

Dedication

This thesis is dedicated to my late father, K.C. Hofisi who died when I was studying overseas. He was such a father who cherishes the success of his children. *'Dad you have always wanted to see me succeed, it is unfortunate that you did not wait to see me finish my studies. I would imagine you celebrating my success with that big smile. Anyhow, now that I have finished and succeeded; my success is your success too. I shall always endeavor to succeed. Rest in peace'*.

Abstract

This research was carried out within the months of August, September and October of 2001 in Zambezi Valley found in the north eastern district of Zimbabwe, where Farmer Field Schools have been modified to suit the farmer's conditions. The research looked at the suitability of the Farmer Field Schools as a learning process for the resource poor farmers of the Zambezi Valley. The resource poor farmers are those with little or no resources to make their farming successful.

The effect of the learning process on the farmers' farming system was also explored. It was found that farmer's farming system changed because of the learning at the Farmer Field Schools. Farmers contributed to the learning process through active experimentation and contribution of their indigenous knowledge. Farmers felt that they wanted to have control over Farmer Field Schools by having Farmer Field Workers and field supervisors accountable to them. The research adopted a participatory approach, employing Participatory Rural Appraisal (PRA) methods.

CONTENTS

List of Acronym.....	1
1 Introduction.....	2
2 Background to the study site	4
2.1 The study area	4
2.2 The People.....	5
2.3 The Mid Zambezi Project.....	5
2.4 Agricultural production	5
2.5 The need for a new farming system.....	6
2.6 Training	7
3 Farmer Field Schools.....	8
3.1 History and Objectives	8
3.2 Farmer Field Schools Approach.....	8
3.3 Concepts and principles guiding the Farmer Field School approach	10
3.3.1 Communication.....	10
3.3.2 Principles not Packages.....	10
3.3.3 Training Driven Research.....	10
3.4 The spread of Farmer Field Schools	11
3.5 Differences between FFS run by FAO and those run by AfForesT	11
4 Research Problem.....	13
4.1 Research Objectives.....	13
4.2 Research questions.....	13
4.2.1 Main question:	13
4.2.2 Sub questions	13
4.3 Hypothesis.....	14
4.4 Justification of the study.....	14
5 Theoretical Approach.....	15

5.1	Theories.....	16
5.1.1	<i>Constructivist theory.....</i>	16
5.1.2	<i>Andragogy Theory.....</i>	16
5.1.3	<i>Constructivism and Adult education.....</i>	16
5.1.4	<i>Kolb's theory.....</i>	17
6	Conceptual framework.....	19
6.1	Summary of theories and their link with conceptual framework and methodological approach	21
7	Research Methodology	22
7.1	Sampling of respondents	22
7.2	Tools	23
7.3	A critique of PRA as a methodology	23
8	Research Findings.....	25
8.1	Summary of findings.....	25
8.2.1	<i>Observation.....</i>	28
8.3	Indigenous knowledge.....	28
8.4	Differences between conventional extension and Farmer Field Schools.....	30
8.4.1	<i>Information Flow</i>	30
8.4.2	<i>Follow ups.....</i>	30
8.4.3	<i>Farmers' Innovation and Intercropping.....</i>	30
8.4.4	<i>Spread of farmers' ideas.....</i>	30
8.4.5	<i>Use of available resources.....</i>	31
8.4.6	<i>Experimentation and Solutions</i>	31
8.4.7	<i>Learning duration</i>	31
8.4.8	<i>Field support.....</i>	31
8.5	Effect of FFSs on farming system.....	32
8.6	Benefits from Farmer Field Schools.....	34

8.6.1	<i>Crop Variety</i>	35
8.6.2	<i>Food Security</i>	35
8.6.3	<i>Pesticide-free produce</i>	35
8.6.4	<i>Agronomic practices</i>	36
8.6.5	<i>Food crops versus Cash crops</i>	36
8.7	Information Sharing	36
8.8	Active experimentation	36
8.9	Applicability and Relevance	37
8.10	Sustainability	38
8.11	Problems	38
8.12	Solutions	40
8.13	General	40
8.14	Discussion	41
9	Conclusion	42
10	References	44

List of Acronyms

ADA-Agricultural Development Authority.

AFC- Agriculture Finance Corporation.

Agritex- Agricultural Technical and Extension Services.

AffOResT- African Farmers Organic Research and Training.

CAMPFIRE- Communal Areas Management Programme for Indigenous Resources.

CMB-Cotton Marketing Board.

CIRAD – Centre de cooperation Internationale en recherche Agronomique pour le Development.

CCZ- Cotton Company of Zimbabwe.

FAO- Food and Agriculture Organization of the United Nations.

FFS- Farmer Field School.

FFW- Farmer Field Worker.

IPM- Integrated Pest Management.

LGDA-Lower Guruve Development Association.

NPM-Natural Pest Management.

PRA- Participatory Rural Appraisal.

SAP-Structural Adjustment Programme.

SFFW- Senior Farmer Field Worker.

SIDA-Swedish International Development Co-operation Agency.

1 Introduction

Western society, along with agricultural science has become dominated by scientism as the only accepted mode of analysis and understanding (Abel & Stocking 1981). The Western scientific educational institutions have also influenced agricultural scientific training in the South. As a result extension services offered by these are much oriented towards high external input and production for the export market. Gibbon *et al* 1995 pointed out that

“Much of the thinking behind modern agriculture, which is driven by western scientific ideas, policies of continued growth, artificially distorted markets and with high dependence on non-renewable resources, is flawed as it does not take account of current or projected consumption patterns or long-term environmental and health hazards”
(p 215)

As it was brought to the south, modern agriculture did not consider the socio-cultural, economic and environmental realities of the societies concerned. In his book *Environmental Sociology; A social constructionist*, Hannigan points out that practical knowledge about the environment often originates from the everyday experiences of villagers, small farmers and others in the Southern societies (Hannigan, 1995). Leaving out the experiences and indigenous knowledge of the farmers in the South has often contributed to the unsustainability of modern farming.

Gibbon *et al* (1995) pointed out that more sustainable agriculture systems may only emerge by developing an understanding of individual situations, by allowing local knowledge to flourish, by understanding local cultures, values and institutions, and by combining these with scientific insights and more conventional ideas and practices, along with appropriate methods of experimentation and discovery.

In attempts to develop more sustainable agriculture systems, alternative ways have been explored and farmers have been involved in many different ways. The following approaches or modes of operation are just some examples:

- a) Low External Input Agriculture (LEIA): As the name implies this system aims at low use of external inputs such as chemical fertilizers, pesticides and herbicides.
- b) Participatory Technology Development (PTD): This is when technology is developed with the involvement of farmers, so that it is likely to be suitable for the farmers who are going to use it.
- c) Participatory Extension (PARTEX): This is a process where farmers are not treated as mere beneficiaries but as equal partners who also have something to contribute to the process of change.
- d) Farmer Interactive Extension or Farmer-to-Farmer Extension: This is when farmers share experiences.

