

“Changes in Using and Conserving Medicinal Plants in Maasai Villages in Monduli District, Tanzania”

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Abstract

The aim of this scoping project was to map the traditional plant utilization landscape in two villages in the Monduli District of northern Tanzania in order to assess changes in conservation status of plant species and explore pragmatic ways in which to work with these communities to conserve these resources for the future. We also sought to promote collaboration between local government officials concerned with health and those concerned with the conservation of natural resources.¹ A series of plant walks were carried out with community members, professional botanists, and an interviewing team followed by semi-structured household interviews in which we gathered in-depth information about the uses of the plants, their supply, and reasons for changes in supply. While this project was small in scope, it provided some important insights into the interconnection of biodiversity of plant species, indigenous communities and health care:

- as the importance of traditional health care in indigenous communities declines, supplies of plant species begin to decline;
- as changes occur in the socio-economic foundation of indigenous communities (e.g. pastoral->agricultural, permanent housing settlements), supplies of plant species and their utility for health care begin to decline;
- as cultural practices (e.g. forest healing retreat - *orpul*) and traditional laws for protection of plant species decline in importance and scope, biodiversity declines;
- as biodiversity of plant species declines, traditional health care knowledge and its role in cultural identity declines.

Many of the changes in the degradation of the ecosystem and some of the losses of indigenous traditions of healing in these predominately Maasai villages have been recent enough that there is still time to aid in the restoration and sustainable development of the medicinal plant resources in these communities. We are currently developing a project plan that works with these same villages in addition to two additional ones in a long-term project that responds to the findings in this scoping project.

¹ Support for this project was provided by the UNDP-GEF East African Cross Border Biodiversity Project and UNDP-GEF Small Grants Programme in Tanzania.

Note: This paper has been adapted from the full project report entitled “Plant Utilization Scoping Project, Monduli District”, prepared by Dr. Tanya Pergola and Gemma Burford. The full report contains extensive qualitative data analysis resulting from participant observation and interviews conducted in two Maasai villages. This paper contains a summary of these findings. Furthermore, the full report includes twenty-eight pages of tables listing the local and scientific names of the plants used by the communities; the parts used and preparation techniques; villagers’ knowledge of how/why the plant works in the way it does; local significance of each individual plant; and the perceived changes in supply of each plant. We have not attached the tables to this paper because of concern for intellectual property rights. The full report is the property of the two communities; the two organizations that conducted the research – Terrawatu and Aang Serian; the UNDP-GEF Cross Border Biodiversity Project staff; GEF-UNDP Small Grants Programme, the Tropical Pesticides Research Institute (TPRI); and the Institute of Traditional Medicine at Muhimbili, Dar es Salaam. Parties interested in viewing the full report should consult these organizations.

I INTRODUCTION

Tanzania has one of the richest floras in tropical Africa with almost 11,000 plant species. Unfortunately, most of the plant species of medicinal and aromatic value are increasingly threatened. This is as a result of over use, industrialization, villagization and other exploitations.

