

**FIREWOOD, FOOD AND MEDICINE: INTERACTIONS BETWEEN FORESTS, VULNERABILITY AND RURAL RESPONSES TO HIV/AIDS**

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Forests and trees outside of forests are integral components of agriculture systems and rural livelihoods. They contribute directly to the food and nutritional security of rural households as sources of food, and indirectly by providing firewood for cooking, income generating activities, and farm inputs (e.g., fertilizer, animal fodder and building materials). Trees increase the resilience of farming systems, and forests and woodlands traditionally serve as safety-nets during agricultural shortfalls. Recognizing that households typically engage in both farm and off-farm livelihoods, and that the impacts of HIV/AIDS are systemic – impacts on one livelihood strategy are bound to affect other livelihood strategies, FAO's Forestry Department, in consultation with national forest departments and forest extension service providers, is developing a series of strategies for multisectoral HIV/AIDS programming. To guide this process, a study was recently commissioned by the FAO to determine the interactions between the epidemic and woodland resources in southern Africa. Exploratory case study research was conducted in six communities in Malawi and Mozambique using qualitative and quantitative data collected from key informants, focus groups, households and traditional healers. The study revealed numerous interactions ranging from the effects of forest policies and programmes on vulnerability to HIV infection, to the role of forests in the coping strategies of AIDS-affected households. Strategies and programmatic themes from which site-specific technical interventions can be designed and implemented have been identified, and the development of modalities to strengthen local institutions and incorporate HIV/AIDS programming in national forest policies and programmes are underway.

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## 1.0 Overview of FAO's HIV/AIDS and Forestry Programming

The miombo woodlands, floristically characterized by the genera *Brachystegia*, *Julbernardia*, and *Isoberlinia*, form the dominant natural woodland type in southern Africa extending from Tanzania and the Democratic Republic of Congo in the north, through Zambia, Malawi and eastern Angola, to Mozambique and Zimbabwe in the south. For most rural communities, the woodlands are a primary source of energy (i.e., firewood and charcoal), and a crucial source of essential subsistence and commercial goods. The HIV/AIDS pandemic is deeply entrenched in the countries making up the miombo ecoregion.

Over the last two years the Forestry Department (FO) of the Food and Agriculture Organization of the United Nations (FAO) has actively sought to develop policies and a strategic framework to support the role of forestry departments in reducing rural vulnerability to HIV infection and strengthening livelihood responses to AIDS. A series of policy briefs and extension materials have been produced for forest and agroforestry extension workers<sup>1</sup>. Consultation is being provided in the development of national forest programmes, agroforestry responses, and work is underway to incorporate HIV/AIDS vulnerability indicators and mapping into national forest assessments (Holding-Anyonge 2004; Villarreal, Holding-Anyonge et al. 2005). FO also recognizes those HIV/AIDS programmes that are already being implemented in the southern African region (e.g., workplace programmes of commercial forest sector). As one element in guiding this process, the Department conducted an exploratory study in southern Africa investigating the interactions between the impacts of HIV/AIDS, livelihoods, and forest resources. This paper summarizes the results of this study, the underlying conceptual framework for analysis of the interactions between HIV/AIDS and the forestry sector, and strategic themes for mobilizing the forest sector.

## 2.0 Approaching Forestry through the Lens of HIV/AIDS (Framework for understanding interactions between HIV/AIDS and Forestry)

The framework presented in Figure 2.1 is intended to guide analysis of the interface between HIV/AIDS, forest resources, and livelihoods for the identification of relevant forestry interventions and their integration within multisectoral efforts<sup>2</sup>.

The subcomponents of Phase 1 are relatively well understood (1a - factors associated with HIV vulnerability; and 1b - the impacts of HIV/AIDS). On the other hand, how these factors and impacts relate to forestry is poorly understood (2a, b, and c). Thus, Phase 2 was the entry point for this analysis – particularly component (2c) - exploring the interface between the impacts of HIV/AIDS, livelihoods and forest resources.