- e) Agroecology: This term incorporates ideas about a more environmentally and socially sensitive approach to agriculture, one that focuses not only on production, but also on the ecological sustainability of the production system (Altieri et al, 1987).
- f) Farmer Field Schools (FFS) are a most recent development in this family; where farmers are trained in a wallless school, which is situated in the field, and the field is used as the main reference material. Farmers and facilitators are co-learners and farmers learn through active experimentation.

2 Background to the study site

2.1 The study area

The research site is in Guruve district, which lies in the Zambezi Valley (see map in appendix 1). Guruve district is found in the north of Zimbabwe and it is geographically divided into Upper and Lower Guruve by an escarpment. The latter being part of the Zambezi Valley because it falls in the Zambezi Valley basin. These two parts of the district are very different both in the type of landscape and climate, and therefore, the agro ecological zone¹ they fall into. Upper Guruve is at an altitude of about 1300m above sea level with a rugged terrain. Maximum daily temperature in summer is 26 degrees Celsius. The average annual rainfall is 700mm. Most of Upper Guruve falls under Agro ecological zone III. Lower Guruve is low, with an altitude of about 400m above sea level and has a gently sloping terrain. It falls under agro ecological zones IV and V. Temperatures are generally high, and maximum daily temperatures in summer are 36 degrees Celsius. Rainfall is generally low, down to 400mm average annual rainfall and in some areas down to 300mm. Effective rainfall is even lower as evaporation is extremely high because of high temperatures. High average temperatures and low annual rainfall makes it an uncomfortable place to stay.

Lower Guruve and Upper Guruve fall under the same administration. Upper Guruve has been the most developed part of the district and has developed infrastructure, and so the local government offices and rural district council offices are found there. The elected councillors from Lower Guruve and Upper Guruve represent their people in the council. Lower Guruve was, and is, generally viewed as backward. This seems to have been the assumption of both government and donors. It was on this basis that the mid Zambezi project was initiated (more carefully described below). Even after the mid Zambezi project there are several institutions working in Lower Guruve who are not necessarily working in Upper Guruve. These are:

- a) Lower Guruve Development Association- This is a community-based organization, which is working on several projects that include food security, natural resource management, and gender issues.
- b) ADA- Government owned farm and irrigation scheme.
- c) Campfire- Community natural resource management programme with special emphasis on wildlife management.
- d) CIRAD- a non-governmental organization working on community natural resource management with special emphasis on forest management.
- e) World Vision- a non-governmental organization that works on agricultural projects.
- f) AffOResT- a non-governmental organization training farmers organic farming and Natural Pest and Disease Management.

¹ Zimbabwe is divided into five agro ecological zones, which are demarcated according to agricultural productivity of the area. Zone one is the most productive with highest rainfall and deep fertile soils while zone five is the least productive with very little rainfall and poor soils.

2.2 The People

People of different ethnicities inhabit the Zambezi Valley area. Originally the area was home to the Korekore and the Chikunda ethnic groups. Low rainfall, high temperatures and Tsetse fly infestation discouraged many people from settling in the area. The rainfall aspect is an important factor because most Zimbabwean villagers depend on farming for their livelihood. Tsetse fly infestation was a hindrance to farmers who keep domestic animals, mainly cattle. Roads and bridges and other communication infrastructure were underdeveloped, while schools and health centres were limited. As a result this area was home to a few people and wildlife.

These people did both dry land farming as well as stream bank cultivation on the fertile banks of the two major rivers, Zambezi and Hunyani when water levels went down in the dry months. Because farmers did not have implements to open up land, the land under cultivation was as low as four acres per farmer. Most of the farmers only grew crops such as maize, sorghum and millet, and beans and cowpeas were grown to a lesser extent for family consumption, with the little surplus being sold or exchanged with neighbours. Historically it is believed that they grew cotton and made their own clothes (Ruwitah, 1994). The majority of the residents who came in after 1980² are immigrants mostly of Zezuru ethnic group who came from Upper Guruve and, the Karanga ethnic group from Masvingo (Masvingo is one of Zimbabwe's 7 provinces). These groups came in after the villagisation programme of the mid Zambezi project and the eradication of tsetse flies.

2.3 The Mid Zambezi Project

This is a project, which was earmarked to settle about 3000 new families and was initiated by the government in the early 80's. All households were to have a residential plot of 1 acre each and a 12 acre plot for cultivation. Land allocated could be adjusted for polygamous households, for each additional wife additional 2.5 acres were allocated to a limit of four wives. Widows were eligible to become 12 acre plot holders provided they have dependents. Elderly widows who do not have dependents living with them were allocated 2.5 acres of arable land and a residential stand. The project was also designed to provide a range of services to the Zambezi Valley residents. These include: improved agricultural credit schemes, increased agricultural extension services, formation of cooperatives, natural resource management, infrastructure development including roads, and water supplies; educational development including new classrooms and housing for teachers, rural service centres, and clinics (Derman B, 1997).

2.4 Agricultural production

The eradication of tsetse flies enabled the new settlers to bring in cattle. Original inhabitants who did not keep cattle before started to buy them. The bringing in of cattle and their use for draught power meant that the farmers could manage to open up and work on bigger pieces of land. The preconditions of an agricultural boom looked like they had been set.

New settlers and new extension advice brought in cotton as a major crop grown, which did quite well in the deep virgin soils which were fertile, and thus suited this crop very well. The

² Zimbabwe attained independence from the British colonial rule in 1980.

crop flourished and soon the government parastatal, CMB, built a marketing depot in the area to purchase cotton. As the production increased other cotton buyers also came into the area. Producing the crop was profitable and the subsidies offered by the government on agricultural inputs made the profit margin even greater. Farmers managed to purchase more cattle and a few farmers even bought tractors. These tractors and some, which came in for hire, helped to further increase the cropping acreage.

By getting profit from growing cotton, farmers reduced so much on growing food crops, which they preferred to buy using proceeds from cotton, partly because maize which constitutes the staple diet for most of the people did not do well under the given climatic conditions. The next best possible crops which were sorghum and millet were not economically viable to grow and are also difficult to process. Farmers therefore felt that growing more cotton was better than using the land for the food crops, because they would use the proceeds from cotton to buy maize, send children to school and could afford some luxuries soon after the cotton sales. Cotton was therefore in many cases and in most fields monocropped with little or no rotation (Interview, Key informant, August, 2001).

Monocropping of cotton brought in many pest, disease and weed problems. Chemical companies quickly came in to sell pesticides in the area and credit arrangements were made for farmers who did not have cash to pay for the pesticides. Some financing schemes such as Agribank, AFC's loaning scheme, CCZ also came in with loans to cover not only pesticide but also land preparation, and purchase of seeds. Some development agencies also came in with such loaning schemes as cotton packs where each pack would consist of chemicals for different pests and for each pack there would be a tilled acre. For all these loans, farmers could then pay at the end of season after sales or, the money would just be deducted from the CMB. The availability of all these loans biased towards cotton enhanced the production of the cotton crop, and fostered monocropping and enforced pest and disease problems. This is so because farmers could not get loans for inputs for other crops.

