Barriers and Coping Mechanisms Relating to Agroforestry Adoption by Smallholder Farmers in Zimbabwe

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Abstract

Purpose: The purpose of the present study was to investigate agroforestry adoption by smallholder farmers in Gutu District, Zimbabwe.

Design/methodology/Approach: The methodology was based on field data collected through household questionnaires, key informant interviews and direct observations.

Findings: Major findings reveal that traditional agroforestry was common in the study area. There were no cases of innovative agroforestry other than dwindling remnants from a former trees-with-pasture project. Majority of respondents were willing to adopt innovative agroforestry technologies to improve yields and income. Damage and destruction of plants by pests and animals due to lack of fences emerged as the major challenges to the adoption of agroforestry. Other challenges included seed availability and labour requirements. Possible coping strategies, identified through consulting farmers and other stakeholders, would include local initiatives and support from outside the community. Local and external efforts are required especially to secure inputs and raise awareness, knowledge and skills with respect to specific agroforestry technologies.

Practical Implications: The paper presents pointers on the involvement of women in agroforestry and on the cultural significance of indigenous and exotic fruit trees. It provides practical lessons useful to extension or rural development workers in a localised set-up.

Originality/Value: The case study gives an insight into the problems faced by peasant farmers and the requirements to make agroforestry successful. Practitioners in southern Africa could learn a great deal about issues relating to smallholder farmers from reading this paper.

Introduction
Over the past two decades, food production levels in sub-Saharan Africa have generally been on a downward trend (NEPAD, 2003; Djurfeldt et al. 2005). This has especially affected smallholder farmers, i.e. farmers who produce on a small-scale mainly for subsistence and irregularly sell surplus produce. The lagging agricultural productivity growth in the region is partly explained by low levels of inputs such as chemical fertilizers, improved seeds and pesticides (Larsson, 2005; Morris et al. 2007). Many smallholder farmers are in a state of poverty and cannot afford industrial inputs to improve yields (Matowanyika et al. 1998; Mazoyer and Roudart, 2006). However, several studies have highlighted that industrial agriculture is a significant source of environmental harm (Pretty, 2008) and that productivity gains from crop genetic improvements and associated inputs have been uneven across crops and regions.

Since the early years of the "Green Revolution" (*circa* 1960), yield growth made only minor contributions to production growth in sub-Saharan Africa. The contributions came mainly from improved varieties (rice, maize, cassava) with very little from fertilizers and other industrial inputs (Evenson and Gollin, 2003). This limited potential of the Green Revolution in the region can be explained by agro-ecological complexities of the region, institutional limitations, political instability and, lack of innovative agricultural systems to make the best use of environmental goods and services (Evenson and Gollin, 2003; Pretty, 2008).

With increasing human and livestock populations over the recent decades, many communal areas in Zimbabwe lost much of their woody cover (Government of Zimbabwe, 2003). This loss of vegetative cover has given rise to several environmental problems which impact negatively on food security and put livelihoods of the communities under threat. Agroforestry is a possible option to sustainably redress the degrading socio-environmental situation in southern Africa (Kwesiga et al. 2003). As a land-use system that involves simultaneous or sequential rearing of trees, crops and/or livestock in varying combinations, agroforestry holds a strong potential. The practice can satisfy human livelihood needs and environmental conservation goals at the same time (Republic of Zambia, 1994; Current et al. 1995). Agroforestry is based on ecosystem thinking and tries to make the best of ecological and socio-economic interactions between woody species and other farming components.

A positive development is that agroforestry technologies have increasingly become available to more and more smallholder farmers in southern Africa (Mafongoya, 2000; Kwesiga et al. 2003). This development has taken place over the last two to three decades. Credit goes to various public and non-governmental organizations promoting agroforestry in communal areas through applied research, extension services and, technical and material support. Notable examples of such organizations in Zimbabwe include the World Agroforestry Centre (formerly the International Centre for Research in Agroforestry, ICRAF), Agricultural Research and Extension Services (AREX), Forestry Commission (FC), Zimbabwe Institute of Religious Research and Ecological

Conservation (ZIRRCON Trust), and the Zimbabwe Farmer's Union (ZFU) (Madzura, 1992; Souharse, 1992; Makaya, 2000; Matarirano, 2002).