Within the interface between the impacts of HIV/AIDS, livelihoods and forest resources, the FO has identified a subset of four key relationships. These include:

1. Opportunistic infections, traditional medicine and woodland resources.
2. Socioeconomic impacts and natural resource-based livelihood and coping strategies.
3. Structural impacts and woodland resources (i.e., use, management, and governance).
4. Macro-economic impacts and forest products markets.

<sup>1</sup> Available at [www.fao.org/forestry/site/hiv-aids/en](http://www.fao.org/forestry/site/hiv-aids/en)

<sup>2</sup> The various components of this framework are open for discussion. Visit FAO's web-based discussion forum on HIV/AIDS and forestry: [www.fao.org/forestry/site/23667/en](http://www.fao.org/forestry/site/23667/en)

Given the mandate of the FAO, the field work conducted in southern Africa concentrated on those immediate relationships at the household level (1 and 2). The conceptual underpinnings of these relationships and questions guiding analysis are presented and discussed briefly in the following sections. Conceptual frameworks regarding the wider structural impacts related to (3) community management of woodlands, and (4) markets for forest products are available in the study's report (FAO 2005).

Figure 2.1: Framework for Interactions between HIV/AIDS and Forestry

1. Identify and understand...
  - a. Factors associated with vulnerability to HIV infection
  - b. Impacts of HIV/AIDS (individual, household, community, and national)
2. Assess...
  - a. Effects of current natural resources sector programming on factors associated with vulnerability to HIV infection
  - b. Impacts of HIV/AIDS on natural resources agencies
  - c. Relationships between the impacts of HIV/AIDS, livelihoods and natural resources (i.e., the role of natural resources in HIV/AIDS responses; the effect of these responses on natural resources)
3. Match and inform...
  - a. Natural resources agencies capacities to natural resource-based needs of affected individuals, households, and communities.
  - b. Current HIV/AIDS strategies outside the natural resources sector to natural resource-based needs of affected individuals, households, and communities (inter-sectoral coordination)
4. Develop, prioritize and coordinate feasible interventions for the prevention, treatment, and mitigation of HIV/AIDS. (Based on the priorities of national HIV/AIDS strategies)

## 2.1 Opportunistic infections, traditional medicine and woodland resources

The region's underdeveloped health infrastructure and pervasive poverty continue to pose problems for the unprecedented challenge of providing and administering antiretroviral therapy (ART) to those in the region in urgent need. In such resource-constrained settings, other options are necessary for the management of HIV/AIDS. Herbal remedies have been observed to improve the quality of life for people living with HIV/AIDS (PLWHA) and to slow the progression of disease<sup>3</sup> through treatment infections such as *candidiasis* (thrush); *herpes simplex* and *zoster* (shingles) and relief of appetite loss, nausea, fever, diarrhea, and cough<sup>4</sup>. The World Health Organization (WHO) has advocated the inclusion of traditional healers in national AIDS programs since 1991, and national Ministries of Health (MoH) are increasingly recruiting traditional healers in collaborative efforts to combat HIV/AIDS.

Throughout the developing world, where the large majority of PLWHA lack access to ART, traditional medicine is being institutionalized in the response to HIV/AIDS and the management of HIV/AIDS symptoms and opportunistic infections is, in significant part, a function of woodland resources. Herbal treatments typically include roots, barks, and leaves of plants<sup>5</sup>. Local responses involving traditional medicine in the management HIV/AIDS, and current institutional

<sup>3</sup> More research is needed on the efficacy of most herbal remedies and their interactions with ART. Recent research raises questions concerning the advisability of combining ART and herbal medicines, indicating that herbal medicines may impair the efficacy of ART treatment.

<sup>4</sup> Additional studies show that herbal remedies are often used in treatment of STDs including herpes – a disease which was recently recognized as a key factor in transmission of HIV in Africa.