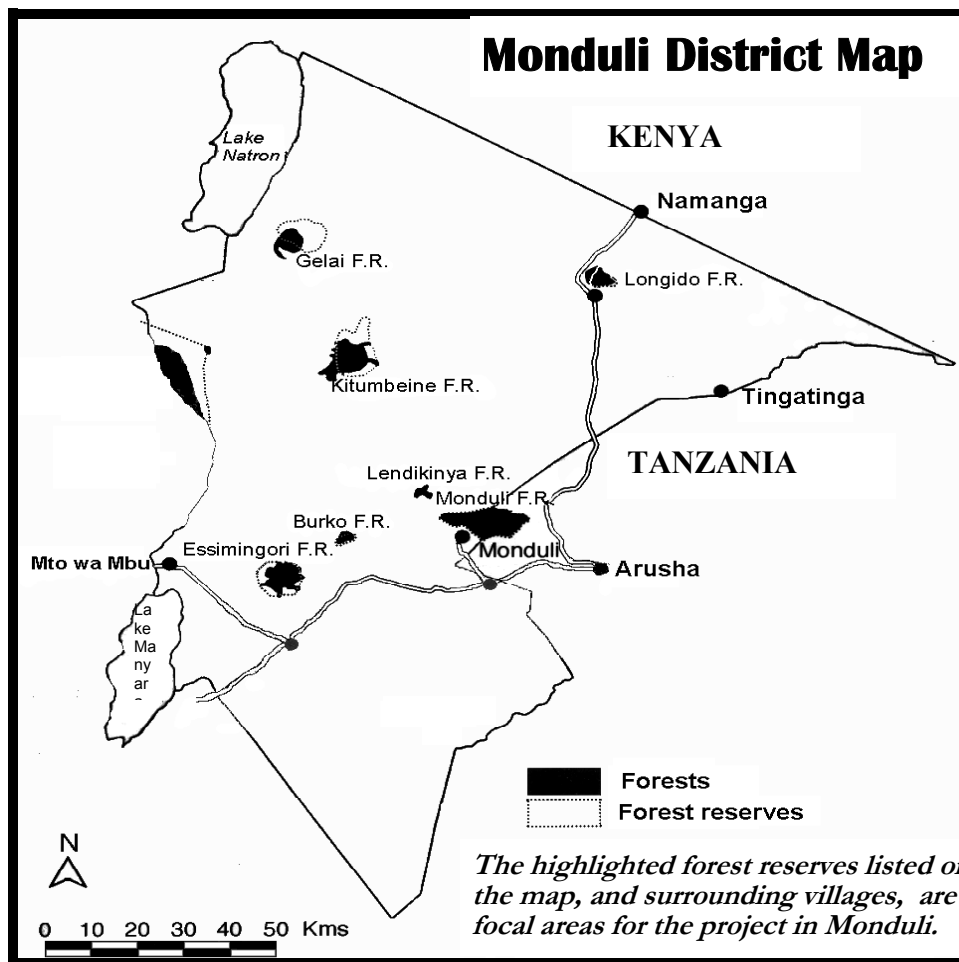
Over one thousand of these species are known to be utilized traditionally as sources of human and veterinary medicine. The significance of many others remains unknown to all but those who use them. The World Health Organization has consistently estimated that 70-80% of Africa’s population relies on traditional systems of medicine for its basic healthcare needs; and Tanzania is no exception. Arusha region in the northern part of Tanzania has a relatively rich flora, but the majority of knowledge relating to medicinal plants and their conservation status remains within communities and has not been systematically documented.

The National Environmental Action Plan (NEAP) of Tanzania includes a focus on biodiversity conservation and specifically refers to the need to develop modes of documenting and conserving medicinal plant genetic resources. In selecting their national research programs, the Ministry of Science and Technology identified the importance of work on information management of plant genetic resources, and the preservation of medicinal genetic diversity through ex-situ and in-situ conservation measures. As is the case throughout many developing nations, a number of national policy plans in Tanzania are encouraging the decentralization of environmental management to give communities a greater responsibility for their own resources, with the hope of improving both the natural environment and reducing poverty.

The aim of this scoping project was to map the traditional plant utilization landscape in two villages in the Monduli District of northern Tanzania in order to assess changes in conservation status of plant species and explore pragmatic ways in which to work with these communities to conserve these resources for the future. We also sought to promote collaboration between local government officials concerned with health and those concerned with the conservation of natural resources.

General Information on study areas

Monduli District is one of ten districts in the Arusha region of Tanzania. The total land area of Monduli is 1,420,000 hectares and it borders Arumeru and Rombo districts to the east, Ngorongoro and Karatu districts to the west, Mbulu and Babati districts to the southwest and Simanjiro district to the south. To the north lies Kenya.



Source: UNDP-GEF Cross Borders Project Database, 2001

Soils: Most areas in Monduli District have poor soil fertility/marginal with the exception of a few areas of Mto wa Mbu and Monduli Juu.

Land Uses: The land use pattern in Monduli District is as follows.

LAND USE TYPE	AREA IN HECTACRES
Agriculture	198,800
Grazing	994,000
Forests	14,200
Woodlands	213,000

Source: Matumizi Bora Ya Mazingira Mwongozo wa wilaya ya Monduli, 1997

The Cross Borders Biodiversity Project has undertaken a series of vascular plant collections on and near 5 major forests in Monduli District: Burko, Essimingori, Kitumbeine, Longido and Monduli Juu. As of October 2001, 429 different species have been identified across the five forests. One hundred and seventy-five of these species were collected in or near Monduli Juu Forest Reserve. Actual number of vascular plants occurring in Monduli District forests is likely to be higher than 429, as many of the Project collections have not yet been identified and named.

Human Population: According to 1988 Census Monduli District had a population of 109,292 and in the year 2000 it rose to 181,134 with growth rate of 4.3%
Income per capita GDP is 140,000 Tanzanian shillings (US\$160).

For over two hundred years, people of the Maasai and Wa-Arusha ethnic groups have inhabited this district. It has been known to outsiders for some time that these ethnic groups have a rich history of using the trees and plants in their immediate environment for medicinal, nutritional, ceremonial, and ritual purposes for both humans and livestock. However, there are no comprehensive ethnobotanical databases for these communities and, therefore, 1) no way to preserve indigenous health knowledge, and 2) no reference point for arguing the importance of conservation of species in this area.