Despite the availability of innovations, adoption rates for new agroforestry technologies have not been as fast as desired (Clarke and Matose, 1992; Sibanda, 1992; Chirwa, 2000; Makaya, 2000). According to Kwesiga et al. (2003), massive scaling up of adoption is required. A clear understanding of the influential factors in farmer decision-making regarding the adoption and maintenance of agroforestry is crucial (McGinty et al. 2008). Innovative, demand-led extension approaches are also required (Kibwika et al. 2009).

An analysis of socio-economic and biophysical conditions in Gutu District, Zimbabwe, revealed considerable opportunities for adoption of agroforestry by smallholder farmers (Chitakira and Haruzivishe, 2007). However, factors inherent in the community could pose serious challenges that significantly hamper the adoption of agricultural technologies. The objective of the current paper was to identify and assess such challenges in order to come up with possible coping mechanisms.

This study acknowledges the existence of marked differences in the social, political, economic and biophysical conditions between Zimbabwe and other countries in sub-Saharan Africa. The country has been experiencing diverse problems including a world record hyper-inflation, political instability, civil unrest and a collapsing economy (Chitakira, 2007). Under such conditions, the experiences of smallholder farmers in Zimbabwe could be unique. As such, the coping strategies suggested here might not be readily applicable to a community under different conditions.

Materials and Methods
Study Area
The study focused on Ward 6 (also known as Serima Communal Area) of Gutu District, in Masvingo Province. It lies in southern-central Zimbabwe (Figure 1) and covers 9916 ha in extent.
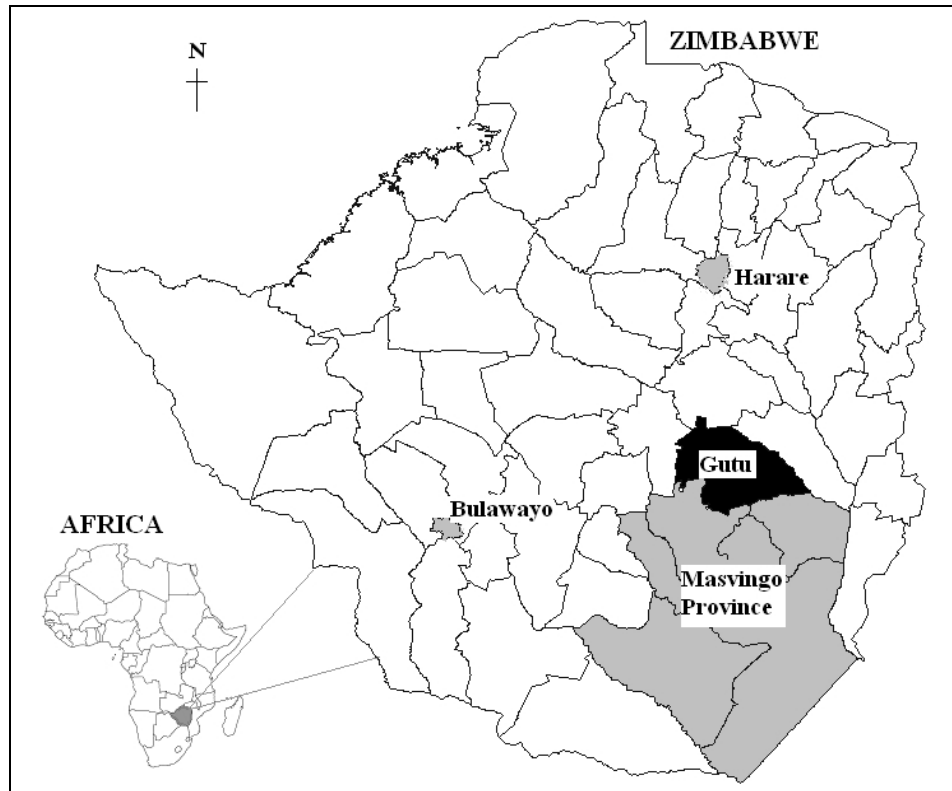
Figure 1: Location of Gutu District *(Adapted from Chitakira & Haruzivishe, 2007)*

The area lies in the country's agro-ecological Region III, which receives between 650 and 750 mm of rainfall per annum. The rain normally occurs from October to March, often with a two-week mid-season drought in January. Rivers, streams and shallow wells in the area are normally dry during the dry season. Mild frost is sometimes experienced in isolated parts of the area (AREX and Forestry Commission official reports, unpublished).

