be considered because of the threat to natural fish stocks.

### **Energy-saving Stoves**

Probably less potential than in Lanzi due to greater availability of fuelwood and colder climate but small scale piloting may be worthwhile as other benefits are also important (such as reduced smoke).

## **5 Agriculture and Agroforestry Strategy for UMEMCP**

### **5.1 Justification**

Analysis of historical trends in all three villages revealed a very clear recognition amongst all social groups of environmental degradation both within the catchment forest itself and the surrounding agricultural lands. Whilst we should be wary of making predictions of environmental disaster (so common in the past and now proven to be exaggerated) it is clear that agriculture on slopes of 45° with relatively fragile soils is not ecologically sustainable, and that the continued degradation of these lands will result in increasing pressure on the natural forest. Also it is clear that a substantial proportion of households are significantly dependent on access to fuelwood and other forest resources and that existing rates of off-take are unlikely to be ecologically sustainable.

In terms of conservation objectives the following issues are of particular concern:

- reduction in habitat quality
- reduction in populations of key animal and plants species (particularly the endemics)
- loss of forest area due to encroachment (conversion for farming)

At this point in time there is no systematic assessment of the level of legal and illegal use of forest resources and potential impact of biodiversity conservation. The assessment therefore remains subjective based on the initial reconnaissance of forest adjacent villages conducted in 2004 and observations of signs of resource use made during ecological studies within the forest.

Experience from other ICD projects indicates that it is not adequate to justify agriculture/agroforestry interventions simply on aggregate level assessments that identify a general problem of environmental degradation around the protected area and unsustainable use of protected area resources. The justification should be made village by village based on an in-depth understanding of forest resource use, the significance of such resource use to livelihood security, land use and the potential of agricultural and agroforestry interventions to provide substitutes for materials and income derived from use of forest resources *to the appropriate target group*.

The in-depth diagnostic survey was targeted on three villages (Lanzi, Lugeni, Vinile) that appeared likely to justify investment of UMEMCP resources in agriculture and agroforestry according to the following three criteria:

- Level of pressure on forest resources (that might be alleviated by agriculture interventions)
- Degree of support already received from other initiatives (e.g. from UMADEP)
- Potential cost effectiveness of agricultural extension services, i.e. where we might get the biggest “bang for the buck” (less in the southern villages which are inaccessible by road).

The case for working in the Vinile village is reinforced by a very specific conservation objective – the need to reconnect the northern and southern blocks of the Uluguru Forest Reserve with a corridor of natural forest. Exactly how this will be achieved is still under discussion but it is clear that agriculture and agroforestry interventions have a crucial role to play both in supporting intensification of land use as land is removed from agricultural use, and as a valuable confidence building measure.

Analysis of the results of the diagnostic survey confirms that investment by UMEMCP in agriculture and agroforestry in the three selected villages is both necessary and appropriate, and it seems probable that a similar case can be made for a number of other (but not all) villages surrounding Uluguru South Forest Reserve. A quick assessment conducted in two neighbouring villages (Bunduki, Nyingwe) suggested work in these two villages is similarly justified (but see comments in the next section). Further studies are needed to confirm this and define other priority villages given that project resources are only sufficient to cover a maximum of 10 villages.

The agriculture and agroforestry component of UMEMCP is designed to support forest conservation by providing alternative/substitute sources of materials and/or income. Additionally this component (along with the micro-enterprise component) is expected to deliver conservation impact through increasing public support for conservation on the Uluguru South Forest Reserve through appreciation of the fact that the extension services are provided by this project because of national and global conservation interests (the goodwill pathway). It is not possible to predict whether substitution or goodwill pathways will prove more effective in delivering conservation impact, but this may be determined over time by effective monitoring and evaluation (see section 5.5).

Assuming that increased effectiveness of management of the forest reserve leads to restrictions on use of certain resources, the agriculture and agroforestry component can also be seen as having a crucial role to play in mitigating negative social impacts of conservation strategies (together with the micro-enterprise component). Without these supporting livelihood interventions there is a very real possibility that more effective conservation of the Uluguru forests could actually exacerbate poverty within forest-adjacent communities. Hence there is a moral as well as practical dimension to the justification for investing in agriculture and agroforestry interventions. Indeed it can be argued that mitigation of negative social impacts of enhanced conservation is an obligation of government and international community, and hence this project, whether or not this activity actually delivers conservation impact. Rarely considered in the past, this perspective on the justification for supporting livelihood interventions within natural resource management projects is getting increasing attention with the growing concern over issues of rights, and growing interest in rights-based approaches.