In recent years, this situation is of increasing concern as several areas in the district are being influenced by socio-economic changes that have consequences for both indigenous knowledge and natural resource preservation. Traditionally pastoral, these communities have been shifting towards agricultural ways of life at the same time as they are being influenced by nearby urban centers. While these factors create many types of changes in both the social and natural environment, in this study we focus on the affects of shifts in economic livelihood and urbanization on traditional health care practices and preservation of plant species in local communities in the district.

Objectives

The aim of the East African Cross-Border Biodiversity Project is to reduce biodiversity loss at cross-border sites in East Africa. The Project works with communities and with district policy initiatives that affect forest and wetland resources in four cross-border sites. In addition, the project looks at central government policy issues that influence the conservation of biodiversity at local levels. This includes incentives and disincentives for conservation, both fiscal and non-fiscal, including access, tenure, and a greater awareness of options and alternatives for sustainable resource use. The Project is aware that it cannot accomplish all of this single handedly, and a key component of the overall project plan is to make linkages to other government and non-governmental initiatives.

This scoping project is one of the linkages the Project has made in order to explore in more depth, issues related to medicinal plant use and conservation. The specific objectives of this scoping project were the following:

- link existing information on plant species to local knowledge of plants, their medicinal uses, and traditional harvesting strategies;

- groundtruth the widespread perception that supplies of priority plant species² are decreasing in the district, and identify the threats to their preservation from both inside and outside the communities;
- compare and contrast a rural and a peri-urban community in order to discern the influence of urbanization on patterns of plant utilization;
- provide a foundation for future work in this area.

Research team

The research team was composed of representatives of two local Tanzanian non-governmental organizations (NGOs): Terrawatu and Aang Serian. The activities of the former include community-based research and development plans for management of natural resources and anthropological analysis of the link between health care and culture. Activities of the latter include the documentation and preservation of indigenous knowledge, together with ongoing educational programs for young adults.

II METHODOLOGY

Ethnographic method

This project employed the ethnographic method used in many studies in the field of environmental sociology. The ethnographic method is operationalized by observing the plants in their natural habitat and discussing their distribution, use and importance with members of the communities who have had long histories with the resources. From initial development of the research questions, through the study design process and onto data collection and analysis, we attempted to understand the significance and use patterns of each plant species through the eyes of the people who have the closest interaction with these resources.

Selection of villages

Given the resources and goals of the scoping project, we conducted our fieldwork in two villages in Monduli District. One is a Maasai village community northwest of the Monduli Juu area named Eluay, and the other is a peri-urban Maasai/Wa-Arusha community northeast of Monduli Chini, named Olarash³ village. Both have had long histories of using plants found in their local environments. Olarash village is closer to Monduli town and is experiencing more impacts of urbanization and contact with other ethnic groups than the more remote community of Eluay. Olarash can be described as a community that is primarily agricultural whereas Eluay is primarily pastoral with an increasing agricultural way of life.

Collaboration with national, district and local authorities

District and local authorities were involved from the beginning of this project through their participation in initial consultations and planning meetings. During the planning process we also consulted with national-level representatives from the Institute of Traditional Medicine in Dar es Salaam and the Tropical Pesticides Research Institute (TPRI) in Ngaramtoni,

² Those species most significant to the local, national, and global community.

³ Both villages are named after plants that grow in the local vicinity.

Tanzania. TPRI provided the organizational infrastructure for conducting the research in the district. We used the TPRI and UNDP botanists who had been working on the Cross Borders project for collection and identification of plant species.

Before beginning the formal interviewing, we met with the local Counselor (*duwani*) to introduce the research team and explain the goals and strategies of the scoping project. A village meeting, organized by the Counselor, was convened and members were told about the research project. The Counselor, along with the District Natural Resources Officer and the Regional Medical Officer participated in the data collection and facilitated our contacts with individual respondents.

Selection of respondents

For the purposes of this study, it was important to speak to community members who had extensive knowledge of local plant uses and changes in supply of plants over time (key informants). For these reasons, we choose to speak to elders in the villages, as it was clear that knowledge of medicinal and other plant uses is acquired through direct experience accumulated over a lifetime.

In many studies of traditional medicine utilization, women are prioritized, as they are generally perceived as having greater responsibility for health care. In this study we selected a greater number of male respondents than female because in Maasai communities, collecting the necessary medicinal plant parts and bringing them back to the home space is a male role. Women are involved in the preparation of medicines for consumption at home. Therefore, men would be expected to have a greater awareness than women of plant availability, methods of harvesting, and the reasons for any observed decline. We interviewed female elders to obtain their perspectives on plant use and priority species and a few younger members of the community (both male and female) to measure generational differences.