The soils are predominantly sandy with low fertility. Sandy soils make up 72%, sandy-loams constitute 27%, and red clay soils with high fertility cover a mere 1% of the ward. The area is fairly flat to gently sloping with a general topography of 2 to 5%, and a mean altitude of 1 440m (AREX official reports, unpublished; Surveyor General, 1982).

Gutu District is one of the most extensively deforested areas in the country. Only 3.8% of its land retains natural woodland canopy cover (Matowanyika et al. 1998). Miombo woodland, a kind of wooded savannah with more or less scattered trees, notably *musasa (Brachystegia speciformis / Caesalpinioideae)* and *munhondo (Julbernardia globifera / Fabaceae),* is the dominant natural vegetation. However, a lot of the natural vegetation has been cleared, especially along watersheds, and the area has become more of a grassland terrain. Eucalyptus woodlots have been established to redress the lack of vegetative cover and provide a source of wood. A critical shortage of firewood and of domestic and wild fruits is experienced in many parts of the ward. At the time of this study the ward had 11 932 people with an average density of 120 per km^2. Its average household size was 5 persons (AREX official records, unpublished).

Methodology
The study targeted at smallholder farmers' households in the ward, totaling 1 993 people organized into 48 villages. Twelve villages were selected for study and from each of these villages, 10 households were selected for interview making a total of 120 households. Simple random sampling techniques were used. Fifteen key informants from within and outside the study area were also interviewed. They included extension officers, traditional leaders and farmers successfully implementing agroforestry. We believe that the sample was small enough to be manageable while large enough to draw reasonable inferences about the population.

Information about households was collected through a questionnaire. The latter targeted household heads as respondents, regardless of gender. Where the household head was not within reach, a household member next in command present at the time of the survey would be interviewed. The term household is defined after Rocheleau et al. (1988) as people of one or more families who share a home, food, wealth, labour, farmland and decision-making.

A group interview for 21 people was held to supplement data from the questionnaire survey. The participants had come from various villages to attend a meeting. The study utilised the meeting and interviewed the group as a means to diagnose agroforestry-related challenges experienced by the farmers and to explore possible solutions.

Field observations were conducted to validate the condition of the soils and vegetative cover. The observations were also a means to establish household farm sizes and existing agroforestry practices in the area. In addition, they served to supplement and ground-truth information collected through questionnaires and interviews. The various methods used to collect data were intended to complement each other.

Results and Discussion
The study established agroforestry practices existing in Serima. Traditional forms of agroforestry were dominating. There were no cases of active modern or systematic forms of agroforestry other than dwindling remnants from a former donor-initiated "trees-with-pasture project".

Traditional agroforestry
All the households surveyed were maintaining trees or shrubs on their homesteads, gardens or fields. Trees, mainly indigenous species, were unsystematically maintained on communal grazing land and in crop fields. Quite often woody species were seen along contour ridges, clustered at the edges of cultivated land or scattered on crop fields. Exotic fruit trees (for example, mango, orange and avocado) were common on many homesteads and vegetable gardens.

The majority of respondents (98%) had planted exotic trees, mainly at homesteads or in vegetable gardens, to obtain fruits for own consumption and for sale. The same trees also provided the farmers with shade. As much as 85% of the surveyed households were also maintaining indigenous fruit trees that had grown naturally on their crop fields or around the home. Notable examples were *muzhanje* (*Uapaca kirkiana / Phyllanthaceae*), *muonde* (*Ficus capensis / Moraceae*), *mutohwe* (*Azanza garckeana / Malvaceae*) and *mutamba (Strychnos cocculoides / Loganiaceae)*. Edible fruit trees were a much more common feature compared to other

indigenous tree species in this regard. The reason behind this scenario was that to cut down an indigenous fruit tree even if growing in the middle of one's crop field was a taboo (culturally unacceptable) practice in the community.