## 5.2 Target Areas

Taking into account the criteria discussed in the previous section and financial resources available, the agriculture and agroforestry component will initially target three clusters of villages:

**Kibungo cluster:** Lanzi, Nyingwe (and possibly Dimilo Lukenge)

**Kisemu/Mtombozi cluster:** Lugeni, Mlono (and possibly Konde, Ng’weme, Lusange)

**Bunduki cluster:** Vinile, Bunduki (and possibly Kibigili)

Within these three clusters the project will initially target the three villages that were the subject of the in-depth assessment - Lanzi, Lugeni and Vinile.

It is assumed that the same interventions and extension approach could be applied to adjacent villages in the cluster without needing to repeat the in depth four-day assessment exercise, and the quick one-day assessments in Bunduki and Nyingwe validated this assumption for these two villages (a quick assessment was planned for Mlono but prevented by heavy rains). After a year of operation in Lanzi, Lugeni and Vinile the strategy is therefore to extend the programme to Bunduki and Nyingwe, and to Mlono, assuming that a quick assessment in Mlono confirms the clustering with Lugeni.



Some uncertainty remains over the strategy for the Bunduki cluster since some errors in the available maps of village boundaries were discovered during the analysis of the diagnostic survey. At this point it remains unclear whether Vinile and Bunduki villages are the priority villages in terms of the proposed reforestation programme to reconnect the southern and northern forest blocks.

In the second year (2006) whilst the programme is being extended to villages neighbouring Lanzi, Lugeni and Vinile the project will conduct in-depth assessments in a further 3-4 villages with a view to adding these villages in the third year (2007). These should be villages that are adjacent to the 6 villages already targeted to ensure a critical mass of effort around the northern and eastern sides of the forest reserve (as opposed to a scatter of villages around the whole reserve). Assuming a maximum of 10 villages the project will eventually be working in approximately one third of the total number of forest adjacent villages.

### **5.3 Target groups**

For an integrated conservation and development project that seeks to deliver conservation impact as well as benefits for local communities the question of who you work with (target groups) is as important as what you do (interventions). The diagnostic survey confirms the view that the people responsible for forms of forest resource utilisation that have a negative impact on conservation are more likely to be from relatively poorer households. In Lugeni young people from poorer households were particularly highlighted as a key target group. Furthermore it seems highly probable that it is the poorer households that are more dependent on the forms of forest resource use that are likely to be restricted, thus negatively affected by improved conservation. These assumptions seem to match with experience from comparable situations elsewhere in East Africa but nonetheless need verification.

The diagnostic survey focused particularly on how forest resource, land use and farming system depends on wealth/poverty status at the household level. Efforts were made to seek the separate views of men and women but with the time and tools available it was not possible to fully explore the gender dimension of forest resource use, and thus the need for targeting within households. Further work is needed to address this issue and identify the situations where it is important to specifically target women, but not necessarily through further formal studies as this type of information can also be collected through on-going dialogue with project staff.

The targeting of specific groups is achieved by a combination of the choice of intervention (see next section) and extension approach (see section 5.5)

### **5.4 Interventions**

Targeting by choice of intervention means prioritising interventions that are preferred by the primary target group. In the case of poorer households these will be interventions that are lower risk, require less capital investment, are less dependent on land quality and deliver a higher return per unit area of land (as availability of land is more likely to be the primary constraint to production). In the case of women additional considerations will be social norms relating to decision-making control over resources, labour availability versus other household tasks. These considerations have been key in developing the list of interventions (see table 4 on the next page).

It is proposed that the project offers support for around 10 interventions per village in the first year of work in a particular village, increasing over time to a maximum of 20 interventions. The limit on the number of interventions reflects the view that greater conservation impact will be achieved from offering fewer interventions carefully selected as of most relevance to the target groups, than from providing a more comprehensive extension service to fewer people. That said it is important to emphasise that each “interventions” will involve a number of options. So, for example, agroforestry trees in farmland will comprise evaluation of several promising species. Likewise improved maize production will involve evaluation of a several improved varieties and associated agronomic practices.