The government began reducing the subsidies on agricultural inputs and completely stopped them in 1989 in accordance with Economic Structural Adjustment³ Programme. Since farmers were not used to bear the full agricultural input costs, this strained their budgets. Meanwhile pests had developed pesticides resistance, which called for stronger brands of pesticides and higher concentrations and this led to spraying more times than before. This further increased the cotton production costs. As production costs kept increasing, prices of cotton were not increasing concomitantly. Farmers started experiencing diminishing returns. This led to reduction in acreages and some resource poor farmers even stopped growing the cotton, as they could no longer afford to buy chemicals (AfFOresT 1999).

2.5 The need for a new farming system

Reduction of cotton acreage by some resource poor farmers of Zambezi Valley and dropping of the crop by many of them has led to very negative implications on their livelihoods. For a long time farmers had depended on cotton to meet a number of household needs; the proceeds from cotton were used to send the children to school, buy food and for other household expenditures such as hospital fees and clothing. Farmers still need to grow crops for both food and income. So far cotton has been the cash crop that has successfully been grown in the Zambezi valley.

³ Economic Structural Adjustment was introduced in Zimbabwe in 1987.

The extension services available had inappropriate technologies, which were developed for the high external input agriculture, which farmers could no longer afford. In order to be able to continue growing food crops as well as cotton profitably, there was need for farmers to change the way they were farming and switch to a farming system that uses little or no external inputs. This led to the re-introduction of organic agriculture. Organic agriculture is a traditional production system that avoids or largely excludes the use of synthetic compounded fertilizers, pesticides, growth regulators and livestock feed additives. To the maximum extent feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes and aspects of biological pests control to maintain soil productivity and tilth; to supply plant nutrients and to control insects, weeds and other pests (Lampkin, 1990). This was much so considering the government budget deficit leading to reduction of expenditure on agriculture. Agritex extension workers' activities were cut (they in the first place were not covering all the farmers) due to lack of resources. Organic agriculture had been dropped with the coming of the modern agricultural system as it was seen as inferior. A few very old people were still practicing it on very small portions and so most of the knowledge had been lost. Most farmers knew about the use of indigenous knowledge through observation from their grandparents and a few had actually practiced it.

2.6 Training

There has been information gap between the early farmers who solely depended on the indigenous knowledge, locally available resources and biological pest control and farmers who had been exposed to the modern way of farming. To reintroduce organic farming there was need to train farmers. The information gap that was created by the current extension service had to be closed in order to empower the farmers to be able to grow cotton without chemicals. Making farmers to learn about Natural Pest Management (NPM) made this possible.

A local NGO, AffOResT began working with the Zambezi Valley farmers in 1996 who were willing to re-introduce organic farming techniques adapted to cotton and other food crops through training. The trainees being adult people who would not want to spend time learning without production, it was necessary to have a learning situation in which farmers learn as they produce. The farmers' experiences and indigenous knowledge would form the basis of learning upon which they would experiment with scientific knowledge. This was made possible with the FFS approach, which is a participatory training of farmers. The FFS approach was borrowed from FAO run FFSs in Asia, in which case the focus was on rice production. This approach is used to teach simple science even to the illiterate and semi-literate farmers. The FFS helps them as science is simplified and most of the learning is done through discovery whilst using their own field as the main reference. The field school also removes the fears of bringing the elderly to a classroom context, where they learn with no immediate benefit. With the field school farmers learn while they work in their fields and get results within the first season. Farmers also learn in a more relaxed atmosphere with no outsider interference. The knowledge acquired in the FFSs enables farmers to make their own decisions about pest management and other agronomic practices. The FFSs at AffOResT were tailor made to suit the Zimbabwean conditions. The tailor-made FFSs are different from the original ones in several ways, which will be elaborated further in the chapter.

3 Farmer Field Schools

3.1 History and Objectives

Farmer field school (FFS) approach was originally developed by an FAO project in south east Asia as a way for small-scale rice farmers to investigate, and learn for themselves the skills required for, and benefits to be obtained from adopting Integrated Pest Management (IPM) practices in their paddy rice (FAO 2000). This was a response to the presence of the leafhopper, which was threatening food security as the hopper was destroying the crop; while its natural enemies were wiped out by the heavy use of pesticides and the hopper itself had developed resistance towards the pesticides being used (Braun et al 2000).

The FFS approach offers an alternative to the traditional extension approach where farmers are reduced to recipients of externally formulated recommendations. In this approach, farmers go through a learning process in which they are presented with new technologies, new ideas, new situations and new ways of responding to problems. The knowledge acquired through this learning process is then used to build on the existing knowledge enabling farmers to adapt the technologies to the best advantage of their own situations. Knowledge gaps between the new technologies and the existing knowledge are addressed through experiential discovery based learning guided by a trained facilitator.

The FFS for rice were designed for a group of 20-25 people who would meet for weekly sessions throughout the growing season for up to 10 weeks; the following are the major concerns of the FFS group:

- To grow a healthy crop
- To conserve natural enemies of insect pests
- To monitor the fields regularly
- To become IPM experts

Weekly meetings begin 3 weeks after transplanting. Improved decision making emerges from a process of analysing a situation from multiple view points, synthesizing the analyses, making decisions accordingly, implementing decisions, observing the outcome and then evaluating the overall impact. New knowledge and insights at each stage require revision of earlier stages and modification of earlier assumptions (FAO, 2000).

3.2 Farmer Field Schools Approach

The following are the characteristics of the Farmer Field Schools Approach:

- ***Farmers as experts.*** Farmers 'learn by-doing' i.e., they carry out for themselves the various activities related to the particular farming/forestry practice they want to study and learn about. This could be related to annual crops, livestock/fodder production, orchards or forest management. The key thing is that farmers conduct their own field studies. Their training is based on comparison studies (of different treatments) and field studies that they, not the extension/research staff conduct. In so doing they become experts on the particular practice they are investigating.
- ***The field is the primary learning place.*** All learning is based in the field. The rice paddy, yam plot, maize field, banana plantation, coffee/fruit orchard, woodlot or grazing area is where farmers learn. Working in small sub-groups they collect data in the field, analyse the data, make action decisions based on their analyses of the data, and present their decisions to the other farmers in the field school for discussion, questioning and refinement.