<sup>5</sup> In some areas, mushrooms are heavily used. Honey and beeswax are commonly used in the application of traditional treatments.

efforts to scale up support for these responses, need to be accompanied by concerns for medicinal plant resources to avoid compromising the sustainability and long term feasible use of this resource. Thus, questions guiding FAO's analysis of HIV/AIDS, livelihoods, and forest resources included: Has there been a change in the availability of species used to treat opportunistic infections and symptoms associated with HIV/AIDS? What factors are contributing to this change (e.g., loss of habitat, unsustainable harvesting levels, and/or poor management practices, etc.)? What interventions do healers and communities identify as appropriate?

## **2.2 Socioeconomic impacts and natural resource-based livelihood and coping strategies**

Woodlands are important natural assets for rural households, providing both subsistence and market-oriented livelihood strategies. For example, in southeastern Zimbabwe, Campbell et al. (Campbell, Jeffrey et al. 2002) calculated that the average in-kind subsistence value of own collected woodland goods (i.e., fuelwood, construction materials, wild foods, and leaf litter) was nearly equal to 30% of average gross cash income per household per year. The expanding commercialization of many woodland products also provides rural households with a range of market-oriented woodland livelihood opportunities. Serra and Zolho (2003) for instance, estimate that charcoal suppliers to Beira, Mozambique earn on average US\$70-140 per month.

Providing a wide range of goods for consumption and sale throughout the year, rural households often turn to woodlands in response to contingencies. For example, 64% of respondents in a survey in Tanzania cited crop failure as a reason for hunting bushmeat (Loibooki, Hofer et al. 2002). In north central Tanzania, Brockington (2001) documented that women responded to the exclusion of their households from grazing lands by entering the medicinal plant trade. Collection of forest products have also been found to be a significant income smoothing response -that is to say that they are not only taken up following stress and shock, but prior to expected agricultural risks as a buffer (Pattanayak and Sills 2001).

Where HIV/AIDS-affected households experience impacts involving reductions in financial, physical, and natural assets leading to increased vulnerability and food insecurity it could be expected that such households not only alter their woodland activities but may increase reliance on woodland activities as a coping, and more consistent livelihood strategy. On the other hand, labor and knowledge are major inputs into woodland activities and the loss of these resources could have a negative effect on household engagement in woodland activities. These contrasting correlations, and the complexity of household dynamics influencing livelihood strategies, have led to conflicting views on the relevance of classical woodland-based livelihood and coping strategies in the context of HIV/AIDS.

In order for natural resource institutions to develop HIV/AIDS responses that are based on the natural resource-based needs and capacities of affected households, and to create an enabling environment for household adaptations to the long-term effects of HIV/AIDS, it is necessary to thoroughly explore and understand these relationships. Questions guiding this component of the analysis included: To what extent can prior engagement in woodland activities help buffer the initial impacts of HIV/AIDS? How does the loss of human capital affect the ability of households to meet forest-based subsistence needs? Do the traditional roles of forests and trees as coping strategies apply to the shock of HIV/AIDS? Does the erosion of household assets lead to increased dependence on remaining natural assets, such as forests, as a more consistent livelihood strategy? How does HIV/AIDS change the use of woodlands household coping strategies to future shock?

### 3.0 Methodology

Exploratory case study research was conducted using qualitative and quantitative data collected from key informants, focus groups, households and traditional healers. Data collection was carried out over the course of four weeks in November and December of 2003 in Malawi and Mozambique. To ensure that the methodology is inclusive, and can be replicated efficiently in the field, effort was made to incorporate rapid rural appraisal (RRA) and participatory rural appraisal (PRA) techniques.

Five sites were selected for analysis - three in Malawi and two in Mozambique. In Malawi, two of the communities selected were part of co-management arrangements of state forest reserves. A third site under customary land tenure was included in Malawi to compare and contrast the results respective to the adjacent co-management site. The communities selected in the Mozambique case study included a community in which forests were under customary land tenure, and another in which the forest was concessioned to the private sector for timber harvesting. The latter tenurial arrangement was selected to provide insight not only into the effect of forest concessions on household woodland-based coping and livelihood strategies, but also to provide insight into the implications of concessions on the vulnerability of rural communities to HIV infection.