Table 4: Proposed Agriculture and Agroforestry Interventions for UMEMCP

Intervention	Timeframe for success	Cluster		
		Lanzi	Lugenyi	Vinile
<b><i>Tree Planting</i></b>				
• Agroforestry trees in farmland	> 3 years	✓	✓	✓
• Private woodlots on steep degraded land	> 3 years	✓	✓	✓
• Tree nurseries – institutional	< 1 year	✓	✓	✓
• Tree nurseries – private	< 1 year	✓	✓	✓
<b><i>Land Husbandry</i></b>				
• Soil conservation by natural barriers	1-3 years	✓	✓	✓
• Soil conservation by building terraces	> 3 years			✓
• Improvement of existing nutrient mgt.	< 1 year	✓	✓	✓
• Composting – production/utilisation	< 1 year	✓	✓	✓
• Use of Vernonia as a natural fertiliser	< 1 year		✓	
<b><i>Crop Husbandry</i></b>				
• Pest and disease control by botanicals	< 1 year	✓	✓	✓
• Improved planting materials/crop mgt.	< 1 year			
- Banana		✓	✓	✓
- Cassava		✓	✓	
- Maize		✓	✓	✓
- Beans		✓		✓
- Spices: cardamom, peppers, cloves			✓	
- Vegetables: tomatoes, cabbages				✓
- Irish potatoes				✓
<b><i>Home Gardening</i></b>				
• Fruit trees	> 3 years	✓	✓	✓
• Composting – production/utilisation	< 1 year	✓	✓	✓
• Vegetables - planting material and mgt	< 1 year	✓	✓	✓
• Banana – planting material and mgt	< 1 year	✓	✓	✓
<b><i>Livestock Husbandry</i></b>				
• Chickens	< 1 year	✓	✓	✓
• Goats	< 1 year	✓	✓	✓
• Pigs	< 1 year			
<b><i>Other</i></b>				
• Improved cooking stoves	< 1 year	✓		

The table of interventions above also provides an estimate of the timeframe within which “rapid recognisable success” may be expected. This is a key criteria in defining interventions for the first year of work in a new village, i.e. prioritising interventions that have the highest probability of delivering tangible results within the first year.

This strategy paper focuses on agriculture and agroforestry production and the related issue of sustainable land use. It is important to note that capital and/or marketing constraints, which may be addressed by the small enterprise and marketing component of the project, will also be key issues in a number of situations. Many ICD projects have experienced failure in introducing new production activities with little or no consideration of marketing and capital constraints. This is not a major risk in this case since this strategy focuses on well-known agricultural and agroforestry products for which there are already existing markets in the area. Nonetheless, real opportunities may exist to further increase the production and income-generating potential of these products by addressing marketing and capital constraints and therefore it is important that the small enterprise and marketing, and agriculture and agroforestry components of the project operate in a complementary manner.

## **5.5 Extension Approach**

The project will use the group extension approach where the front line extensionist works with groups of farmers who have an interest in a specific intervention or groups of interventions. Typically one full time extensionist can work with 600-1000 farmers using this approach, depending on ease of access to the communities and households within communities. Assuming an average village size of 250 households this implies that one full-time extensionist should be able to work with at least 3 villages. Assuming the programme starts in Lanzi, Lugeni and Vinile the project will require the services of three extensionists, initially on a part time basis (each of whom will need a motorcycle). In 2006 each of these extensionists would then add a second village, and then a third village in 2007.

The District Agriculture Department has indicated that they will provide the necessary front line extension staff, as well as providing technical support (from Subject Matter Specialists)<sup>7</sup>. The District will also have an important role to play, alongside project staff, in monitoring, and the effectiveness of the different agricultural and agroforestry interventions and overall impact of the programme against both conservation and development objectives (as both a partner in UMEMCP as the representative of the central government of Tanzania that is funding this project).

The role of CARE is that of coordination and quality control. This quality control function is rather different from that of the district in that it takes more of a project management perspective: financial accountability and cost effectiveness, and the achievement of the goals and outputs specified in the project's logical framework (as assessed by the M&E indicators). Clearly this means that CARE must also take a keen interest in the performance of the agriculture and agroforestry strategy. To perform this role effectively CARE would benefit from continued input from relevant centres of excellence in the region, notably the centres involved in the African Highlands Initiative that have supported the design and implementation of the diagnostic survey.

Once the basic extension system is in place the project will evaluate the possibility of engaging members of the community as para-professionals who might over time take over the role of front-line extensionist from local NGOs. The first stage in this process will be to look at the experience of other programmes in Tanzania that are applying this approach. If the project decides to proceed with this approach the selection of para-professionals should take place no earlier than year three of the programme (2007), allowing time for the project to establish a good relationship with the community and for the community to properly understand the nature of the project.

