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Community assessment of agroforestry opportunities in GaMothiba, South Africa

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Abstract Evaluating environmentally sustainable and culturally sensitive approaches to natural resource management issues is a necessary step towards improving livelihoods in rural South Africa. This study assessed the applicability of various agroforestry practices to natural resource management issues in the village of GaMothiba located in the northwestern region of South Africa. Agroforestry assessments were carried out using a community based approach through the application of participatory rural appraisal (PRA) methods. These methods were selected in order to assess the acceptability of agroforestry practices according to the perspective of the local people. The assessment process culminated in a variety of community designed agroforestry interventions. The acceptability of agroforestry practices is largely influenced by the degree of community cohesion, land rights, and cooperation between traditional and municipal authority figures. Understanding the opportunities and constraints of agroforestry adoption in rural sub-Saharan Africa furthers the movement towards community based natural resource management and ultimately a more sustainable approach to rural development.

Keywords Community based natural resource management · Participatory rural appraisal · Rural livelihoods · South Africa

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Introduction

Despite the efforts of various agencies and organizations, many of Africa's problems such as environmental degradation and diminishing natural resources, continue to impede efforts to improve livelihoods in dryland regions. Explosive population growth and uneven population distribution place increasing demands on limited natural resources (Barret and Aboud 2002; Collier 2007). Deforestation, desertification, and soil erosion brought about by unsustainable agriculture and other land uses are accelerating the rapid reduction in land productivity (World Bank 2007; FAO 2006; Abbalu and Hassan 1998). Inappropriate land use practices have set into motion a series of events that leave rural communities spiraling towards ever increasing poverty and environmental degradation (Jama 2003). Subsistence level, rain-fed agriculture remains the primary source of livelihood for those living in sub-Saharan Africa. With roughly 80% of the rural population of

sub-Saharan Africa dependent on agricultural livelihoods, it is clear that the recovery of the rural economy depends largely on the potential of advancements in agricultural technologies, such a agroforestry, to reduce overall poverty and increase food security (Kwesiga et al. 2003).

With the rapid deterioration of arable lands, pressures to develop sustainable agricultural practices have spurred various projects throughout rural Africa in hopes of increasing productivity and simultaneously improving natural resource management (Barret and Aboud 2002). However, attempts to use agricultural productivity as a means of reducing poverty and improving food security have been largely unsuccessful (Barret and Aboud 2002).

In South Africa, agroforestry was one of the traditional practices carried out by local farmers prior to apartheid (Ayisi et al. 1999). During apartheid, many traditional agricultural practices were lost as families were forced into homelands, creating a knowledge gap for agricultural development in South Africa (Van Zyl et al. 1996). Traditional agricultural practices tended to be rich in plant diversity, providing a number of ecological services that helped mitigate risks and decrease inputs, ultimately creating a relatively sustainable system (Alieri 1995). These practices were largely phased out during the apartheid regime when large monocultures became the preferred method of farming (Darkoh 2002). Unfortunately, this proved to be ineffective in the homelands particularly due to poor soil conditions.

The focus on large scale monocultures fueled the country's deviation from agroforestry (Thirtle et al. 2000) as is evidenced by South Africa's refusal to participate in the formation of the World Agroforestry Centre (ICRAF) in the mid 1980s. Agroforestry was not recognized by South African authorities and very few development projects in the former homelands included these practices. Some of the primary issues included the inability to purchase inputs, poor markets and unclear tenure. Only a few university researchers were involved with work in agroforestry prior to the end of apartheid (Esterhuyse 1994, Ngcobo 2002, Ayisi et al. 1999).

Although traditional practices were included in the Agroforestry Systems Inventory (AFSI), one of the key criticisms of the AFSI was that it did not include explicit documentation of local knowledge (Sinclair 1999). There was a paucity of research on indigenous knowledge with respect to traditional agroforestry practices in South Africa, until a study conducted by the University of Limpopo (Ayisi et al. 1999) recognized the need to document existing agroforestry practices in the South African provinces. The primary objective of this study was to document traditional agroforestry practices, often overlooked by field researchers, in order to foster the development of more ecologically and culturally appropriate agroforestry technologies. In addition to conducting a detailed inventory of agroforestry practices, the study also identified the socioeconomic aspects of each system.