A village social profile was created to efficiently stratify the village into households potentially affected by HIV/AIDS and those that were not. A list of households in the village was generated and information was collected on the following indicators: mortality<sup>6</sup>, morbidity<sup>7</sup>, household structure and demographic load indicators. Based on these indicators, households were grouped into two categories: proxy HIV/AIDS-affected households<sup>8</sup> and unaffected households<sup>9</sup>. In addition to providing a stratified sampling frame from which households would later be selected for interview, creation of the social profile provides the opportunity to discuss relationships between illness/death/HIV/AIDS and woodland livelihood and coping strategies.

A small group of both male and female community members were recruited (3-4 persons) to conduct a woodland transect and a mapping exercise. The transect was conducted to understand the availability and quality of woodland resources in the community. Attributes of the various woodland resources in the area were recorded including: main uses of forest/tree products from each area, types of users (e.g., men, women, children, community outsiders, etc), vegetation type including structure, species, and the relative abundance/scarcity of species. In the participatory mapping exercise specific areas of woodlands (resource units) were delineated by uses or products collected. The controls and regulations of these different resource units and tenurial niches (formal and informal) were recorded and used as a talking point for discussion questions regarding change in these resources.

Village focus groups were assembled to collect community-level data on woodland values, use, management and change. Relationships between household reliance on woodlands and adult morbidity and mortality were also discussed. Male and female focus groups were assembled.

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<sup>6</sup> recent death of prime-age adult within last 3 years.

<sup>7</sup> chronically ill household head, chronically ill adult under the age of 49 (within the last twelve months).

<sup>8</sup> one, or more prime-age adults chronically ill; widow/widower not remarried; children living without parents; children living with grandparents/elders; adults present and well with orphans; widow/widower living with parents/siblings; widow/widower remarried

<sup>9</sup> adults (between the ages 19-49) are present part of year and not chronically ill.

When time permitted an additional focus group was conducted with children from the community. The following exercises were conducted: seasonal calendar and activity ranking, contingency and coping strategy matrix ranking, forest and tree product listing and ranking, discussion of woodland map, and a SWOT analysis of threats and opportunities for woodland management.

Household interviews were conducted to explore differences in woodland use between proxy HIV/AIDS-affected households and unaffected households and the effect of illness and/or death on household use of woodlands. A non-probability quota sample was drawn from the village social profiles and households identified as proxy HIV/AIDS-affected households were sampled in greater proportion to the unaffected households. Semi-structured interviews were carried out with the household member most knowledgeable about the household's use of woodlands. The questionnaire included items to measure the type of woodland activities carried out by the household, the relative importance of forest products to the household livelihood, and changes in the household reliance on woodlands. Analysis of household data varied between the Malawi and Mozambique studies. In preparation of the data collected in Malawi, households were recoded whether or not they had illness of a prime-age adult (ages 15-49) requiring care of another family member in the last year (i.e., to explore the effect of illness on woodland activities), and whether or not there was a death of prime-age adult in the household within the last three years<sup>10</sup>.

Herbalists were interviewed to explore species-specific changes in the woodlands in relation to the HIV/AIDS epidemic, and also to discuss the effect of illness and death on household dependence on woodland livelihoods. The herbalists were then asked whether they treated any of the following AIDS-related illnesses and symptoms with medicinal plants: tuberculosis, mouth and throat sores/rashes, skin rashes, diarrhea, fevers, and other sexually transmitted diseases. Plants used in treating these illnesses were listed. The herbalists were simply asked to list the medicinal plants used in treating these conditions and their correlation with specific illnesses was optional. Herbalists were asked several questions regarding change in the availability of these species over time, followed by the reasons for this change and opportunities for improving the management of medicinal plant supplies.