- ***Extension Workers as Facilitators Not Teachers.*** The role of the extension worker is very much that of a facilitator rather than a conventional teacher. Once the farmers know what it is they have to do, and what it is that they can observe in the field, the extension worker takes a back seat role, only offering help and guidance when asked to do so. Presentations during group meetings are the work of the farmers not the extension worker, with members of each working group assuming responsibility for presenting their findings in turn to their fellow farmers. The extension worker may take part in the subsequent discussion sessions but as a contributor, rather than leader, in arriving at an agreed consensus on what action needs to be taken at that time.
- ***Scientists/Subject Matter Specialists work with rather than lecture to Farmers.*** The role of scientist and subject matter specialists is to provide backstopping support to the members of the FFS and in so doing to learn to work in a consultative capacity with farmers. Instead of lecturing to farmers, their role is that of colleagues and advisers who can be consulted for advice on solving specific problems, and who can serve as a source of new ideas and/or information on locally unknown.
- ***The curriculum is integrated.*** Crop husbandry, animal husbandry, horticulture, siculture, land husbandry are considered together with ecology, economics, sociology and education to form a holistic approach. Problems confronted in the field are the integrating principle.
- ***Training Follows the Seasonal Cycle.*** Training is related to the seasonal cycle of the practice being investigated. For annual crops this would extend from land preparation to harvesting. For fodder production would include the dry season to evaluate the quantity and quality at a time of the year when livestock feeds are commonly in short supply. For tree production, and conservation measures such as hedgerows and grass strips, training would need to continue over several years for farmers to see for themselves the full range, costs and benefits.
- ***Regular group meetings.*** Farmers meet at agreed regular intervals. For annual crops such meetings may be every 1 or 2 weeks during the cropping season. For other farm/forestry management practices the time between each meeting would depend on what specific activities need to be done, or be related to critical periods of the year when there are key issues to observe and discuss in the field.
- ***Learning materials are learner generated.*** Farmers generate their own learning materials, from drawings of what they observe, to the field trials themselves. These materials are always consistent with local conditions, are less expensive to develop, are controlled by the learners and can thus be discussed by the learners with others. Learners know the meaning of the materials because they have created the materials. Even illiterate farmers can prepare and use simple diagrams to illustrate the points they want to make.
- ***Problem-posing/problem solving.*** Within this form of training problems are seen as challenges, not constraints. Farmers' groups are taught numerous analytical methods. Problems are posed to groups in a graduated manner such that trainees can build confidence in their ability to identify and tackle any problem they may encounter in the field.

- **Field based education.** Put farmers in a classroom and if they have been to school, what they remember are the bad times they probably had in the classroom. Education in the classroom can only mimic the natural world. Putting the classroom in the field allows the field to be the learning material and the farmer to be able to learn from real life examples. Putting the classroom in the field means that the educator (extension worker) must come to terms with the farmer in the farmer's domain.
- **Group dynamics/team building.** Training includes communication skills building, problem solving, and leadership and discussion methods. Farmers require these skills. Successful activities at the community level require that farmers can apply effective leadership skills and have the ability to communicate their findings to others (*FAO, 1993*).

3.3 Concepts and principles guiding the Farmer Field School approach

3.3.1 Communication

Communication in extension has come to mean the marketing of informal packages. Messages are crafted to focus on a particular aspect, put on flip charts, the mass media, or posters that are developed in central offices. In addition they may be disseminated to farmers via 'model' demonstration farms where the farmer is effectively serving as a laborer, merely following the instructions of the research or extension worker. The extensionists ignore the farmer's view and implement their decisions in his or her field. This approach does not educate and use of these communication approaches does not educate a farmer; they treat him or her as the target. Education is the most important thing that an extension programme can do and the farmer is the most important person being educated. Within the education approach, communication must take place at the field level, dealing with field issues in a dialogue with learners. The communications model cannot do this. However it can be done within the context of the farmer field school. The field school deals not only with the practice that farmers want to learn about but also with farmers as farmers. Such farmer field schools are conducted for the purpose of helping farmers to master and apply field management skills. The farmer implements his or her own decisions in his or her own field.

3.3.2 Principles not Packages

Educational programmes should not promote packages in which are presented weekly-atomized messages. Educational programmes should take a broad integrated approach to working with farmers, based on the belief that farmers want to learn to be better farmers and wish to optimise their incomes. The FFS approach teaches principles, any activity encompasses several principles, principles bring out cause and effect relationships, principles help farmers discover and learn, principles help farmers to learn so that they can continue to learn. Packages have nothing to do with learning and do not encourage learning; in the long run they are neither cost effective nor effective at improving the quality of farmers' management skills. Skilled farmers can optimise yields independently of others. Packaged approaches increase the dependence of farmers on central planners.

3.3.3 Training Driven Research

Research must be responsive to field needs. By and large researchers have got it backwards; field needs have to adapt to the research results. Research programmes in agriculture drive

the extension or education programme that the research should actually be serving. What farmers need to know to be able to operate sustainably, both environmentally and economically, should drive the research programme. In the FFS approach, research is based on training needs or is a part of the training itself. Through their participation in the field schools farmers can become a part of a wider programme of local, district and national research networks investigating agricultural production problems and developing local solutions for improving the sustainability and productivity of the country's farming systems (FAO, 2000.)

3.4 The spread of Farmer Field Schools

The success of FAO FFS approach in South East Asia led to it being extended into the other parts of Asia, Central America and Africa. There has been a shift from the original rice crop to other crops, which means the approach had to be tailor made to suit these crops. Examples in point are: Indonesia adopted the Integrated Pest Management as a national policy in 1986 and there have been a lot of initiatives to expand IPM to other crops such as horticultural crops. A good example of that was the 1994 project in Java carried by the Research Institute for Legumes and Tubers (Braun *et al*, 2000). In Africa, in 1996 FAO worked with an IPM vegetable project in Sudan and in 1996 it was involved in training agricultural extension workers in a cotton IPM project in Zimbabwe. There is a new IPM project, which started in February 2000, which will support the training of cotton farmers in Bangladesh, China, India, Pakistan, the Philippines and Vietnam. This is funded by the European Union and is managed by FAO, this is a sister project to two existing Regional IPM Programme for Community IPM in Asia, and the Inter-country Programme for vegetable IPM (FAO Community IPM- News, 2000).

FAO started in 1996 to adapt the FFS concept to other aspects of farm management. This includes integrated soil and plant nutrient and water conservation's pilot project in four Southern Asian countries (FAO 2000). Realising the success of FAO FFSs, other countries have tried to adapt FFS to other methods of crop protection. Thailand, Vietnam, and Australia have tried to adapt FFS to organic farming. However there is no literature on these projects. Zimbabwe has now joined, with AffOResT tailor making the IPM FFS to suit NPM FFSs.

3.5 Differences between FFS run by FAO and those run by AffOResT

While the motive behind FFSs is the same, that of removing the dependency by farmers on chemical pesticides for pest control, AffOResT FFSs were modified hence they differ from those run by FAO in the following:

- Trained farmers do facilitation of the AffOResT FFS so that the knowledge does not only stay at higher levels. This is because experience has shown that training farmers will enable the knowledge to stay in the area than training extension workers who will eventually leave to work in other areas or look for other jobs elsewhere. Besides farmers learn better from their peers with similar experience. Van de Flirt *et al*, (1995) also pointed out to the fact that farmer-facilitators have shown more motivation and that they sometimes are more effective than their professional counterparts. Farmers learn better from their peers because they speak the same language and they are affected by the same problems.

- Farmers are trained in Natural Pest Management (NPM) as opposed to Integrated Pest Management (IPM). NPM does not allow use of any chemicals whereas IPM allows for use of pesticides as a last resort.
- The farmers' group membership is 11 including the facilitator as opposed to 25 for FAO FFSs. This gives the group members better opportunities for observing, interacting and sharing experiences. During the agroecological surveys the group split into two sub groups of five participants each, and the facilitator will be moving from one group to the other as she/he facilitates the process.
- Weekly meetings start during land preparation so as to cover all aspects of plant production, as they are all important in NPM as opposed to FAO FFSs, which start 3 weeks after planting. The other topics covered are on soil fertility as in the integrated soil and nutrient management and conservation project of FAO.