The study found that traditional agroforestry practices were still being applied to various aspects of rural life; however, practices and species selection varied widely from one site to the next. The study divided the country based on rainfall and geographical region. The very low rainfall zone of the central district of the northern region (where GaMothiba is located) receives less than 500 mm of rain per year making it a very challenging region for cultivating crops.

GaMothiba is located in the Limpopo Province, a region that receives less than 500 mm of precipitation per year making it one of the most challenging areas in the country for cultivating crops (Ayisi et al. 1999). As part of the former homelands, GaMohtiba continues to struggle with poor infrastructure and socio-economic development (James 2007) with the primary form of land use being subsistence dryland agriculture and pastoralism. The rural poor scratch out a meager existence with incomes derived from crop sales, remittances, non-farm activities and pensions. (McCusker 2004).

Primary crops in this region include maize, sorghum, pumpkin and cowpea with an average farm size of one hectare. Farmers in this region do not appear to practice any form of intercropping. The most common agrosilvocultural practice consists of maize and marula (*Sclerocarya birrea*) combinations. Trees in the field are usually used to line farm boundaries and are randomly scattered throughout the land being cultivated. While such practices do exist, they are uncommon and little traditional knowledge has been passed down concerning the benefits of using trees in the field. Because of the lack of available fodder banks, few farmers are able to keep livestock and even fewer use any form of

agrosilvopastoral practices. Some areas do employ a combination of goats and acacia. Like many rural regions in South Africa, it is largely the elderly women who assume the farmer role while few young people take part in these responsibilities (Ayisi et al. 1999).

There is a growing body of research suggesting that the lack of community involvement in the planning and implementation of such projects is one reason for low success rates (Waisbord 2001). Many governmental and non-governmental organizations (NGOs) have looked to agroforestry as a means of improving rural livelihoods. However, several efforts to introduce more sustainable agricultural projects such as agroforestry have failed due to ecological and cultural incompatibility. In the past, extension agents have approached local farmers in a "top–down, male dominated, and gender blind" manner with little or no input from local farmers (Percy 1999). In addition to the loss of traditional agricultural practices, extension agents have historically approached local farmers in the homelands in an authoritative and condescending manner, often discounting the female perspective. This has resulted in strained relations between communities and extension agents, halting much needed progress and preventing communities from directly participating in a sustainable solution. In addition, agricultural interventions implemented and funded by outside organizations tend to be short-lived, as community members lose interest once the support is gone.

Many of the obstacles to agroforestry project adoption have been linked to lack of community involvement. To date, very little field work has been conducted using participatory methods as a means of introducing agroforestry practices into a comprehensive community based natural resource management initiative. Most agroforestry field work has been conducted under controlled circumstances and is rarely observed under both the environmental and cultural context for which they are intended. Of the few early agroforestry projects that existed in southern Africa, many were unsuccessful when project managers failed to account for cultural and political influences. The Khomokhoana Project (1972–1980) in Lesotho is a good example of problems that arise when people's needs are not incorporated into the design of the project. The primary objective of this study was to increase agricultural production and improve overall soil quality. Local people were not consulted during the project planning phase and instead were informed of the project objectives through a team of agricultural extension agents who were sent into various villages to promote the ensuing project (Sanders 1991). Although the project was successful in completing conservation structures and dams, villagers did not fully appreciate and understand the importance of their work and how it would reduce the effects of soil erosion over time. Because of the overall lack of understanding in soil management, the likelihood of long-term maintenance by local residence was greatly reduced. Outreach nurseries promoting agroforestry practices have come against similar obstacles (Botha et al. 2006). Of 48 nurseries examined, 54% failed, with lack of community interest accounting for 9% of project failures and an additional 15% of projects failed after key community participants left the project (Botha et al. 2006).

In recent years, NGOs and international agencies alike have recognized the necessity of people's participation in the process of developing agricultural interventions and assessing community needs. Community based projects using Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) methods have made a significant contribution towards the development of sustainable community-designed agricultural interventions (Fabrcius and Koch 2004; Colfer 2005). In addition to improving the overall effectiveness of such interventions, these methods also tend to improve community empowerment. Eventually communities are able to gain a new level of self reliance and discover local solutions to agricultural and natural resource management issues (Kumar 2002). In short, the premise of PRA is based on "handing over the stick of authority" and trusting local people to play an active role in development projects (Chambers 1997).