#### **4.0 Results**

While both, the impacts of HIV/AIDS, and forest-based livelihood strategies are influenced by a diverse range of factors, some noteworthy patterns emerged in respect to the role of forest resources in affected household responses. Relationships between HIV/AIDS and household woodland activities appeared to correspond closely with disease staging. The data presented here is from the Malawi case study as sample sizes were adequate for descriptive statistical analysis.

##### **4.1 Household woodland strategies during symptomatic stages of illness**

The collection and/or use of medicinal plants are common woodland-based responses to illness. Focus groups in Ndaje and Chimaliro all identified the collection and/or use of medicinal plants as a primary response to illness. Of the households experiencing the illness of an adult member within the last 12 months, 60% relied on medicinal plants as a response. Even those who made clinic visits continued to use medicinal plants as a complement.

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<sup>10</sup> The reference period of three years was chosen to explore longer term effects of death on household woodland activities.

Furthermore, the immediate economic impacts of adult illness (i.e., health expenses) lead some households to fall back on commercial woodland activities. When households experiencing prime-age (PA) adult illness were asked how this event affected household frequency of forest product collection, 17% of households reported increasing forest product collection. The most common reason cited by these households was to generate income needed to pay for medical expenses and purchase basic necessities. Activities included the collection and sale of firewood, the collection and sale of wild foods (fruits and mushrooms), and the production and sale of reed mats.

For the majority, PA adult illness limited the ability of the household to meet their daily subsistence woodland needs. 54% of households experiencing adult illness reduced frequency of forest product collection. The main reasons cited for the reduction were the decrease in household labor due to sickness, and/or an increase in time spent caring for the sick. While all households in the study consumed firewood to meet energy needs, 36% of households decreased their collection of firewood due to labor shortages.

#### **4.2 Woodland livelihood and coping strategies following PA adult mortality**

Woodland activities remain important livelihood strategies of households affected by PA adult mortality, and findings from the case studies indicated that for some households, the importance of these activities increase. Households affected by the recent mortality of a PA adult were twice as likely to have made a major forest product collection trip in the last month: 77% of households affected by adult mortality in the last 18 months had made at least one major forest product collection trip in the last month, compared to 62% of unaffected households.

Of the households affected by PA adult mortality, 23% stated that the importance of forest product collection increased following the death. These households reported to become more dependent on income from the sale of forest products (i.e., firewood, thatch grass, fruits, mushrooms, mats, baskets) and activities requiring firewood as an input (i.e., brewing, food vending). Some households reported entry into commercial woodland activities for the first time (e.g., selling thatch grass, mushrooms, and/or fruits). Households in which the importance of woodland activities decreased reported that this was due to the ill health of the remaining household members.

Further evidence that PA adult mortality increases dependence on woodlands is evident regarding change in the household collection of firewood. Households affected by PA adult mortality were 5 times more likely to have increased collection of firewood than unaffected households in the last 5 years. That 75% of households affected by adult mortality increase firewood collection can be explained in part as a result of households pursuing income-generating activities (i.e., including those which forest products are an input - processing beer, vending food, etc.)

#### **4.3 Woodland coping strategies in affected household responses to future shock**

Traditional woodland coping strategies (e.g., collection of wild foods) can be expected to remain, if not become a more frequent option for households affected by PA adult mortality. Numerous studies indicate that PA adult mortality increases household vulnerability to future contingencies<sup>11</sup>. In the communities of Nkula and Ndaje, woodland-based activities were identified as being among the most important coping strategies. Focus groups in Ndaje revealed that the sale of firewood occurs in response to all contingencies (i.e., pests, drought, and

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<sup>11</sup> For example, 57% of the households affected by PA adult mortality had reduced fertilizer inputs and 20% reduced the area of land cultivated since the event

excessive rains). Whereas labor constraints brought on by illness and care-giving may be prohibitive to household participation in certain woodland activities during the symptomatic stages of HIV, labor requirements of such activities do not appear to be prohibitive following PA adult mortality. In Ndaje and Nkula, households affected by PA adult mortality were more likely to engage in collection of forest products than unaffected households, even when labor requirements for collection of certain forest products are increasing. This data strongly suggests, that as the epidemic matures and mortality rates increase, the role of traditional woodland coping strategies in affected communities may become more commonplace.