The extension approach of the project should be based on a process of farmer experimentation that places farmers at the centre of the agricultural development process. For all interventions, no matter how simple and sure of success, farmers should be encouraged to make their own evaluation with the extensionist in the role of facilitator rather than technology promoter. That said a distinction needs to be made between interventions that are highly likely to be successful and those where there is

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<sup>7</sup> This decision was made subsequent to the strategy development exercise which had recommended that a local NGO (in this case UMADEP) perform the role of front line extension/service provider in line with the broad trend in the region towards more demand-driven approaches to service delivery.

genuinely a higher degree of uncertainty (such as new varieties that have not yet been tested in the Ulugurus area) which should be reserved for more experienced groups who have already achieved some success and thus are likely to be more comfortable with a greater degree of uncertainty.

## 5.6 Project Identity

The effectiveness of the “goodwill” pathway to conservation impact depends crucially on the extension services provided by the project being seen by the receiving communities as a benefit of forest conservation. In practical terms this linkage can be established and maintained by:

- a project logo showing the forest on all vehicles and motorbikes
- constant reminders of the linkage at community meetings.
- Clear explanation of the linkage to village leaders.

## 5.7 Monitoring, Evaluation and Adaptive Management

Monitoring and evaluation will focus on assessing progress against the immediate objective of the project and the specific output for the agriculture and agroforestry component:

- Improved forest management and conservation and improved land husbandry practices in the Uluguru Mountain forests and adjacent villages implemented by local communities, government authorities and other stakeholders.
- Capacity of local communities in sustainable land use management is enhanced

The project M&E framework defines the specific indicators that should be used to assess progress. Amongst these will be indicators to assess uptake of different interventions and indicators to assess increased capacity of local communities to implement the interventions being promoted.

Assessing uptake of improved agriculture, agroforestry and land husbandry practices is an issue of assessing adoption rates (the number of farmers/households who are practicing a specific intervention that has been introduced by the project). With the group extension approach adoption rates are often assessed by checking how many people within the groups have adopted the particular intervention. However it should be noted that this can substantially underestimate total adoption as this approach does not capture “diffusion” – that is farmers adopting by learning from each other. To get an accurate assessment of adoption it is better to do an adoption survey with a random sample of households. In any such survey it is important to determine the wealth/poverty status of the households surveyed in order to be able to check the targeting strategy.

The other critical element of M&E is assessment of the extent to which agriculture and agroforestry interventions have succeeded in supporting forest conservation. This can be assessed in two ways:

- By random survey: conducting a survey asking local people about attitudes, cooperation with forest authorities and incidence of illegal activities and, where there has been a change in any of these, asking what types of intervention have contributed. However it takes some years for these changes to be detectable so this type of assessment can only be done after c 10 years. As with adoption it is crucial to determine the wealth status and gender of the respondent.
- By specific studies to test critical assumptions: the link between agriculture/agroforestry interventions and conservation can be expressed as an assumption, e.g: *poor youths who are able to increase their income through vegetable production will be no longer hunt animals.* Case studies can be conducted in particular villages to test whether this assumption is valid.

Information gathered from these type of studies has a crucial role to play in informing decision making that enables project strategy to evolve over time. This process of adaptive management should be formalised through review and planning meetings conducted at least on an annual basis.

## 6 Annex 1: Checklist of key issues

1. Poverty status
  - Overall well-being/poverty (by wealth ranking)
  - Other: food security, female headed HH, Education, Health
2. Benefits from the forest
  - What are the perceived benefits from the forest
  - What products are harvested from the forest (“illegal” and legal)
  - To what extent are these products for home consumption versus sale for income
  - Social profile of people engaged in “illegal” activities
  - What are the perceived costs related to the forest (if any)
3. Fuelwood
  - Sources and distance/time to collect
  - Evidence of shortages (eg using crop residues, fewer cooked meals)
  - Adoption of any type of energy saving technologies
4. Land tenure
  - ownership
  - extent of renting/borrowing
  - degree of landlessness and what constitutes landlessness
5. Agricultural production and marketing
  - principle cash crops (and where markets are)
  - principle subsistence crops
  - livestock ownership
  - allocation of farming roles/responsibilities by gender
  - emerging market opportunities
  - Perceived constraints to agricultural production
6. Tree planting
  - What types of trees have been planted, by whom and for what purpose
  - Rights over different types of tree (especially by gender)
  - Perceived constraints to tree planting
7. Land access and quality
  - availability of land suitable for farming
  - amount of land classified as abandoned (i.e. permanently out of the farming cycle)
  - size of farms and location of plots/degree of fragmentation of land holdings
  - soil type and quality
8. Soil fertility management
  - Fallowing rotation
  - Other practices to enhance soil fertility
9. Evidence of agricultural/agroforestry innovation
  - What innovations have taken place in recent years and from where did they come
  - NGOs and/or government extension services in the area