About 73% of the respondents were also maintaining certain woody species on their homesteads for cultural reasons. A conventional belief was that these plants would protect the household members against lightning, evil spirits or witches. For instance, *mukonde (Euphorbia ingens /Euphorbiaceae)* was believed to provide protection against lightning, evil spirits or witches. A mere 5 % of the surveyed households had devoted portions of their fields to indigenous woodlots, particularly *Brachystegia spiciformis.* Observations revealed that all such households had secure fencing materials to protect their woodlots from browsers. The fenced woodlots were protected from free grazing by especially cattle and goats, the common forms of livestock in the area. Such woodlots ceased to be 'open access' resources which any member of the community could harvest. Their use became restricted to members of a particular household. Such woodlots appeared better managed than the communally owned ones where access was less restricted.

Vhuzhe trees-with-pasture project
A GTZ/ARDA-funded Coordinated Agricultural and Rural Development (CARD) Programme formerly existed in the ward. The CARD Programme had been running an agroforestry project known as "Pfumai Livestock Development Project", from 1988 to 1997 (CARD, 1988). This project was locally known as Vhuzhe Scheme. It involved planting of *Leucaena, Acacia* (both Mimosaceae) and *Sesbania* (Fabaceae) tree species for cattle fodder. Trees were planted on 500 ha of fenced land and on 385 ha of unfenced land (for control purposes). Its membership comprised of farmers from five surrounding villages that shared a communal grazing land on which the project was established. By 1997 it had collapsed and the site was invaded by new settlers who gradually turned it into a built-up and cultivated area. At the time of this study, only a few residual trees could be seen scattered on the site where the agroforestry project formerly existed. There was no evidence of active management of these trees. Quite often, the new settlers expressed ignorance of the former project.

Interviews of local agricultural extension workers revealed that Vhuzhe Scheme encountered several problems which included theft of fencing material protecting the fodder trees. This mishap exposed tender plants to damage by animals or to vandalism by free-riders. Some members of the project neglected their duties because they did not perceive any benefits from the activity since they did not own cattle. Another major problem was a slow growth rate of the trees which the extension workers attributed to the poor sandy soils on the site.

It can be concluded that Vhuzhe trees-with-pasture project did not produce desired results. However, it introduced local farmers to more systematic forms of agroforestry and the understanding that such may have wider benefits than traditional forms. It also helped to expose the challenges associated with agroforestry adoption by smallholder farmers. Future efforts to promote new agroforestry technologies in similar communities could learn a great deal from the fate of this project.

Challenges to Agroforestry Adoption

The study revealed that the local farmers were facing diverse problems due to lack of woody cover. Traditional agroforestry which was practiced extensively in the area did not enable them to enjoy maximised benefits such as tree products for household use or sale, protection from windbreaks or shade, soil improvement through nitrogen fixation, organic manure and subsequent increases in agricultural yields. When asked whether they were willing to adopt more intensive agroforestry technologies on larger scales, 98% of the respondents were positive on the matter. However, due to factors within their socio-economic and biophysical environment, they were not implementing such technologies. Figure 2 summarises these factors.
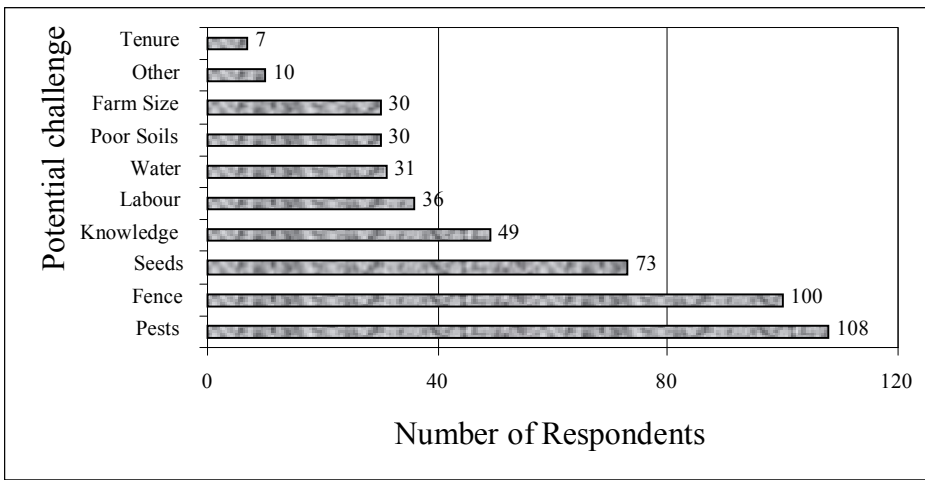