#### **4.4 HIV/AIDS and Woodland Resources**

The quality of woodland resources appears to be negatively associated with HIV prevalence. Change in a household's source of firewood collection over the last 5 years was measured as an indicator of change in woodland resources. While 86% and 73% of the households in Ndaje and Nkula respectively, responded that they now travel further to collect firewood, only 38% of those households in Chimaliro responded traveling further to collect firewood. According to district prevalence indexes, both Ndaje and Nkula are communities have substantially higher HIV prevalence relative to Chimaliro (i.e., 17.0% and 6.7% respectively). While household responses to HIV/AIDS may play a role in the decreasing availability of firewood in those communities with higher HIV prevalence, this is not to say that other confounding factors (i.e., market access, population densities, etc.) are not responsible for the reduction in resource availability. Regardless, this association between HIV prevalence and woodland degradation has potentially negative implications for affected households including: loss of income generating options, increase in labor spent collecting forest products, reduction in use of firewood (possibly leading to inadequate energy to meet household needs including cooking and sanitation), and reduced access to medicine.

Interviews with traditional healers revealed that medicinal plants are used in the treatment of at least 10 illnesses and symptoms related to HIV/AIDS. Medicinal plants in general are becoming less available with 93% of herbalists reporting a general decrease over the last ten years. 32 medicinal plant species were identified as vulnerable to overexploitation and increasingly difficult to source in the last 5 years, including species used in the treatment of HIV/AIDS-related illnesses. When asked about the major factors driving this change: 85% of respondents reported destructive harvesting methods as the main threat, followed by increasing demand for trade (77%), commercial harvesting by outsiders (69%), conversion of forest land (54%), policies that prohibit collection (23%), and finally competing uses (15%). A large majority of the healers (77%) stated that over the last 5 years the number of people collecting medicinal plants in the community had increased with 40% indicating that this was a result of increased illness in the community and more people entering the trade for income generation.

#### **5.0 Limitations**

The broad scope of the research design was necessary to canvass the various interactions between woodlands, HIV/AIDS, and livelihoods. While appropriate at this early stage of institutional understanding, an approach of such breadth has limitations. For example, the small sample sizes did not allow for analysis of the differential effects of household composition on woodland responses to HIV/AIDS. Given the disproportionate impact of the epidemic on women (in terms of HIV infection and the socio-economic impacts of AIDS) and their traditional roles in woodland activities (e.g., collection of firewood), a rigorous gender analysis would have greatly enhanced understanding of these interactions and this needs to be a priority in future efforts. In addition to the staging of HIV/AIDS, the effect of HIV/AIDS on woodland livelihood activities is

in part a function of these other factors including: gender, household composition, household wealth, social safety-nets, labor requirements, access to markets, and of course access to forest resources.<sup>12</sup>

## **6.0 Strategic Themes for HIV/AIDS and Forestry Programming**

To mitigate the impacts of HIV/AIDS among constituents, the fundamental goal of forest sector interventions should be to support the sustainability of those forest benefits relied upon by households and communities affected by HIV/AIDS (e.g., the specific roles of forests as a safety-net, provision of medicinal plants used in the management of HIV/AIDS-related illness, etc.), and to alleviate those interactions which aggravate the impacts of HIV/AIDS on households (e.g., household labor reductions and scarcity of subsistence forest needs, in particular firewood). At this stage in the development of the forestry sector's role, the priority is to identify and introduce strategies and programmatic themes from which site-specific technical interventions can be designed and implemented. Originating from stakeholder participation in the fieldwork conducted in Malawi and Mozambique, and in consultation with representatives of regional national forest administrations (FAO 2004); the following recommendations outline key strategies that may be carried out within the forestry sector, and in coordination with other sectors, as part of the multisectoral response to HIV/AIDS.