Data collection

Plant walks

A series of “plant walks” were carried out with community members, two professional botanists, and the interviewing team. The respondents were asked to lead the research team on a walk through different areas surrounding their homes⁴ and to indicate any plants they recognized as being useful to the community. The survey was not restricted to medicinal plants but included species important for nutritional, veterinary, ritual, ceremonial, cosmetic and hygienic purposes, as well as those used for building, roofing and fuel. For each plant that we saw the respondents told us the local name, the uses of various parts (bark, leaves, roots, fruits, etc) and the prevalence of the plant in the locality.

Semi-structured interviews – Households and Traditional Herb Seller

In addition to the “plant walks”, we conducted household interviews (male and female subjects in all age groups) in both communities. The purpose of these interviews was to gather more in-depth information about the uses of the plants, their supply, and reasons for

⁴ Maasai are traditionally nomadic and the “area surrounding their homes” can extend as far as a two-day walk and further. Given the purposes of the study, we walked with villagers for what seemed a reasonable distance and asked about additional plants during the semi-structured interviews.

changes in supply. We also asked respondents to prioritize the medicinal species used by the community and to mention any plants they may use that are not locally available. Lastly, we interviewed an elderly traditional herb-seller in Monduli Chini town as his business had been mentioned by a number of respondents during our fieldwork in Olarash.

Data analysis

Plant identification

Specimens of plants that informants explained to be useful were collected using secateurs, long handled pruners as well as hoes for digging out underground plant organs. Each piece of a specimen was tagged with a number corresponding to collecting details recorded in a book at the time the collection was made. The collection book has, on each page, prompts for provisional identification, local name (Maa), locality, altitude, habitat, collector's name and number as well as description of plant features that may not be apparent from the dried specimen, such as plant size, flower color and scent. We recorded locality data in a manner that will enable information to be transferred to Geographic Information System (GIS), so that it is easily accessible to other workers, using Global Positioning System units (GPS).

Qualitative Data

Interviews were recorded on Mini Disc and fieldnotes, initially taken in note form, were transcribed into sentences and assigned codes that corresponded with the research questions and the themes that began to emerge during the fieldwork process. Sections of text that corresponded to each coding category were organized into data groupings and analyzed for patterns of plant uses and changes over time. During both the plant walks and semi-structured interviews, we noted any discrepancies between information given by different respondents, and returned to the villages to ask for clarification from a group of elders.

III FINDINGS

Structure of findings section

The findings section is organized into three main categories. The first two – Complex System of Indigenous Knowledge and Conservation Status – begin by describing the traditional system and laws governing plant knowledge and behavior in the communities. These descriptions are followed by the changes that are occurring in the communities with respect to plant use and availability. The differences between Olarash and Eluay are noted throughout the analysis. The third and last part of this section discusses the prospect of cultivation of plant species in these communities. The following are some examples from the findings section.

COMPLEX SYSTEM OF INDIGENOUS KNOWLEDGE

The Traditional System

An extensive set of tables tell a compelling story of the communities' complex system of knowledge on plant use⁵. We note that the majority of elders can identify large numbers of

⁵ Tables are proprietary information and are included in final report.

species and freely communicate the specific parts of the plant that are used, the process of preparation and, in some cases, explanatory models for how the medicines work. It is evident – as has been noted in previous studies of Maasai culture- that this extensive knowledge of plants is part of being “Maasai”.

A male elder in Olarash repeated to us a statement we heard before:

“For the Maasai, all plants are medicine, there are just some plants we don’t know what they are used for yet.”

The Maasai believe that knowledge of medicinal plants evolves over time and they themselves are still learning. Of course, this assumes that the plants will still be available in the future.⁶

Many plants (almost 50%) are used for general health maintenance while the other half are used to treat illnesses. Several comments relating to mechanisms of action of particular plants indicate a system of classification linked to a “hot/cold” theory of disease. The following exchange between an interviewer (I) and a male elder in Olarash (respondent, R) illustrates the basis of this “hot/cold” model.

I: What is meant by a cold medicine?

R: [A cold plant] is used for blessings. It reduces disease and cures well. Something that has no thorns is cold.

I: If something has thorns, does that mean it is hot?

R: Yes, a plant with thorns is hot and can't be used for blessings. When something is cold it also brings peace to cure diseases.

I: Does that mean heat is the cause of diseases?

R: Yes, it is the sun that causes disease, or it is heat, like the heat when a thorn pricks you.

This is not to say that all medicinal plants are thorn-less; those with thorns have an important place in Maasai medicine, but they are generally believed to increase strength, aggression or power. It is often stated that “a strong disease needs a strong remedy” and so-called “hot plants” often provide treatments for severe conditions such as diabetes, HIV and typhoid.