The overall goal of this study was to assist a rural community with the evaluation of their current needs and identify ways agroforestry may be used to assist in addressing these needs as they relate to natural resource management. Specific objectives were to:

- Evaluate current community issues with respect to agriculture and land use
- Indentify potential agroforestry practices that address key issues

- Discuss constraints and approaches to agroforestry adoption in the community.

Methods

The village of GaMothiba was selected for this study based on the relationship already established through the Centre for Rural Community Empowerment (CRCE) at the University of Limpopo, focusing on community development that closely identifies with its traditional knowledge and environment. The agroforestry assessment process in GaMothiba took place in 2005 over the course of 6 months drawing from participatory appraisal methods such as, community meetings, focus groups and individual interviews which were carried out to assess needs, and identify opportunities and constraints. Pair-wise ranking was used to evaluate various agroforestry practices, and develop a collection of agroforestry project designs (Jackson and Ingles 1998).

The first phase of action research in GaMothiba began with general community meetings held once a week, for 6 weeks. The community was notified of these meetings through the traditional authorities, written invitation distributed through the local school, and word of mouth. Many of those in attendance were also members of various farmers' groups within the village. During the first meeting, and over the course of the next five meetings, community members were asked to discuss primary issues within the community. From these discussions community members collectively compiled a list of needs and assessed these needs by identifying opportunities and constraints associated with each issue. This was accomplished collectively through group exercises.

Once the needs of the community were identified, a series of 5 weekly focus group meetings took place. The focus groups included four preexisting farmers groups from the community (Table 1). These groups were not selected by the research team, but rather they asserted their interest through participation during the community meetings. During these focus groups, members were first asked to review the key issues identified during the community workshops and determine whether or not this was a fair representation of community needs. After the key issues were described, the farmers groups were presented with a detailed oral and visual description of the 16 agroforestry practices prescribed by the International Council for Research in Agroforestry (ICRAF) for use in sub-Saharan Africa (Rocheleau et al. 1988). A brief description and benefits of the sixteen agroforestry interventions presented and discussed during the focus group meeting are shown in Table 2. Once they assessed their current needs, they identified agroforestry to address some of these issues.

Leolo farmers

Beginning in 2003, the Leolo Farmer's Group has been cultivating maize on land provided to them by the chief in the form of a "Permission to Occupy" (PTO). There are currently eleven farmers who make up Leolo Farmers Group, each of which has his or her own designated rows of maize within their communal plot. Harvests are currently used for subsistence and are not sold.

Melkboom farmers

Unlike the Leolo Farmers Group, the Melkboom farmers are not an organized farming group. Instead they associate themselves with the geographic location of their individual plots, Melkboom field. Maize is the only crop cultivated on the Melkboom fields and provides a yield just big enough to satisfy the needs of their families.

Tamaane farmers

The Traditional Authorities provided the Tamaane farmers with individual plots in the 1960s. While the Tamaane farmers are not sure of the current size of their plots, they do know that the amount of land available to them for plowing has been reduced over the years. They are currently cultivating maize, ground nuts and brown beans; however their harvest has not been large enough to make a sizeable profit.

Bakone Youth Organization

Named after a local species of bird, the Bakone Youth Organization (BYO) began in 2003 with the primary focus of providing assistance to the youth of GaMothiba through job creation, training and counseling. The organization is currently working towards

Table 1 Focus group demographics

Focus groups	Primary project focus	Age	Gender
Leolo Farmer's Group	Maize project	Late 40s–Late 60s	3 Females
			8 Males
Melkboom farmers	Individual fields	Late 40s–Late 60s	8 Females
			2 Males
Tamaane farmers	Individual fields	Late 40s–Late 60s	8 Males
Bakone Youth Organization	Poultry project	Mid 20s–Early 30s	1 Female
			4 Males

Table 2 Selected agroforestry practices and benefits used in focus group discussions