4 Research Problem

The FFSs have been implemented in the organic cotton project for the resource poor farmers of the Zambezi Valley. These FFSs were first established in 1997 and about 800 farmers have been reached. The farmers have managed to produce cotton and other food crops without using pesticides and it appears their pattern of farming has since changed. However it is not clear if farmers have managed to do this because of the learning at the FFS or not. If the resource poor farmers have gained knowledge at the FFSs, it is the aim of this research to find out from the participating farmers what exactly they learnt that influenced this farming system. The FFS as a methodology might be having problems that need to be addressed so that they become more beneficial to the resource poor farmers. It is also the aim of this research to check on these issues and to check on whether the approach and methods might have a wider application.

4.1 Research Objectives

The following are the objectives of the research:

- a) To examine the relevance of a FFS learning approach to the resource poor farmers of the Zambezi Valley.
- b) To examine the impact of active experimentation and Indigenous Knowledge⁴ on the farmers' learning process.
- c) To find out problems which are being experienced in the FFS and their possible solutions.
- d) To see whether the approach may have a wider application.

4.2 Research Questions

The following is the main question and the sub questions guiding the research.

4.2.1 Main question:

Can FFS be a platform for farmers to develop a farming system using indigenous knowledge and active experimentation to develop new knowledge?

4.2.2 Sub questions

- a) To what extent did the new knowledge acquired during FFS help farmers to change their farming practices?
- b) To what extent did the farmers' indigenous knowledge contribute to the learning of farmers at the NPM FFS?
- c) In what way did active experimentation contribute to NPM Farmer Field Schools?
- d) Were farmers active participants in the FFSs, if so what did the farmers gain by participating in the school?
- e) What, in the farmers' opinion, should be improved in FFS and how?

⁴ The knowledge a community has which is not influenced by outside knowledge and is passed on from generation to generation.

4.3 Hypothesis

Farmers have a dynamic indigenous knowledge that has constantly been changing and being updated with time. This is the knowledge that they have been using to grow their traditional crops. If this knowledge is re-activated, and updated by incorporating it with scientific lessons learnt from the FFS and used to grow cotton organically, this resultant farming system can lead farmers out of dependency on chemicals and lead to food security.

4.4 Justification of the study

The NPM FFS have been running for three years from 1999 to 2000. It is important that these FFS be evaluated so as to check on their relevance and suitability as a learning process for the resource poor farmers. It is on the basis of this research that these FFS can be spread to other areas and can be applied in different situations.

5 Theoretical Approach

Agriculture extension has, until recently been primarily based on a positive-realist epistemology. Positive-realist epistemology assumes that: "Reality exists independently of the human observer, and that scientific research is the source of innovations. (Röling and Wagemakers, 1998, p11). In this epistemology farmers are regarded as objects, whose development depends on the research results of science and they are not given room to participate as agents of their own change.

Information has been transferred in a linear communication process. From international research centres to national research centres, where it is locally adapted, to subject matter specialists who translate it for extension purposes into technical recommendations, to village level extension workers who pass the recommendations to contact farmers. Farmers are just receivers of technology that has been developed without their involvement or consultation. The technology often falls out of the farmers' environmental; socio- economic and political constructs and is therefore not relevant. On the other hand a closer look at positive realism shows that although it ignores the farmers' perspective, it provides an argument standpoint as it have contributed in some way to the increasing productivity of many agricultural systems. However whether these advances are sustainable remains to be seen.

Although positive-realist epistemology alone is still being used but on its own it is increasingly becoming incompatible with the search for sustainable societies. There is an on going paradigm shift within extension work from this old epistemology to another epistemology which is Constructivism (sometimes also called Constructionism). Constructivism epistemology considers reality as something that is not 'given' but rather takes it as something that is actively constructed by people. According to constructivism, reality is created in the discourse of, and negotiations among people as social actors. Constructivism dates back in the 60s, although it was not that widely used. Sir Albert Howard (who is often regarded as the originator of organic agriculture), worked within this epistemology and he derived many of his ideas from consulting with peasant cultivators in India whom he called his 'professors' (Howard 1953 p 222). This is because he believed in farming as a social construct, which for its success depends on the cultivators' knowledge and experience.

This thesis is about farmers, their learning as adults and their farming system. Because of that the thesis is largely based on the constructionist epistemology as the farmer's feelings and points of view have to be considered. In as much as this thesis considers human feelings and viewpoints, it does not ignore the importance of the scientific facts got from positive realism. The reason being that while constructivism is more farmer friendly, it does have its own problems; for instance; everything is considered correct for as long as it is someone's point of view, which is not practical. It does not have a basis for argument, as does the positive realism, which is based on facts. Use of constructivism on its own hampers development because arguments are just based on individuals' experiences and exposure. So in as much as constructivism is good in that it considers the views of people involved, there is a danger in over romanticising on it as it might be detrimental to development. Personally I feel it is good to mix positive realism and constructivism because both theories are important to enhance development. Suchman also supported that in Brunno (1999), when he reiterated the need to develop a discourse that recognizes the deep mutual constitution of humans and artefacts without losing the particularities of the two.

5.1 Theories

The following theories are going to be used in this thesis and below are the justifications for their use.

5.1.1 *Constructivist theory*

In constructivist theory reality is viewed as internal to the owner and that it takes farmers' views seriously. This takes a sharp contrast from behaviourism and cognitive theories whose view to reality is that it is external to the owner where the mind acts as a processor of input from reality (Cooper, 1993; Jonassen, 1991). The following is a quotation from Cooper when he compared constructivism to both behaviourism and cognitivism:

"The constructivist...sees reality as determined by the experiences of the knower. The move from behaviourism through to constructivism represents a shift in emphasis away from an external view to an internal view. To the behaviourist, the internal processing is of no interest; to the cognitivist, the internal processing is only of importance to the extent to which reality is understood. In contrast, the constructivist views the mind as a builder of symbols- the tools used to represent the knower's reality. External phenomena are meaningless except, as the mind perceives them.... Constructivism views reality as personally constructed, and state that personal experiences determine reality, not the other way round". (Cooper, 1993 p 16).

5.1.2 *Andragogy Theory*

Malcolm Knowles developed this theory specifically for adult learning. He describes andragogy as the art and science of adult learning. He contrasts Andragogy to the more traditional Pedagogy, which he argues that is not suitable to adult learners as they are different from child learners.

The theory of Andragogy makes the following assumptions about the design of learning;

- a) Adults need to know why they need to learn something
- b) Adults need to learn experientially
- c) Adults approach learning as problem solving
- d) Adults learn best when the topic is of immediate value

(Brookfield, 1986, Knowles 1980)

Knowles emphasises that adults are self-directed and expect to take responsibility for decisions (Knowles, 1970). This makes this theory relevant to the FFS methodology, as the learners in these schools are adults who are self directed and they have experiences.