Figure 2: Challenges to agroforestry adoption *(Source: survey results. Multiple responses were allowed)*

Pests, lack of fences and seed
Damage of plants by pests and by animals due to lack of fences and shortage of seeds were perceived the most outstanding challenges. The explanation for such an outcome should be found in the farmers' socio-economic environment, particularly income, farm size and gender of household head. Issues relating to these factors are discussed in conjunction with other factors below since these are interlinked.

Knowledge
Going by the respondents' perceptions, lack of knowledge for raising trees and of managing new agroforestry practices would not be a major constraint. Many of the farmers were aware of organisations from which they could obtain the necessary knowledge and skills. However, there was concern over indigenous tree species. The farmers' knowledge about how to nurse and raise such was generally limited and the existing stakeholder organisations and extension workers tended to concentrate on exotic species.

Water availability
With an average annual rainfall of 700mm, the study area is fairly well-watered. This is most probably why water availability was quoted to be a problem by only 26% of the respondents.

However the problem of water would still be a major challenge, particularly in the dry (winter) season and during periods of drought when the water-table significantly drops and most local water sources such as streams and wells dry up.

Nature of soils
Soils were perceived to present a challenge by just a quarter of the respondents. This result shows that the farmers were generally optimistic regarding the nature and capability of their soils. However, infertile sandy soils that are predominant in the area (72%) might significantly reduce the rate of tree growth. Failure of the Vhuzhe Project, largely attributed to poor soils, testifies to the gravity of the soil problem. Soil improving innovations would be required. Applying organic fertilizers such as livestock manure and leaf litter would be an affordable and sustainable measure. However, cow dung might not be readily available to a significant proportion of the farmers (25%) that had no livestock. Leaf litter tended to be scarce in villages in the northern and western parts of the ward due to lack of tree cover. As noted by Kwesiga et al. (2003), chemical fertilizers are hardly an option since they are unaffordable to a majority of smallholder farmers. Agroforestry technologies which make simultaneous use of farm resources for crop and tree growing (such as intercropping), or which are focused on soil fertility improvement (like improved fallows, scattered trees and hedgerows) would be more preferable options under the prevailing conditions.

Tenure system
Security of land tenure is an important factor in agricultural development. Lack of clearly defined land tenure weakens incentives for long-term investments in land to raise its productivity (Norton, 2004). However, the present study showed that land tenure was the least important of the factors perceived as challenges to agroforestry adoption. Even though the peasants had access to land through customary rights, without title deeds, the farmers expressed confidence in communal land tenure. This attitude was not unique to Serima area. According to Norton (2004:152), "Traditional rights of usufruct can provide the degree of tenure security necessary to encourage production and even investment on the land".

Other factors
The "other" perceived problems include lack of equipment (such as buckets and wheelbarrows) for carrying water and manure, uncontrolled fires, frost and theft of plants or plant products. Theft was more likely where trees were grown away from the homesteads. Fire and frost were experienced only occasionally in the area, but were sometimes severe enough to cause permanent damage to plants, especially young ones. To increase their chances of success, efforts to promote new agroforestry technologies in smallholder farming communities should consider all such factors.