### **6.1 Management of medicinal plants used in the treatment of HIV/AIDS-related illnesses**

Efforts need to be made to sustain supplies of medicinal plants used in the management of HIV/AIDS-related symptoms and opportunistic infections. The benefits of this objective include ensuring the availability, affordability and quality of herbal therapy for PLWHA. These interventions can be grouped into those based on the management of natural woodlands, and those based on the domestication of species for cultivation. Where feasible, support for the management of medicinal plants in natural woodlands (i.e., management plans, sustainable harvesting methods, organization of user rights/associations) is an important precursor to domestication. Due to the wide range of species used in treating HIV/AIDS-related illnesses, the first step in the development of these interventions is to identify priority species. This will involve coordinating with healers associations, particularly where they are involved in collaborative arrangements with the biomedical sector, to identify species popularly used in the treatment of opportunistic infections and management of AIDS-related symptoms. These include medicinal plants used in treating: tuberculosis, mouth and throat sores/rashes, skin rashes, diarrhea, fevers, and other sexually transmitted diseases. Emphasis should be given to those species that are being evaluated in trials. Following the identification of priority species, indicators of species scarcity will need to be evaluated and monitored.

### **6.2 Identification and advocacy of nutritional non-wood forest products**

Though households tended to decrease subsistence collection of wild foods during illness, subsistence collection of wild foods can provide a food diversification strategy for achieving adequate nutrition prior to the onset of symptomatic HIV infection. In the Malawi study sites, 79% of households collected fruits from local forest resources for consumption and 34% of households collected fruits on a weekly basis. Across each of the three study sites, communities identified an average of 16 different tree species producing fruits or other foods. Certain non-

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<sup>12</sup> Though further analysis is needed, some inferences can be made in regards to the effects of these factors and brief discussion is given to each factor in the study's report FAO (2005). [HIV/AIDS and the Miombo Woodlands of Malawi and Mozambique](#). Rome.

wood forest products (NWFPs) and other wild foods are high in some of the key nutrients required by PLWHA particularly protein, fat, vitamins A and C, iron and zinc (Barany, Hammett et al. 2004). For example, 100g of *Annona senegalensis* fruits (collected and consumed in all study site communities) contain 103% of the daily recommended nutrient intake of vitamin A, compared to 34% and 24% for mango and papaya respectively. Participatory appraisals of the role that NWFPs play in local livelihood strategies can be valuable inputs for those in the health sector conducting nutrition assessments and developing community-based nutrition interventions. DoFs can coordinate with communities and natural resource committees to carry out such appraisals to identify commonly consumed species in a given area. Development and training of storage and processing skills can help increase the seasonal availability of these foods. Availability of these foods can also be increased through the inclusion of these species in agroforestry systems.

### **6.3 Reduce labor requirements for subsistence woodland firewood collection**

Interventions that reduce the labor requirements for firewood collection can help mitigate the impact of HIV/AIDS on household labor. Reducing labor requirements associated with the subsistence use of firewood can provide households with the following benefits:

- increased labor availability for other household activities;
- reduced labor burden on children;
- avoids adverse strategies such as reducing firewood consumption (w/ potential nutritional consequences); and
- reduced vulnerability of women to HIV infection.

There are a variety of interventions that can be carried out within the forestry sector to improve the accessibility and availability of firewood. Opportunities exist to improve access through the creation of tenurial niches within forests and to create limited benefit streams to those currently excluded from co-management arrangements. The promotion of women and children in decision making and planning of resource management will allow for the identification of the needs of specific user groups, which in the case of firewood collection are typically women and children. Strategies to increase production of firewood resources include improved management of customary woodlands, reforestation of degraded areas within customary lands with fast growing woody species, and nursery stock distribution of species with high firewood quality to households and communities. Labor saving technologies such as fuel efficient stoves can help reduce household consumption of firewood, and can help lower the volume of wood a household needs to collect.