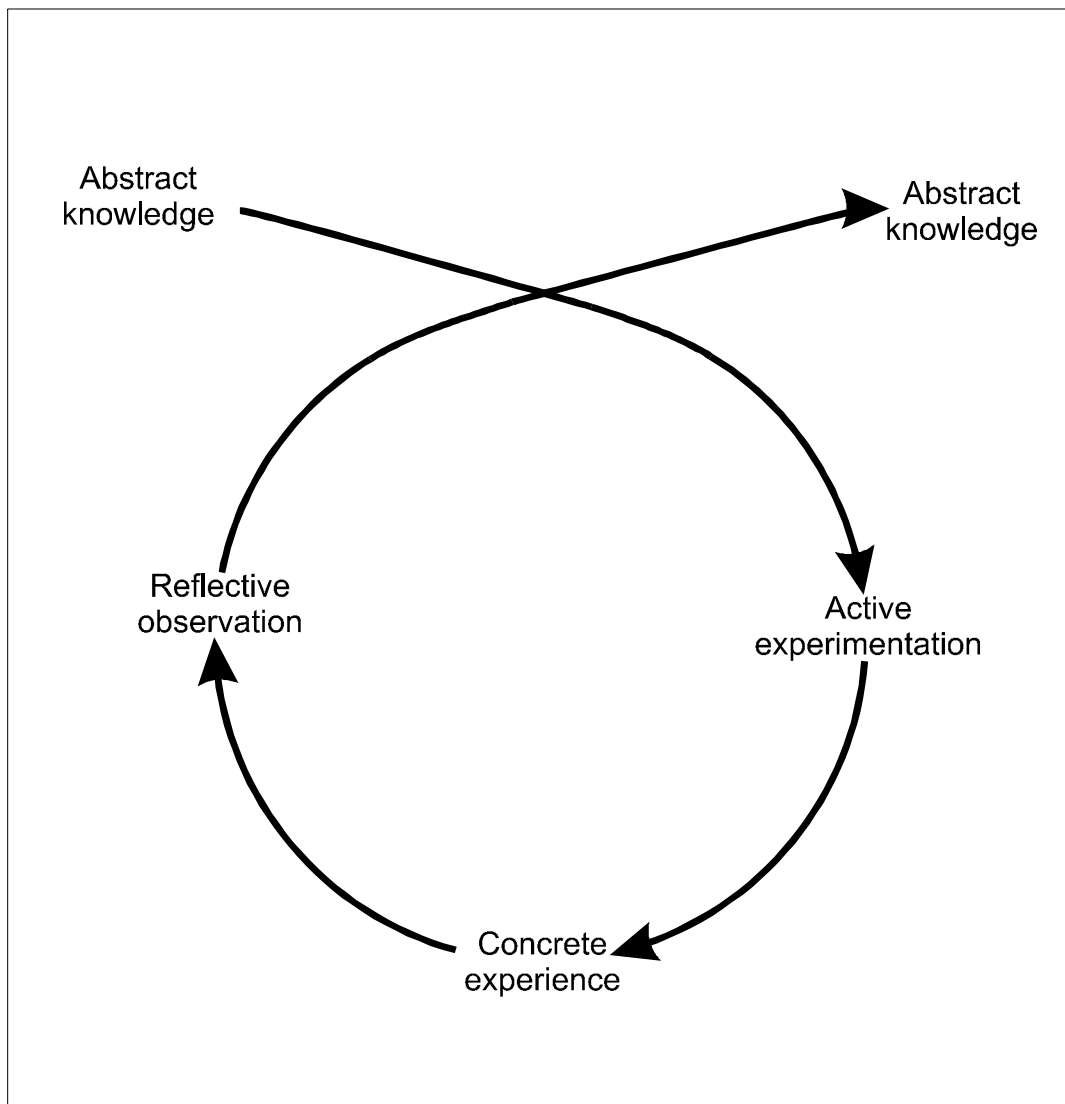
5.1.3 *Constructivism and Adult education*

On exploring adult education theory, one would find that there is little reference to constructivism, but looking closely to the concepts of constructivism there is a resemblance with Andragogy. Malcolm Knowles defined Andragogy as the 'art and science of helping adults learn', which clearly shows that the learning depends on the learner who would construct what is practical to him/her. Therefore in this thesis the theory of Andragogy is considered as related to constructivism.

5.1.4 *Kolb's theory*

Kolb is an education theorist who has developed a learning theory and linked it with practice (King, 2000). He developed a learning cycle, which consists of four different stages, which are: Concrete experience, Reflective observation, Abstract conceptualisation and Active experimentation (Kolb 1984). This learning cycle (see Figure 1) is a process that is repeated but each cycle is different because the learner would have been exposed to more experiences than in the previous cycles, therefore the proceeding cycles are usually more developed than the ones before. In FFS, I assume, farmers are going through this cycle as they learn. Farmers enter into a learning cycle with their experiences upon which they reflect as they get new information, ideas and experiment with them. They gain experiences and knowledge from the first cycle, which they take to the next cycle as concrete experience.

Kolb Cycle



Source: Kolb, 1984

Figure 1: The Kolb Learning Cycle.

6 Conceptual framework

In FFS, the resource poor farmers get into Kolb learning cycles, in turn these cycles are influenced by the environmental, socio-cultural and economic settings of the farmers. The Kolb learning cycles expose the farmers in FFS in ways that are different from the settings or reality of the resource poor farmers who do not participate in FFS. Therefore in this thesis the FFSs are conceptualised as follows:

- a) Farmers already have their indigenous knowledge and experiences before entering into FFS where they gain new scientific knowledge.
- b) Farmers' indigenous knowledge as well as their experiences are influenced by the environment, socio-cultural and political settings.
- c) Farmers acquire new scientific knowledge at FFS. They combine it with their experiences and indigenous knowledge and get into a learning cycle influenced by the environment, socio-cultural and economic settings. The resultant farming system is a product of the combination of all these activities and influences. Therefore scientific knowledge (which are facts from positive realism) in the resultant farming system will no longer be the same as it entered the learning cycle, the farmers who in this case are social actors socially constructed it. This is shown in figure 2