The association of “cold plants” with concepts of blessings, peace and sacredness highlights the interconnection of religion and health care in Maasai/Wa-Arusha communities, as is the case in many other indigenous societies. Many plants have very specific ritual uses, while others can be used for blessings on any ceremonial occasion such as circumcision, marriage or rainmaking.

Our informants demonstrated an in-depth knowledge of the phenomenon of seasonal variation in the strength of medicines:

⁶ This point has been made by those in the Amazon region of South America who argue that entire “warehouses” of pharmacological information and potentially useful plants are being lost during deforestation, many of which have yet to be considered significant by the international community.

“It depends on the tree. Some of them are stronger in the drought because their water dries up. For others, the water helps you to get the medicine, so they are stronger after the rains. *Oloodwa (Embelia schimperi)* is good during the drought. You chew a bit of the medicine to understand whether or not the strength is good.” – *Male elder, Olarash*

The medical officer in Olarash noted that he has seen more and more people who have suffered side-effects attributed to incorrect dosage of some traditional medicines. This could be because people in the community are losing some detailed knowledge about preparation and dosage levels, or because changes in climactic conditions are altering the strength of some medicinal plants, or a combination of both.

In addition to their medicinal, ceremonial and spiritual uses, plants fulfill practical needs such as building, firewood, cosmetics and hygiene. Plant uses can be very specific, for example “sticks for stirring soup” (*orgumi [Vangueria acutiloba]*, Olarash). Some individual species are used for many different purposes: for example, *olorien (Olea europaea)* is used for building, walking sticks, fuel, and cleaning calabashes.

What is Changing

During the course of our fieldwork, it became apparent that this extensive system of knowledge is starting to lose some of its base of support, especially in Olarash. One reason is the change in lifestyle of the younger generation. Many of the young people in this community are spending more and more of their time outside the village, either in schools in other towns, or exploring life in Arusha town.

In cultures with an oral tradition of learning, the passing on of wisdom can quickly and easily come to an end when the people who are to be the new containers of knowledge are not available to hold the information.

People in this community still frequently use traditional medicine, but more for curative reasons than for both preventative and curative care.

A very important tradition in Maasai and Wa-Arusha culture is participation in a healing ritual called “*orpul*”. *Orpul* can be considered as an intensive form of informal education, where information important for the survival of the healing tradition is passed on to younger generations – both through participant observation and songs. At this event, people (typically young men) consume large amounts of meat and drink a decoction made with a complex combination of medicinal plants (Burford et al. 2001). The *orpul* retreat is held in a protected area of the forest where the group stays for a few days to as long as a year.

The value of the *orpul* tradition is declining as both communities argue it has become “too expensive”. In the past, people would have made big sacrifices to attend *orpul* and now they are placing other priorities ahead of this healing ritual.

CONSERVATION STATUS

Customary laws for Conservation

In both villages there have been traditional laws governing the use of resources of all kinds. Overall, the ethnic groups represented in these communities describe a strong cultural belief to be all plants, like wildlife and livestock, should only be used for a good reason. While not called “conservation” per se, these laws have served to protect supplies of plant species for future generations. A male elder in Olarash explained:

“It is the commandment of our fathers. If you cut a tree and you have no work to do with it, you have to offer a sacrifice.”

The customary laws of conservation govern 1) the utilization of individual plant species; 2) the protection of specific spaces in the environment; and 3) sustainable harvesting techniques. In the first case, some species of trees are strictly forbidden to be cut down for any reason. One example is *oreteti* (*ficus sp.*). An informant later explained that *oreteti* has been conserved for political reasons as well, as the Maasai people hold important meetings near these trees:

“In the law of the culture, the big meetings to choose the Oleigwanani [speakers for each age-set] took place at the *oreteti* tree. Even the office of the government had a big cultural meeting there to tell people not to lose their culture. All the major important meetings happen there.”

While almost everyone stated that *oreteti* is considered to be sacred and therefore forbidden to cut down, there are other plants that are protected as well. There was a large difference in the numbers of plants considered sacred in two villages. In Olarash, only three or four were listed, while in Eluay, respondents listed as many as twenty. There could be several reasons for this, one being the influence of non-animistic religion on the peri-urban village of Olarash. When asked about possible changes in the traditional religious belief system, a female elder explained:

“Yes, only a few elders have that [traditional] religion. The young people are in church now. [The church] tells you not to use traditional medicine again, not to go to the olaibon (traditional spiritual healer), and not to talk to your husband if he uses traditional medicine. The church doesn't talk about the environment.”

Secondly, in addition to preserving individual trees, people in these communities have traditionally protected the plant resources that grow in spaces important to their culture. The *orpul* ritual, mentioned in the previous section, is usually held at a secluded forest site. Trees are not cut down in this area. Other protected areas where it is forbidden to cut down trees include the site (*edoinyo ormoruraki*) where the Maasai go to get the name of a new age-set; the areas directly surrounding the living compounds (*orlalili/orekeri*); around graves; and near streams and rivers. The plants growing around living compounds are left standing because they provide both shade and food for baby goats, and in Olarash, as protection from tornados.