### **6.4 Development of woodland-based income generating activities**

Where communities have access to markets, woodland-based income generating activities can increase a household's economic access to healthcare and improve food security. While certain woodland activities, such as the collection and sale of firewood do not require advanced skills, others activities do. These include (but are not limited to) products for which value can be added through home-based work such as reed mats, baskets, and processing of food. These activities can be carried out opportunistically when time and labor permit, while attending to other duties in the household such as care-giving. Support for the development of these activities can be channeled through village marketing associations and may require transfer of skills related to market information (i.e., prices, products, quality preferences, seasonal price fluctuations). FAO's Market Analysis and Development methodology for community-based tree and forest enterprises will be particularly useful in this regard. In addition to marketing assistance, additional efforts could include support for value-added processing and post-harvest loss reduction.

### **6.5 Forest revenue sharing for community members affected by HIV/AIDS**

Woodland resources and forestry interventions can indirectly support social groups affected by HIV/AIDS through revenue sharing and employment. Social safety nets and the reliance on neighbors and community members for in-kind and financial assistance was a common coping strategy in the case study communities. Revenue generated from the licensing and sale of forest products from private forest concessions, co-management arrangements, and community management of customary lands can be a source of funds to finance systems in communities that support households affected by HIV/AIDS. A portion of these funds could go into a community savings to be used in support of affected households. These funds could also contribute as a source of loans for persons who are committed to caring for abandoned or terminally ill members of their rural community. This will require institutional support for the ability of communities to regulate and enforce licensing and mechanisms for revenue sharing. Additionally, community members affected by HIV/AIDS, such as orphans, could be employed in the implementation of forestry interventions such as nursery management and tree planting. This could be accompanied by training of orphans in seed collection, tree propagation, and nursery management.

### **6.6 Management of natural woodlands**

More intensive forest management to increase productivity and accessibility of natural capital is in itself a mitigation strategy. Within communities, there is a need to improve management of natural woodlands for multiple purposes. Efforts need to be made to organize these user groups and to identify the opportunities and threats in regards to specific uses of woodlands. Management plans and the training of proper harvesting skills can help sustain the productivity of specific resource units within natural woodlands. The organization of user groups, creation of tenurial niches, development of management plans, and regulation and control of resource use will require capacity building of community-based organizations and institutions. This includes transferring technical skills for planning and management, but also facilitating processes of woodland governance that account for the needs of vulnerable and affected households. This includes the continued promotion of gender equality within decision making and planning. Support for local institutions to manage natural woodlands is particularly important given the impact of HIV/AIDS on natural resource management institutions at the national and local levels.

### **7.0 Conclusion**

Through the framework, field work, and set of strategic themes demonstrated here, the Forestry Department of the FAO continues to work in consultation with stakeholders to build capacity and develop modalities for the integration of HIV/AIDS and forestry programming at national, institutional, and local levels. This work presents the case for new operational efforts to support rural, natural resource-based responses to HIV/AIDS and opens the door to innovative cross-sectoral research efforts targeting the needs of those affected by HIV/AIDS. For example, what are the food interactions between *Annona senegalensis* and ART? While FAO's recent fieldwork is relevant to many countries where natural woodlands and government management is commonplace, more research is needed regarding these interactions where large numbers of people rely on woodlands under commercial private sector management such as South Africa, Swaziland, and Zimbabwe. More research is also needed regarding the interactions between woodland livelihood strategies and various forms of other coping strategies and social safety nets. And further investigation into the differential effects of HIV/AIDS on the woodland strategies of specific population groups (i.e., widows, orphans, and the elderly) is required. While further research efforts will provide a deeper understanding of the interactions between HIV/AIDS, woodlands, and livelihoods; the urgency of the epidemic requires mobilization now. The framework and strategic themes outlined above provide the way forward.

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