Size of arable land
Many respondents (59%) perceived that the arable land allocated to them was enough for their household crop production. In most cases, they expressed that they did not have enough resources to be able to utilise any more land. The sizes of farmland entitled to the households surveyed are presented in Figure 3.
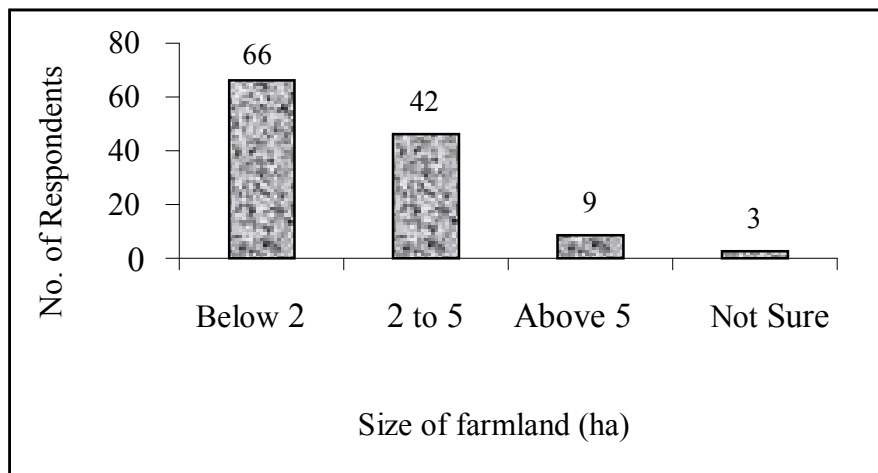
Figure 3: Size of arable land occupied *(Source: survey results)*

According to extension officers interviewed during the survey, the size of arable land officially recommended per household (of four to six members) was 5 hectares. However, 93% of the households had access to less than the recommended size of land. Literature reveals that lack of enough arable land can discourage the adoption of agroforestry by smallholder farmers (Moyo and Mapfumo, 2001). Technologies that require larger areas of land (such as tree-crop fallowing) would hardly be possible where household farmland is relatively small. Technologies such as tree/crop mixed intercropping or annual relay planting of trees that are amenable to small farm size (Kwesiga et al. 2003) are more appropriate when land size is a constraint.

It is of interest to note that although a majority of respondent households had less than the recommended size of land, only 25% perceived lack of land as a serious challenge to their adoption of agroforestry. This should not be taken to imply that the farmers were unconscious of the possible problem of land shortage. Some indicated that they would utilize contour ridges and edges of fields for growing trees. Others appreciated that agroforestry would enable improved soil fertility thereby enabling more intensified crop production on the small fields.

It may also be noted that 5 ha of land is too big for a household which lacks enough labour or mechanisation. The question here is whether the limiting factor is land size or inputs. While literature often has it that land size is a key factor, our data reveal that farmers' resources (like labour and other inputs) probably have a more important influence on people's decision about implementing agroforestry.

Low household income
The ability or inability to afford pesticides, fencing material, seeds and other inputs required for implementing new agroforestry technologies is dependent upon household income. Respondents were asked to state their households' average monthly income from sales of crops, livestock, fruits, vegetables, crafts, wages, salaries or any other sources (as was applicable). Table 1 shows the findings.

Table 1: Average monthly household income

Average Monthly Income (Z$)		Number of Respondents	Percentage of Respondents
Bellow 200 000	(or US$35)*	54	45
200 000 to 599 000	(US$35 to 104)	19	16
600 000 to 799 000	(US$105 to 139)	6	5
800 000 plus	(US$140 plus)	11	9
Not Sure		30	25
TOTAL		120	100

*(Source: survey results. * Exchange rate at Z$5 729 per US$1 in 2004, CIA, 2008)*

The incomes stated were estimates rather than accurate calculations. The 30 respondents who gave a "not sure" response could hardly estimate their household income because they were too irregular and unpredictable, sometimes with no income at all in certain months. However, the information provides a reasonable picture of smallholder farmers' income levels, revealing them to be very low and unpredictable. For at least 66% of them, the average monthly income was well below Z$ 860 000, the country's prevailing poverty datum line (Gadzikwa, 2004). Although this poverty datum line might not be directly applicable to a family with subsistence crops it serves as a yardstick. With such low incomes, many households would not be able to acquire the inputs required for substantial crop production, let alone for managing agroforestry projects. A similar observation was made by McGinty et al. (2008) on smallholder farmers of Southern Bahia in Brazil. Lack of resources was found to be the major external factor limiting the farmers' ability to adopt agroforestry. The present findings confirm earlier observations by Moyo and Mapfumo (2001) that smallholder farmers generally have low purchasing power to acquire commercial inputs such as fertilizers, livestock feed and pesticides. Thus, extension workers who would want to promote the adoption of agroforestry in the communal areas should offer technologies that demand relatively low capital inputs, viable to low income earners.