Thirdly, customary laws for conservation have dictated harvest practices in these communities. Traditionally, the practice was to take only the parts of plants that were needed. A female elder in Olarash explains:

“There are different kinds of harvesting. The elders who know the meaning of trees use care. They cut one place and take maybe three roots, so the rest are left and the tree doesn't die. They follow the traditional law.”

As more and more plants are being cut down, people are traveling longer distances to gather their medicines. This will have an impact on harvesting techniques as people take more of each plant to keep in their homes.

What is Changing: Threats to Conservation, new ways to conserve

The supply of plant resources has greatly declined in Olarash due to interconnected factors – livestock disease, increased agriculture, changes in housing construction, and urban trade in medicine. A number of our respondents were critical of the changeover from pastoral to agricultural lifestyle. A young woman in Olarash explained:

“Farming has been here for a long time, since we were girls. I don't think people will profit from it. Agriculture has brought great poverty to the Maasai society. The Maasai have big families and the fields are small. There are times when there is no rain, and you can't move your field to where the water is like you can move cattle during the dry season. The effects are very bad. You can't herd cattle and dig. You can do one or the other but you can't mix them.”

Apparently, when agriculture was first introduced into this community, farmers left some trees standing in their fields because they knew they were important for medicinal purposes. Now, as the knowledge of medicinal plants is decreasing, the younger generation is clearing the land completely for their farms. Even some of the sacred trees are being cut. As the younger generation becomes influenced by the market economy of the town, they have involved themselves in the business of selling medicinal plants. Unfortunately, they often do not obey the traditional laws of sustainable harvesting.

In an effort to conserve plant species in the area, a forest reserve was developed by the government. The Counselor of Olarash described to us the good intentions of the reserve; but the unfortunate way it was executed has had unintended consequences:

“Up there in the forest is a reserve area where people are not permitted to cut trees. Now there are so many people here, if it was not forbidden then the trees would be finished. It is a reserve of the Natural Resources Department. You have to get a license and pay a fee to collect medicine, even if it is just taking the branches or the bark. They don't want you to do it. You have to explain what type of tree you need and then go to the Forest Officer. [I: Do people really do this?] No, they don't want to, because it costs 6,000 TSh and hospital medicine only costs 2,000 TSh. There are elderly women who only like to use traditional medicine and they send a person to steal it.”

However, the Counselor admitted that regulation has shown some improvement in forest resources:

“If you want wood for building you can get a license from the Natural Resources Office. Once you have the license, they tell you to go to a certain place. It is patrolled by the Biodiversity Project, the Natural Resources Office and the Environment Division. There has been an improvement since these three came. In

the past people used to go and cut down too many trees. There were seminars and we were told that it was bad to cut down trees. The river used to run here in the past because it was covered by trees, but now there is evaporation so the river dries out.”

A male elder in Olarash describes the impact these programs have had on his understanding of conservation:

I: Do people clear the land completely when they dig their shambas?

R: Yes, but now they plant new trees.

I: Is that because of the government and the Biodiversity Project?

R: Yes, they tell us that if we cut trees we should plant trees.

I: What kind of trees do you plant?

R: There are modern trees that are used for timber or for fruit. The government brought them because they are good for timber. They are not medicine. Maybe they could be medicine, but we don't know how to use them. Very often they bring those trees from outside but sometimes they mix them with our own forest trees.

In Eluay, all of our respondents claimed that they did not have any problems obtaining the plants they needed although in some cases they had to travel greater distances to find them. Any over-harvesting that did occur was regulated by the elders. While this is the situation now, there is a potential for supply problems in the future as population increases and the lifestyle changes from pastoralist to agro-pastoralist. As is clear from the case of Olarash, the growth of agriculture is one the most significant factors in the loss of plant species in these communities. There are important lessons to learn from the situation in Olarash that can help prevent future problems in Eluay. For example, educating the community about the importance of conservation and developing mixed-use land plans that combine agricultural land with protected areas could prove to be an important strategy.

The community of Eluay is in the early stages of a similar progression of events that occurred in Olarash. A male elder explains:

“In the past we moved more and didn't dig. We took our cattle and followed the rains and the good pasture. Now we stay in one place because we have our fields. We did this when the cows were reduced. Many diseases killed our cattle. The government showed us that we could use this way to help ourselves so that our children do not go hungry.”