Agroforestry practices	Benefits
Scattered trees on croplands	Increase crop yields; extend growing period; crop diversification
Contour strips	Erosion control; food, fuelwood, fodder, and leaf litter; increase soil nutrients
Alley cropping	Reduce evaporation; improve soil and microclimate; tree products such as building poles, food, medicine, or fodder
Home gardens	Supplement to household income from sale of produce; cash savings from garden produce; improved household nutrition
Improved fallows	Prevent soil erosion prevention; eliminate crop specific pests and weed; improve soil nutrients, organic content, and structure
Earthwork structures	Solidify and reinforce conservation structures such as microcatchments, contour and furrows, and infiltration ditches
Trees and shrubs on terraces	Conserve topsoil; reinforce soil stabilization with root networking; protect crops from wind, increase soil fertility
Waterway protection and stabilization	Stabilize the banks and channels of manmade waterways and natural rivers
Micro-catchments and water management	Aid the growth of trees and shrubs in semi-arid and arid regions
Living fences	Protecting crops from livestock and wild animals; provide wind protection; improve organic content of soil
Trees and shrubs on borderlines and boundaries	A means of permanently defining land tenure; used to for fruit, timber or fodder
Windbreaks	Protect crops, grazing land, homes and other areas from damaging winds; provide various products
Trees and shrubs along waterways and floodplains	Stabilize land vulnerable to soil erosion; revegetate overgrazed or over harvested land; filtering out any harmful pollutants
Trees and shrubs along roads and paths	Erosion control; improve integrity of the roadway or path, from storm water runoff, provide shade, reduce the spread of dust
Trees and shrubs around houses and public places	Natural aesthetic of an area as well as provide shade
Pastures and rangeland	Provide fodder to livestock and protect soil from further erosion

the establishment of a poultry project that they hope will eventually provide funding for future initiatives such as a youth center and skills development programs.

Group members identified up to eight of the 16 agroforestry practices they were interested in implementing in their fields, in their homegardens, or in the community, taking into account their needs and ranked these practices using a pair-wise ranking exercise. Pair-wise ranking is an effective exercise for ranking the importance or popularity of a collection of complex items or issues (Kumar 2002). The pair

wise ranking exercise begins with a grid on which each agroforestry practice is listed on both the *y* and *x* axis. This creates a matrix on which each pair of items or issues may be compared to the other. Preferences are recorded on the grid and summed in order to determine overall ranking (Jackson and Ingles 1998). When participants were undecided, both practices were selected. All cells below the diagonal line will remain blank as this is a mirror image of the comparisons made above the diagonal cross of X's (Kumar 2002). Once the agroforestry practices were ranked, each focus group discussed the opportunities and constraints associated with each practice. The focus groups concluded with the design of an agroforestry project that was presented using multimedia at a general community meeting attended by community members and various stakeholders including the Department of Water and Forestry, the Municipality, and the Department of Agriculture.

Results

From the needs assessment exercises that took place during the initial general community meetings, the following list of key issues were identified (listed in random order):

- Lack of adequate water management
- Soil erosion and lack of nutrients
- Lack of cooperation with government officials
- Lack of biodiversity conservation
- Fear from lack of personal security and safety
- Lack of area for farming including equipment and infrastructure
- Need for more involvement by youth in community activities
- Limited vegetation management on the farms
- Lack of fencing leading to theft and harm to livestock
- Poor health of the general population (e.g., HIV-AIDS)
- Increasing population with limited natural resources and land availability

At least five issues could be directly addressed with agroforestry interventions namely, water, soils, biodiversity, limited vegetation, and lack of fencing. Issues varied by male and female participants. Females were more concerned with environmental issues such as water, lack of fencing, and soil erosion, while males mentioned government cooperation, youth involvement and people's security as the major issues.

Pair-wise ranking and preference for agroforestry practices

During the focus groups pair-wise ranking exercises coupled with the group discussions provided a clear outline of those practices that were most preferred by each group as well as the concerns that support their reasoning. Table 3 shows each groups preferences for the agroforestry practices presented.