Women-headed households
The main sources of women-headed households identified in this study were widowhood and divorce. Literature shows that households headed by women are prone to problems of poverty and disadvantage (Jary and Jary, 1995). They are likely to experience lack of resources to carry out viable agroforestry projects. Table 2 is a cross-tabulation of household-heads gender and the problem of labour shortage from the current research.

The table shows that the households headed by women (30%) were much less than those headed by men (70%). Yet, of the 31 households facing labour shortage, majority (71%) were headed by women. This result reveals the vulnerability of women-headed households in this area to labour problems. Such households would need guidance on adopting technologies that are potentially gender-neutral, for example, improved fallows. Studies by ICRAF in eastern Zambian villages (Gladwin et al. 2002) and other studies from Malawi, Zimbabwe and Kenya (Thangata, et al. 2007; Quisumbing and McClafferty, 2006) have shown female-headed households to be equally competent in adopting particular agroforestry systems. While such is the case, it remains

Table 2: Women-headed households and labour shortage

Gender of Household Head	Households Facing Labour Shortage	Households not Facing Labour Shortage	Total
Female	22	14	36
Male	9	75	84
Total	31	89	120

(Source: survey results)

important to emphasise the need for careful selection of technologies to arrive at those that suit the conditions of disadvantaged households.

Coping Mechanisms
Apart from identifying the agroforestry adoption challenges of smallholder farmers, the study further investigated possible coping strategies. The aim was to come up with feasible and socially acceptable mechanisms appropriate to the farming community under investigation. By means of a questionnaire survey (including several open-ended questions) and key informant interviews, several strategies were arrived at and are summarised in Table 3.

Most of the strategies outlined in the table probably do not require further explanation. The discussion under "conclusions and recommendations" section makes reference to some of the coping strategies. Perhaps, 'rainwater harvesting' and 'revolving fences' concepts need to be discussed further. Rainwater harvesting techniques refer to the use of small earthwork structures or bunds to trap runoff water from rainfall so that it concentrates in small areas to increase the water available for plant growth (Rocheleau et. al. 1988). Such techniques are essential for successful implementation of agroforestry practices considering that the area receives rainfall seasonally and in less than five months of the year. Apart from helping to improve crop yield, rainwater harvesting would make more water available to the farmers to water their plants for a longer time in the year.

Regarding the critical problem of lack of fencing material facing the farmers, a possible way to address it would be to implement the idea of 'revolving fences'. This strategy would involve acquiring fencing material in the first place, probably from a donation or from a group of farmers pooling together their resources. The fencing material is loaned to a farmer for a given period, three years for instance, to protect his/her trees especially during the early years of growth when they would be tender and most vulnerable. Meanwhile, the farmer may put up a live fence. At the end of the loaning term, the fencing material would be withdrawn and loaned to the next farmer. Thus the same fencing material can serve several farmers in a relay. The process may be organised and decided upon by the members of the farmers' group in form of a co-operative.

The implementation of the identified coping strategies should depend on the farmers' needs, initiative and capabilities. Perhaps, organising farmer groups is fundamental in overcoming the various challenges faced by these poor smallholder farmers.

Table 3: Strategies to overcome adoption challenges

Challenge	Possible Coping Strategies
Lack of water to irrigate plants	Households to dig own wells; Sink communal boreholes; Implement rainwater-harvesting techniques.
Lack of labour force	Consider hiring labour; Organise communal labour force; Adopt less labour-demanding agroforestry technologies.
Pests and harmful insects	Form buying clubs with fellow farmers procure pesticides at lower cost; Seek external support
Fences to protect plants	Utilise live fences; Seek loans or donations from government or non-governmental agencies; Create 'revolving fences' clubs.
Knowledge to raise trees	Consult extension workers; Learn from co-farmers
Lack of seeds/seedlings	Establish household nurseries; Procure seeds from stakeholder institutions (e.g. Forestry Commission, ICRAF and ZIRRCON Trust)
Insufficient farmland	Utilise contour ridges or field edges; Adopt agroforestry practices appropriate to small fields, e.g. scattered trees on cropland, hedges around fields
Insecure land tenure	Lobby for more secure tenure system through local member of parliament; Pursue the provision to apply for title deeds or leases.
Infertile soils hamper good tree growth	Apply organic fertiliser like leaf litter, livestock or poultry waste.