The people in the community claim that they only farm land where there are naturally no trees:

“When the people from Eluay first began to dig, they chose places with few trees. There are places that God created with no trees, the drylands. If there were one or two trees in the field, they left them standing.” – *Male elder, Eluay*

Yet, the research team noticed that a space was being cleared of *eluwai* (*Acacia drepanolobium*) trees in order for a farm to be started.

Changes in lifestyle are occurring for similar reasons (disease killing cattle, less land on which to graze the cattle, and increased education and interest in agriculture). Plant species are just beginning to be reduced in numbers. Although, it seems that it has taken a longer time to effect this community as they used other coping strategies to deal with hunger and had less interaction with other ethnic groups who practiced agriculture.

These changes have also influenced the community to become a more permanent settlement than in the past. One outcome of this has been the construction of more permanent homes, using larger trees in greater amounts:

I: Why have these plants been reduced in recent times, compared with the past?

R: They are trees that are used very much. In the past it used to be forest here.

I: For example, are people using more wood for building now than in the past?

R: Yes, a long time ago people used very small trees to build their houses. They used a lot of cow dung and mud. When people learned the technology from other ethnic groups, they built bigger houses using bigger trees.

I: Why are the new houses better?

R: The old ones were eaten by termites and they fell down during the rains. These new ones last for many years. – *Male elder, Eluay*

One male elder in Eluay explained to us a conservation strategy developed from within the community to preserve *olderakwai* (*Juniperus procera*):

“There used to be a lot of it here but now there is only this small one left. They built a lot of bomas (houses) with it. It is a very tough wood. People go to a big forest one hour away from here to go to get it now. It was cleared five years ago. People began to move into the area in 1991 and they kept building a lot of bomas up to 1995. It is important for the ceremonial fire, they mix it with *oreteti*, so the people were told not to cut it any more. The elders of the village held a big meeting with all the warriors and mothers and told them not to use this tree for building.”

This technique may be a more successful conservation strategy than the creation of the forest reserve in Olarash because it relies on the traditional system of the elder’s power and respect instead of imposing a ‘government’ dictum from outside.

We asked about commercial harvest in Eluay and all of our respondents said, at this point, it is not a problem for the community. A young male explained:

“People in Eluay don’t know about selling plants, they just use it for their families. Urban-based collectors are not reaching the remote areas. Also, people there don’t think of money as anything more useful than cows.”

FUTURE PROSPECTS: CULTIVATION

Overall, there has not been much cultivation of plants for medicine in these communities. In some instances, where land has been transformed into farmland, shrubs and herbs with medicinal uses are growing in and around these

places. These plants have not been there previously and are often pulled up by some villagers thinking they are weeds while others attest to their beneficial uses.

It seems that there is opportunity here to create a mixed-use land plan with this community that combines farming foodstuffs with medicinal plant species. We had a discussion with some community members in Eluay about some ideas on cultivation of medicinal plant species with respect to a problem they were facing with parasite infestation of their livestock. The community has recently been using expensive and highly toxic pesticides as well as used motor oil. We discussed with them the possibility of using plant sap instead:

Interviewer (I): Do you dip the livestock to get rid of insects?

Respondent (R): Yes, we dip them every Tuesday. Also we put oil on the goats to kill insects.

I: What did you use before you had dips?

R: *Ondimwai*.

I: Was it effective?

R: Yes, and it also cures a skin disease.

I: Why did you stop using it?

R: It grows very far away. A long time ago we would go up there and collect it, but now it is not needed because we have modern medicine.

I: Would you use it if it was readily available?

R: Yes, the elders would use it. The problem is that one tree only gives a small amount of sap, enough for four or five goats, but the oil from cars is available free and normally it is thrown away.

I: How long does it take after planting *ondimwai* before you can collect the sap?

R: You can start to get sap after one year. It is a small tree.

Overall, there appears to be a general awareness about the concept and benefits of cultivation within these communities. While there is much work to be done identifying which plants are most likely to be successfully cultivated based on interest of the community and scientific feasibility, this area of research and development would prove worthwhile to many concerned groups.

IV DISCUSSION

While this project was small in scope, it has provided some important insights into the interconnection of biodiversity of plant species and indigenous culture and health care that can be explored further in future work:

- as the importance of traditional health care in indigenous communities declines, supplies of plant species begin to decline;

- as changes occur in the socio-economic foundation of indigenous culture (e.g. pastoral->agricultural, permanent housing settlements), supplies of plant species and their utility for health care begin to decline;
- as cultural practices (e.g. *orpul*) and traditional laws for protection of plant species decline in importance and scope, biodiversity declines;
- as biodiversity of plant species declines, traditional health care knowledge and its role in cultural identity declines.

All of these conditions highlight the importance of working with communities in an effort to slow these changes. We have shared with the communities our findings from this study regarding plant resources that exist in their area, their conservation status, and the importance of conservation. A shortened version of this report has been translated into Kiswahili and Maa and a de-briefing conducted in the villages to exchange information with Eluay and Olarash.