The Tamaane Farmers are particularly interested in micro-catchments, improved fallows, and living fences. This makes sense as their concerns for project success include water availability, available soil nutrients, and livestock exclusion. Contour plantings were not selected as the project site is not located on or near sloping land. The Tamaane Farmers were also not interested in improved range lands because they keep a minimal supply of livestock and do not feel that they are in need of more grazing. The Tamaane Farmers were primarily males which may explain their lack of interest in practices such as home gardens.

Practices selected by the Melkboom Farmers reflect their interest in reducing wind and water erosion in their living areas. The Melkboom Farmers were primarily comprised of females which may

Table 3 Community groups preferences

Community organization	Preferred practices
Tamaane farmers	Microcatchments
	Improved fallows
	Living fences
Melkboom farmers	Roadside plantings
	Open space/public areas
	Living fences
Leolo farmers	Microcatchments
	Improved fallows
	Borderlines
Bakone Youth Organization	Living fences
	Contour plantings
	Roadside plantings
	Open space/public areas

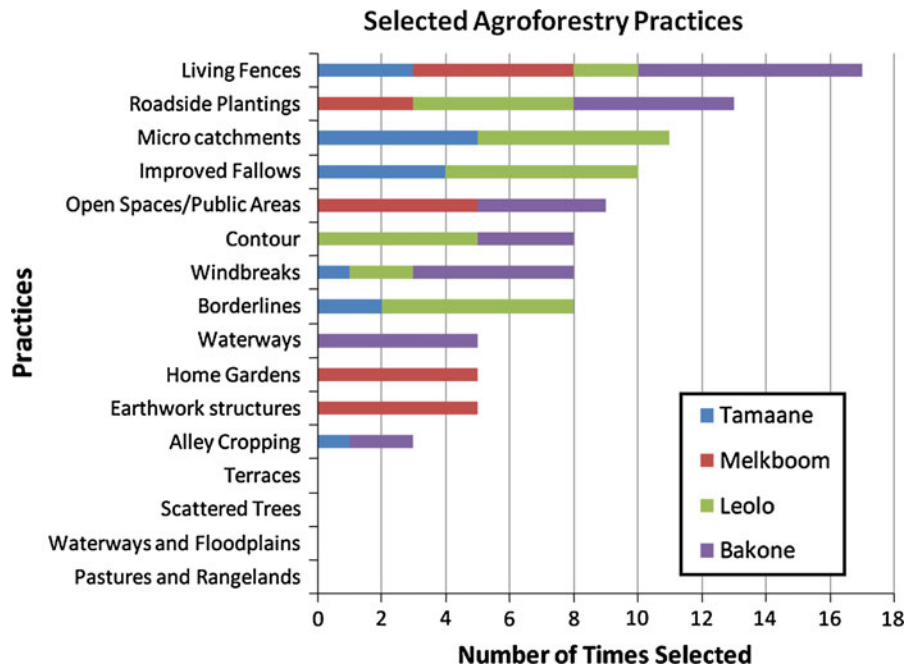

Fig. 1 Number of times an agroforestry practice was selected by a community organization

explain the relatively high interest in home gardens. Practices such as roadside plantings, open/public spaces, and living fences were selected to reduce the loss of soil by both wind and water erosion. The Melkboom Farmers were not as interested in using these practices in their own maize fields as they were not prepared to risk a decrease in crop yield.

The Leolo Farmers are currently engaged in an organized group farming project with assistance from the region's agricultural extension agent and were interested in incorporating these agroforestry practices into their field. Micro-catchments, improved fallows, and borderlines were among the most attractive activities. Borderlines were particularly attractive to the Leolo Farmers as they have separated their maize fields into individual sections for each participating farmers. The borderlines would provide a more definitive boundary to their plots. The Leolo Farmers are currently more interested in improving their project site and were not interested in practices such as open spaces/public areas or waterway and floodplain plantings. Although, the use of borderlines in this project is quite similar to alley cropping, the Leolo Farmers were not interested in using alley cropping due to the large space requirements.

Participants from the Bakone Youth Organization (BYO) were interested in designing two projects, which resulted in a more diverse selection of agroforestry practices. As with other groups, living fences were the most popular due to the presence of intruding grazing livestock and wildlife. Because the poultry/vegetable project site was located at the base of a small hill, contour plantings were selected to protect the soil from further erosion. Roadside plantings were also a popular choice among the BYO due to the poor condition of access roads to the site. Open space/public areas were selected for use in the proposed community park and youth center. While the BYO did understand the need for improved riparian zones, they felt that they did not have the resources to initiate such a practice. Instead, they expressed an interest in involving the community in the implementation of riparian improvements.