(Source: Survey results. Information was collected through interviews and questionnaires)

Conclusions and Recommendations

The present study revealed that with their low incomes, many smallholder farmers would not have adequate resources to make meaningful investment in agriculture. The farmers would therefore need support to be able to successfully adopt new agroforestry technologies. Such support could take the form of subsidies or soft loans to procure required inputs. Local authorities, including chiefs and councillors, could assist farmers in sourcing support, probably from the local business community, donor community or the government.

Considering the challenges faced by the farmers, major forms of support required would include fencing material, pesticides and seed. The need for external support cannot be over-emphasised. After several years of promoting agroforestry adoption, the Forestry Commission extension officer for Gutu District concluded that for agroforestry projects to succeed in an area, "farmers must be supported in the form of fencing material" (Rusingah, 2001:3). This remark was confirmed by a study in Bahia (Brazil) which revealed that the farmers were not able to adopt and maintain agroforestry without external financial and technical support (McGinty et al. 2008). However, the political and economic environment in Zimbabwe could limit the practical usefulness of this recommendation. Little support could be expected from the public sector which

was in a state of bankruptcy. The local business community was battling to survive under prevailing hyper-inflationary conditions and any hopes of getting assistance from outside the country were dampened by the government's sour relations with the international community (Chitakira, 2007).

Given uncertainties regarding external support, perhaps the assistance more readily available to the farmers would be in form of knowledge and skills relating to agroforestry technologies. Farmers do require additional technical skills on managing more intensive and systematic agroforestry projects. Information about how to nurse and raise trees, especially indigenous ones, needs to be disseminated for successful incorporation of such species into agroforestry systems. When those practical steps are taken, farmers would be better equipped to implement agroforestry with a wider range of options to choose from.

Skills-training on rainwater harvesting techniques and tree nurseries would be acutely required. The role of extension workers is crucial here. It is very important for all extension work to draw attention to the unique constraints and opportunities of each farmer. Extension messages need to be demand-led and extension programmes should facilitate farmers' learning and experimentation as well as promote information exchange (Kibwika et al. 2009). Given the multiplicity of agroforestry associations, there cannot be a single extension message for all farmers. Perhaps, a general message to put across is about the key role of trees in providing useful products (fruits, wood, fibres, medicines, etc.) and in simultaneously providing important environmental services (soil improvement, windbreak effect, fence and shelter effects, etc.).

Agricultural extension workers in Gutu District have so far tended to focus on conventional crop production. Further training of the extension workers on the art of delivering a comprehensive message of agroforestry is essential. As observed by Kiptot et al. (2006), extension officers would need to simplify technical information in order to help the farmers' understanding and subsequent information-sharing. Simplifying a supposedly sophisticated agroforestry message is a challenge for extension workers and extension training programmes. Basically, the agroforestry technologies to be promoted must be appropriate to the farmer's socio-economic and biophysical conditions.

Quisumbing and McClafferty (2006) found out that women adopt technologies more readily if the extension agent is a woman. The current study would recommend that since a significant proportion (30%) of households was women-headed, some of the extension workers be women. Such a step would boost the rate at which women-headed households learn about and implement agroforestry technologies.

Finally, we would recommend increased commitment from the farmers themselves. There is need for the farmer to give tree growing a higher priority and to commit the available resources to agroforestry. Awareness campaigns to the farmer on the potential benefits of tree-based agriculture could go a long way in activating the desired commitment. An expression that was often uttered by the respondents is, "As long as the farmer is committed, tree growing can be a success". There is every reason to hope that smallholder farmers would be ready to commit themselves to developing sustainable low-input agroforestry land-use systems and making the

best use of the local environment in the same way they have been committed to conventional cropping systems.

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