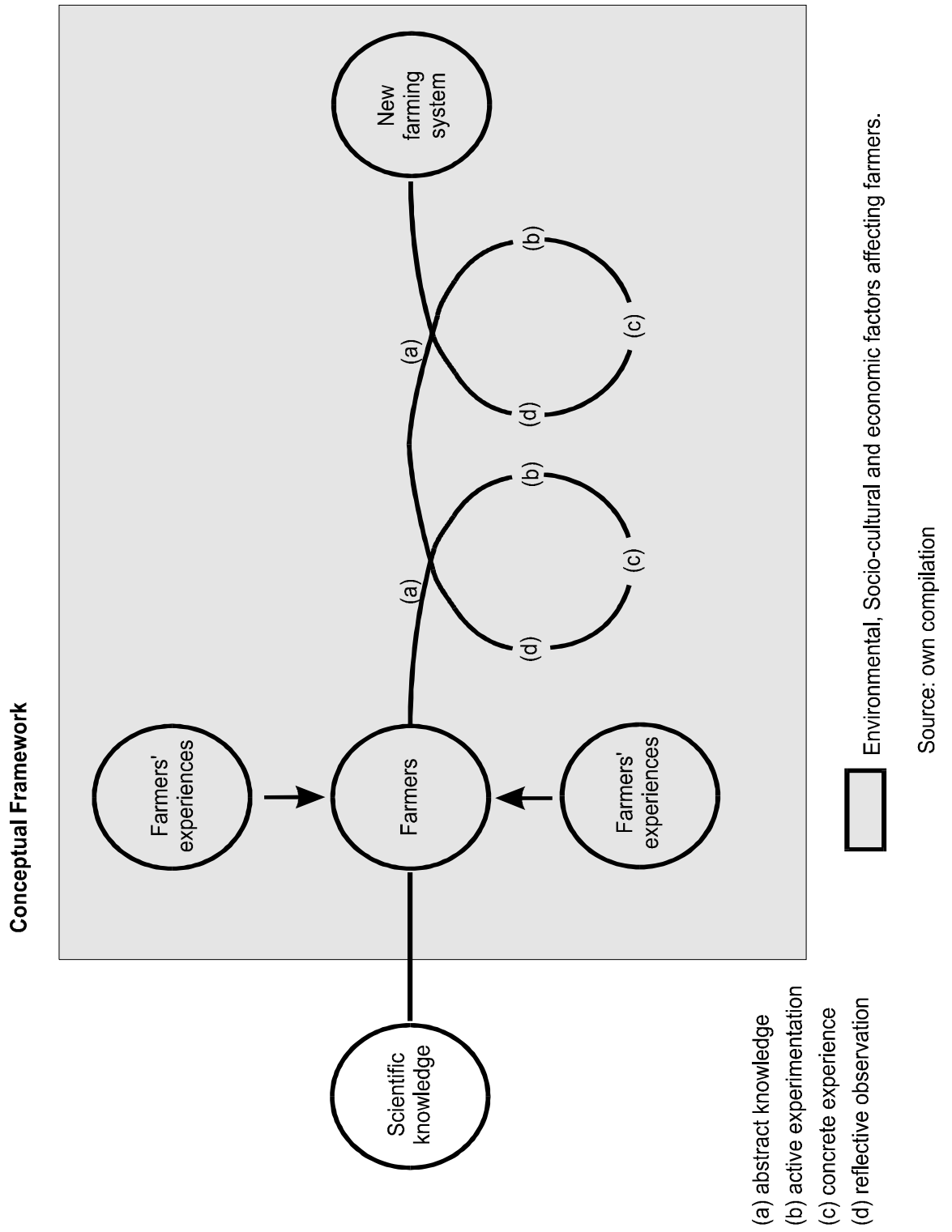


Figure 2: FFS Conceptualisation

6.1 Summary of theories and their link with conceptual framework and methodological approach

The above theories have been found appropriate for this thesis because the thesis is looking at adult farmers who construct their reality through adult learning at the AfFOresT FFSs.

These theories come into play both in the conceptual framework and methodological approach. Basing on the constructivist theory it is evident that farmers know their reality better and they are the ones who can come up with a farming system that suits them. According to Andragogy theory farmers can direct themselves through learning cycles as in Kolb theory as they use their experiences to refine their farming system. The methodological approach used also tallies with the above set of theories in that farmers are not taken as objects but as subjects who can be involved in assessing their own farming system.

7 Research Methodology

The approach to research was participatory where the researcher intended not just to extract information from the participants but to guide them through a learning process. The idea of this is to bring a meaningful change to the participants. The methodology used was Participatory Rural Appraisal.

7.1 Sampling of respondents

Respondents were taken from ward 10 because it gives a good representation of both successful and unsuccessful FFSs, as well as the four major ethnic groups found in the Zambezi valley, namely the Zezuru, the Karanga, the Chikunda and the Korekore. About 10 FFS groups with 11 participants each were studied. Three non-participating members of the society were also interviewed. Thus in total, 113 respondents participated in the study. Of the 10 groups met, 4 groups were led by female FFWs and six were led by male FFWs. There was one group that was led by a young male FFW and all the participants were young men. The other groups with male FFWs, women outnumbered men. For those groups with female FFWs, the group would either have all women or only 30% at most were men. This showed that women were more interested in the schools than men. Women were more comfortable to work with a female FFW than with a male FFW. This was most evident in one group led by female FFW and it had 14 women and 2 men of which both men had their wives in the same group. It was however not common to have both husband and wife attending school. In cases where men were attending as members their wives would be members too and attend on a regular basis but for women members it was not obvious that their husbands would be members. Age of participants varied from elderly men and women to young men and women.

Key informants in the research process were:

- a) A woman senior FFW who has been actively involved in the project since its inception, who is no longer using pesticides.
- b) A man FFW whose group has been performing very well, and had highest yields from all farmers implementing lessons from the FFSs.
- c) All the FFWs in the groups.
- d) Non participating farmers were also interviewed so as to get an outside opinion of the Farmer field schools and their effect on the farming system.

Participating farmers were interviewed in groups as follows:

- a) Successful groups, where success is measured by the farmers being able to reduce chemical use, and being able to implement lessons from the FFSs.
- b) Less successful groups.
- c) Gender difference was addressed by working with groups of men and women separately where necessary.

7.2 Tools

A few tools were used to accomplish the research and the tools used were the ones that were found suitable and effective for both literate and illiterate farmers. By use of pictorial forms, drawing outlines on the ground, and making use of objects and symbols reflecting different things and orders of magnitude, every respondent in the group was motivated to participate. The tools worked in some cases and not in other cases. Thus different sets of tools were used in different groups.

The following are the tools that were used in the research:

- a) *Mapping (group)* - This was done at the beginning of the meeting to break communication barriers and to get the research going. The maps showed the following;
 - i. Residences of participants
 - ii. Names of all the participating farmers
 - iii. Location of their fields
 - iv. Crops grown in the fields
 - v. Relative amounts of different crops in the fields
 - vi. The sizes of land where lessons learnt from the FFSs are being implemented.
- b) *This Semi structured interviews* – These were done with groups and with individual respondents. This is the tool that was used always either to start up a conversation or on follow up questions on some issues that came out after some exercises. This tool was also used for those outside the project, as they did not have much time to participate in the study.
- c) *Matrix scoring* -. This was used to find farmer preferences among topics learnt at the FFSs basing on attributes given by participants. Attributes given by farmers included relevance, applicability, easy to understand, and suitability.
- d) *Score ranking*-This tool was used to look at different topics taught at FFSs, using the above given attributes to cross-examine the answers given in the above exercise.
- e) *Historical trend analysis*-This was used to check on the trend of the farming system, how it has changed from the time before FFSs were introduced and now after the schools were introduced.

7.3 A critique of PRA as a methodology

Students have used PRA extensively in today's research and it has been realised that PRA as a methodology has its own problems when used by students, for instance using PRA for research can lead to an over-emphasis on methods and products rather than the whole process. Also as a student there is always time constraint to follow up the PRA and there are usually no funds to do the follow up. So in most cases for student researchers the success of PRA depends on the relationship between the student and the community being worked with.