Figure 1 and Table 4 illustrate the frequency of practice selection among all four groups. Displaying the pair-wise ranking results in this manner allows us to identify the total number of focus groups that selected each practice. Of the 16 agroforestry practices presented, 13 were identified for adoption by all four community groups. Although the various community participants had different projects and objectives, there were similar patterns and trends in terms of the practices selected. The most commonly selected practices namely; living fences, roadside

Table 4 Overall practice selection among all four groups

Overall preference	Tamaane	Melkboom	Leolo	Bakone	Total
Living fences	1	1	1	1	4
Roadside plantings	0	1	1	1	3
Windbreaks	1	0	1	1	3
Micro catchments	1	0	1	0	2
Improved fallows	1	0	1	0	2
Borderlines	1	0	1	0	2
Contour	0	0	1	1	2
Alley cropping	1	0	0	1	2
Public areas	0	1	0	0	1
Earthwork structures	0	1	0	0	1
Home gardens	0	1	0	0	1
Waterways	0	0	0	1	1
Open spaces	0	0	0	1	1
Scattered trees	0	0	0	0	0
Pastures and rangelands	0	0	0	0	0
Terraces	0	0	0	0	0
Total	6	5	7	7	

plantings, and trees around microcatchments do not interfere too much with other land uses such as agriculture. The top practices were also based largely on water and soil management as well as fencing needs. Live fencing was the only practice selected by all four groups followed by roadside plantings and windbreaks which were selected by three of the four groups. These top three practices were attractive to the focus groups primarily for their erosion reduction capabilities as well as their low space requirement in the field. Practices such as scattered trees, pasture and rangelands, and waterways and floodplains were not selected by any of the four groups due to the space requirement and level of community involvement.

Discussion

Selection criteria of agroforestry practices

Assessing participant knowledge of agroforestry practices was of particular concern during our study in GaMothiba. While all participants had extensive experience in subsistence agricultural practices, it is difficult to determine participant familiarity with agroforestry practices. Although focus group participants may have grasped the concepts of these agroforestry practices, they may not have had sufficient perspective on exactly what is involved in the implementation process and what obstacles may arise during the implementation phase.

Live fencing was a particularly attractive agroforestry practice for community members as fences are widely used in the field and around the home. In the field, fencing is used to prevent livestock and wildlife from intruding on their fields and browsing in their crops. Around the home, fencing is used to prevent intruders from entering their homes. Unfortunately, fences are frequently vandalized and stolen. Many community members expressed an interest in using Mokgorokgoro (*Eurphorbia ingens*), a species that is not used for fuel wood, as living fences around their fields. Because it is not well suited for fuel wood purposes, community members believe it will most likely not be subject to theft.

Land use intensity was among the most important factor in practice selection. Participants were not interested in sacrificing land dedicated to crop cultivation for agroforestry practices. This was a particular problem with alley cropping, improved fallows, and scattered trees. Also, practices that would probably require large scale community support such as waterway restoration and rangeland revegetation were not options selected by the groups. This indicates that the groups were mostly concerned for their specific needs, more than the community as a

whole. At the same time, focus groups expressed a general lack of trust in the community at large and did not believe that community level interventions such as the restoration of waterways and floodplains would be successful. Community members working in the same farmers group tend to trust one another more than community members from other farmers groups within GaMothiba. Secrecy between community members and between farmer's groups also had a significant impact on data collection. For example, the Leolo farmers were not interested in sharing their ideas with the community at large as they feared someone might steal their ideas and win the attention of an outside donor. They were; however, more interested in sharing their ideas once they realized they could potentially serve as role models for the community.