We are now preparing project plans to expand our work with these villages and to extend activities into a neighboring district in Tanzania. The aim is to develop ways to conserve plants while meeting the changing needs of the communities. Encouraging villagers to maintain their indigenous knowledge and practices with regards to healing, while educating them with new ways to conserve resources, is a critical aspect of this work; and, increasingly, a target linkage highlighted by sustainable development analysts (Margoluis et al. 2001).

The issue of intellectual property rights must be considered in any study of indigenous medicinal plant use. At this time, we have explained to community members that the data in this report rests with the district-level government, Terrawatu and Aang Serian, the Cross-Borders project, TPRI, and the Institute of Traditional Medicine at Muhimbili. Any dissemination of this data beyond these organizations will be discussed with all those concerned.

In sum, the area in which this scoping project was conducted is part of the Northern Tanzanian dry mountain ecosystem that is unique to Africa. The integrity of this ecosystem is currently threatened by population growth, scarcity of land for traditional communities, and climate change. Many of the changes in the degradation of the natural environment and some of the losses in indigenous traditions of healing in the local villages have been recent enough that there is still time to aid in the restoration and future sustainable development of the communities with which we have become connected.

References

Bodeker, G., Burford, G., Chamberlain, J., Bhat, S. 2001. The underexploited medicinal potential of *Azadirachta indica* A. Juss. (Meliaceae) and *Acacia nilotica* (L.) Willd ex. Del. (Fabaceae) in sub-Saharan Africa: a case for a review of priorities. *International Forestry Review*, in press.

Burford, G., Rafiki, M.Y., Ngila, L.O. 2001. The forest retreat of *orpul*: a holistic system of health care practiced by the Maasai of northern Tanzania. *Journal of Alternative and Complementary Medicine*, in press.

Burford, G., Rafiki, M.Y., Ngila, L.O. 2000. *Orpul*, the place of medicine and forest feasts: a holistic approach to primary health care among the Maasai of northern Tanzania. *Unpublished manuscript*.

Ellemann, Lis, 1996. The Maasai and their use of plants. *Doctoral Thesis*.

Hussein, G., Miyashiro, H., Nakamura, N., Hattori, M., Kawahata, T., Otake, T. 1999, Inhibitory effects of Sudanese plant extracts on HIV-1 replication and HIV-1 protease. *Phytotherapy Research* **13**: 31-36.

Johns, T., Mahunnah, R.L.A., Sanaya, P., Chapman, L., Ticktin, T. 1999. Saponins and phenolic content in plant dietary additives of a traditional subsistence community, the Batemi of Ngorongoro District, Tanzania. *Journal of Ethnopharmacology* **66**: 1-10.

Mahunnah, RLA. 1990. *Utilization and conservation status of medicinal plants in Tanzania*. Proceedings of the First National Workshop held in Arusha, Tanzania, 16-20 January 1990. Dar es Salaam, Tanzania: Benedictine Publications.

Margoluis, R., Myers, S., Allen, J., Roca, J., Melnyk, M., Swanson, J. 2001. *An Ounce of Prevention: Making the Link Between Health and Conservation*. Biodiversity Support Program. Publication available on-line at www.BSPonline.org.

Further reading

Bogh, H.O., Andreassen, J., Lemmich, J. 1996. Anthelmintic usage of extracts of *Embelia schimperi* from Tanzania. *Journal of Ethnopharmacology* **50**: 35-42.

Galal, M., Bashir, A.K., Salih, A.M., Adam, S.E.I. 1991. Activity of water extracts of *Albizzia anthelmintica* and *A. lebbek* barks against experimental *Hymenolepis diminuta* infection in rats. *Journal of Ethnopharmacology* **31**: 333-337.

Gessler, M.C., Tanner, M., Chollet, J., Nkunya, M.H.H., Heinrich, M. 1995. Tanzanian medicinal plants used traditionally for the treatment of malaria: *in vivo* antimalarial and *in vitro* cytotoxic activities. *Phytotherapy Research* **9**: 504-508.

Kupchan, S.M., Hemingway, R.J., Smith, R.M. 1969. Tumor inhibitors. XLV. Crotepoxyde, a novel cyclohexane diepoxyde tumor inhibitor from *Croton macrostachys*. *Journal of Organic Chemistry* **34**: 3898-3902.

Mazzanti, G., Bolle, P., Martinioli, L., Piccinelli, D., Grgurina, I., Animati, F., Mugne, Y. 1987. *Croton macrostachys*, a plant used in traditional medicine: purgative and inflammatory activity. *Journal of Ethnopharmacology* **19**: 213-219.