Practices that greatly reduced maneuverability and visibility in the field were also not attractive to most focus groups. Farmer's groups periodically rent large machinery such as tractors to be used in their fields and are not interested in practices such as scattered trees that may greatly reduce their maneuverability. Field visibility was also of particular concern due to the prevalence of violent crimes in GaMothiba. Men were concerned for the safety of women working in fields that were not open and visible. Most community members removed trees surrounding their homes and public gathering sites for this purpose. Low lying tree and shrub species such as mokwaripa (*Acacia hebeclada*) are especially problematic as they tended to be most concealing.

Throughout the community workshops and focus groups, participants often blamed development failures on an overall lack of ambition and community cohesion. Community members often used the word "lazy" as an explanation for slow progress within GaMothiba; however, the issue is far too complex to justify with such a term. Although community members may perceive this to be an issue of laziness, the societal repercussions of community disempowerment are more likely at the root of slow progress towards improved livelihoods.

Barriers to agroforestry adoption

Throughout the course of this study many impediments to agroforestry adoption were identified. Because GaMothiba continues to be held in trust by the South African government, the village chief has not yet made many any efforts in the direction of a land management or development plan. Without any form of land management or policy, community based natural resource management interventions are quite difficult if not impossible to develop and maintain. At present, little has been done since the fall of apartheid when government officials enforced restrictions on herd size and fuel wood collection to monitor grazing and fuel wood supply (the primary causes of deforestation) on GaMothiba property. Therefore, there is very little incentive for community members to adhere to sustainable agricultural practices such as agroforestry.

Lack of communication between the traditional authorities and various governmental organizations presents a particularly delicate and complicated obstacle to agroforestry adoption in addition to other interventions aimed at improved livelihoods and community empowerment. Lack of communication between the traditional authorities and the municipality is a result of the gradual post-apartheid transfer of power as the homelands are reabsorbed into South Africa. There is also a lack of communication between governmental and non-governmental organizations working within the village on various agricultural projects.

The general lack of interest in agriculture by GaMothiba's youth poses an obstacle to agroforestry adoption due to the long term nature of agroforestry. The majority of farmers in GaMothiba are elderly community members who will not fully appreciate the benefits of agroforestry interventions within their lifetime. Agriculture is not considered to be a viable form of income by most youth in GaMothiba and would prefer unemployment to being involved in subsistence farming.

Agroforestry adoption is also impeded by the lack of available information and education concerning implementation and proper crop/tree combinations. While reviewing the various agroforestry practices presented during the focus group discussions, many participants expressed an interest in further agroforestry education in an effort to make more informed decisions in their agroforestry projects.

One of the topics for further agroforestry education is appropriate species selection. Most farmers prefer using exotic trees to indigenous trees. Native trees such as mokwaripa (*Acacia hebeclada*), mooka

(*acacia* sp.), and moholoho (*Euhporbia ingens*) are considered to be trees from the veld (bush lands) and do not have a place around the home or on cultivated land according to the participants. Unfortunately, many of the exotic species they prefer such as orange (*Citrus sinensis)*, lemon (*Citrus limon*), jacaranda (*Jacaranda mimosaefoloia)*, and blue gum (*Eucalyptus globules*) tend to compete with crops for limited soil moisture and do not improve availability of soil nutrients. Using these species in agroforestry interventions aimed at improving soil and water management may produce disappointing results. With more education, perhaps species preference will shift to more indigenous species.

Further observations revealed that traditional knowledge is quickly being lost. Those who do implement traditional farming practices are slow to share their knowledge with others. Lack of youth involvement in crop cultivation is a serious problem especially in terms of passing on traditional knowledge. In addition, many farmers identified a need for more assistance from agricultural extension agents.

Other issues such as community empowerment, project ownership and responsibility as well as access to resources such as finances, seedlings, and basic infrastructure to develop agroforestry practices was beyond the scope of this study but are critical factors not to be overlooked.

Lessons in agroforestry assessment and PRA

The assessment of agroforestry adoption in GaMothiba was a gradual process as community members became familiar with both the field worker and the flow of workshops and focus groups. Allowing the community to take responsibility for the dissemination of information concerning the details of the agroforestry assessment process gave participants the opportunity to absorb the information on their own time and attend meetings on their own terms. Creating a working friendship between participants and the field worker established a foundation of trust, (an essential part of the assessment process) facilitating an environment conducive to the exchanging of ideas. During the 6 months of community workshops and focus groups, participants formed a forum dedicated to the discussion of natural resource management issues.

Empowering community members to "craft" their own institutions is an essential part of creating a self-sustaining community intervention (Ostrom 1992). Using a participatory approach, the field researcher first developed a working rapport with the farmers groups in order to develop a partnership with community members. This is important as agricultural practices are more likely to be adopted if community members are part of the decision making process, thus ensuring the relevance and affordability of the selected practices (Dipholo 2002).

The participatory assessment of community needs created a holistic understanding of the current issues influencing rural livelihoods in GaMothiba. Although some of these needs did not directly relate to agroforestry and natural resource management, the village must be understood as a whole rather than dissected into a list of isolated parts. While maintaining a general focus on the assessment of agroforestry adoption, opportunities and constraints were discussed for each of the key issues identified during the community workshops. This exercise made social and environmental village dynamics more transparent and identified overlapping and interrelated issues embedded in the community structure.

Using visual aids improved communication and spatial understanding at community workshops and focus group discussions. Because education levels vary across a broad spectrum, communicating ideas can often be difficult when working with a group of community members. Combining oral and visual communication techniques helped to reduce misunderstandings and ensure that everyone was able to participate in group discussions regardless of their educational background. It is in this way that selecting the appropriate PRA tools can continue to improve.

Conclusion

The assessment process, initiated by the people of GaMothiba and the Centre for Rural Community Empowerment, has established new venues of communication for natural resource management issues currently impeding progress towards improving rural livelihoods. Through these venues agroforestry interventions were introduced as an alternative to unsustainable agricultural practices as well as a means of

managing scarce natural resources. Community meetings and focus groups led to decisions regarding various agroforestry options in the community. Pair wise ranking was used to select from 16 agroforestry practices. In many cases, selected agroforestry practices addressed soil and water management needs as well as fencing. Although initially skeptical, community members are now eager to integrate these interventions into a community based natural resource management plan aimed at improving rural livelihoods and establishing a more ecologically sustainable approach to agriculture. It is progress such as this that will allow agroforestry to assume a significant role in efforts towards rural-development in the Limpopo Province of South Africa.

Working with community members, the field researchers allowed focus groups to grow and evolve on their own with little outside facilitation or structure. The natural organization of these groups created a more cohesive group dynamic, therefore reinforcing the continued existence of the union upon the completion of the assessment process. Significant improvements were made in community esteem and empowerment over the course of this study resulting in the formation of a community forum.

Overall, the study laid a foundation for further research into agroforestry adoption in the region. Documenting key lessons learned during this process can both improve further efforts in GaMothiba as well as provide insight into community empowerment initiatives as they relate to community based natural resource management. Because the political, ecological, and cultural climate of southern Africa is as diverse as it is complex, site specific inventories of existing traditional agroforestry practices is an essential part of understanding how best to improve the role of agroforestry in everyday life.

In order to "scale-up" the impact of agroforestry in southern Africa, technology adoption issues must first be addressed. Technologies should be designed to "meet the peoples' needs and match their circumstances." Proper training should be provided to farmers and extension agents in order to enable them to implement agroforestry practices properly. Biophysical, socioeconomic and political issues should also be considered when assessing technology adoption issues. The authors found that the long-term nature of agroforestry interventions was a major obstacle to technology adoption. Many farmers are not able to participate in a project that does not produce an immediate benefit. Some strategies identified for further agroforestry development include improved marketing, diversification of agroforestry products, large-scale dissemination of agroforestry technology, and the development of partnerships (Kwesiga et al. 2003, pp. 1–13)

Possible areas for future research include project implementation, species composition, available markets, and youth involvement. Monitoring the implementation and long-term success of these projects will indicate the overall effectiveness of the assessment design as well as bring to light its strengths and weaknesses. Proper species combinations to be used in GaMothiba in various agroforestry interventions need to be identified before project implementation can begin. In order to improve the financial sustainability of agroforestry interventions in the region, more information is needed in the area of available markets for medicinals and other value added non-timber forest products (NTFPs) at the local, national, and international level. Because of the long term nature of agroforestry, assessing the lack of interest in agriculture by GaMothiba's youth is also an area of much needed research.

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