These problems are not unique and the following is an analysis of the weaknesses of PRA as they were experienced in the field:

- a) The use of PRA as methodology for research by students is usually extractive as it is rarely followed up by implementation. The research is normally for purposes of producing a thesis for examination and not for helping the communities from where the research is done. However this was overcome by the fact that the researcher has been working with the same community on the program that was researched on and it is the researcher's intention to continue working with the community in implementing the findings of this research.
- b) The researcher has worked in the area for seven years. This means that the researcher knows the community very much and there was possible danger of the researcher having preconceived ideas about the outcome and the researcher is tempted to manipulate the participants so as to get the expected outcome. To overcome this, the researcher tried by all means possible to let participants express themselves freely.
- c) When a student uses PRA methodology normally there is emphasis on tools rather than the process, because of limitations on both time and monetary resources. Although in this research there was emphasis on the tools to get results in the given time, the research is still part of a process because the researcher has been working with the community and will continue working with the same community even beyond this research.
- d) Researchers are always viewed with suspicion, although this is worse with outside researchers, it also happens with local researchers. So it was very important to explain the purpose of the research before going further so that the responses are not biased.

Although in some cases the success of PRA depends on the researchers' relationship with the project, it is not all that easy, as the exercise will bring out new agendas. This means writing new proposals and there is no guarantee of funds for that (especially here in Zimbabwe where donors are pulling out due to political reasons). This may affect the relationship of the researcher and the project, as it is unavoidable to raise hopes during PRA process.

A relationship between the researcher and the project might affect the research negatively. One example was that in one group this researcher had to deal with conflict resolution first before working on the research. If it was an unknown researcher this might not have affected the research, as generally people do not show their conflicts to an outsider.

Although these were the problems found with using the methodology, there were still some positive aspects on the methodology, which in my own opinion made the research more relevant to the participants who also in the end felt that they owned the research results and will benefit from them. PRA played a very important role in empowering the researched, (the local communities) rather than the researcher. The methodology made the research process a very active one which lead to local analyses by the community members themselves and this will eventually lead to a change. PRA also gave a visual language that provided an opportunity for more direct involvement and interaction by both literate, semi-literate and illiterate participants. A lot of data was collected in a short space of time. I also found that some of the data collected was not relevant for this thesis but is very important to the project as a whole, this data will be kept for use in future.

8 Research Findings



Farmer Field school group at one of the PRA sessions

8.1 Summary of findings

The following were the major findings of the research followed by a detailed account of the report.

- a) Farmers' meetings were not done weekly as scheduled but different groups met different times according to their work schedule.
- b) The topics, which were, suppose to be covered in one year could not be finished and different groups were on different topics because the learning paces and topic priorities differed. Different groups had different learning needs because of different problems that they faced. This showed that farmers made decisions about their learning.
- c) Farmers felt their active participation through contributions; information sharing and active experimentation enhanced their learning. The more farmers attended FFS and participated actively, the more confident they became. The active participation enhanced knowledge and it had a bearing on farmers claiming ownership of their knowledge.
- d) Learning did not only last while farmers were at the school, but it was an on going process.

- e) Indigenous knowledge contributed to learning at the FFS as it was shared and then incorporated with scientific knowledge gained at the FFSs for a better and useful result.
- f) Learning at FFS brought about a new farming system that brought back crops that were getting extinct and helped to restore food and nutritional security.
- g) Farmers saw the FFS as a more farmer friendly extension method for the resource poor farmers compared to the conventional extension method.
- h) Farmers felt that they own the knowledge that they gained at the FFS.

For the details of the findings refer to appendix 2 for some of the PRA exercises conducted. There is a problem/solution tree analysing the problems found within the schools and their possible solutions. There is also a sample of the matrix ranking and score ranking to show importance of topics learnt.

8.2 The learning process

At the FFSs, the learning process is facilitated by FFWs who are either men or women who have gone through and passed a month long course in organic production of crops. These FFW are farmers themselves and they normally stay in the same locality as the farmers they save. To qualify for training, nominated FFW has to prove to be an exemplary farmer and literacy levels are not highly considered for as long as one can read and write (Musiyandaka July, 2001, Pers.comm)⁵.

The learning process at FFSs leads to improved decision making which emerges from an iterative process of analysing a situation from multiple view points, synthesizing the analyses, making decisions accordingly, implementing the decisions, observing the outcome and then evaluating the overall impact (Braun et al 2000). It was found out in the group interviews that were conducted with all the groups, (group interview with FFWs, August,2001) that some farmers were reluctant to learn during the dry season, they wanted to learn whilst plants are growing. Farmers meet for schools once every two weeks at one farmer's field and they move from one field to the other. The FFSs were originally planned for once every week (AfFOResT, 1998) but farmers felt that would take much of their time that they would have used to work in the fields. In a group interview with FFWs, the FFWs expressed that having lessons once in a fortnight draws back the learning programme and all the lessons cannot be covered in one year. However in some groups, schools were intensified during the dry season, up to once every week since group members are usually not busy during this time of the year. This has led to farmers making priorities on topics to be learnt at a given time. In most groups ranking exercises showed that the highly prioritised topics were; mixed cropping, pest and disease management which is represented by pests and farmers' friends and scouting for pests and farmers' friends in appendix 2 as well as the use and promotion of natural enemies, natural remedies for pest control. Topics like the importance and use of rainfall records and water harvesting techniques were ranked very low.

⁵ Research & acting training officer with AfFOResT.

Although farmers meet once in two weeks for schools, in between the FFW visit farmers or the farmers consult the FFW or their peers. So learning goes on all the time. During the growing season farmers do not want to miss their fortnightly schools. When a FFW is away they consult a FFW close to their village and they sometimes join the other group for lessons (Mazikana, August 2001, pers comm.)⁶.

In this research farmers expressed an improvement in decision making following learning at FFSs, in addition to that farmers also expressed that the learning process was an empowering process, as they became aware of how they can use the resources around them to improve their farming system. A woman farmer in a group interview that had middle aged men and women came out openly to say:

'Before the FFS we had to grow crops in the same way; we had to put specified amounts of fertilizer, and pesticides after specified periods. Failure to have these pesticides and fertilizers would mean that we could not grow that particular crop. The difference is that the farmer can decide to spray for pests after having scouted the field and verified the level of infestation, besides the farmer would choose to use natural herbal sprays in his/her field' (group interview August, 2001).

In an interview farmers expressed that practicing in fields after learning allowed the lessons to stick to their minds. This helped the illiterate farmers so much and a good example was when an illiterate farmer narrated the lessons learnt as if she was reading from somewhere.

The elite⁷ members of the society felt proud and different from the resource poor farmers. They perceived farmer's learning process as waste of time and that it would not benefit them. On the other hand resource poor farmers felt empowered and found learning process at the FFS as giving them the right information for their situation. However the elite's perception did not influence the resource poor farmers, as the elite farmers are the minority. Some of the elite farmers who had joined the groups before did not stay for long a time because of their lack of patience. They felt the results were taking too long to show. This goes to show that resource poor farmers experience farming practices in a similar way while resource rich farmers have other experiences based on their farming conditions which then differ from other groups of farmers. Reality is then not entirely constructed by individuals but also results from e.g. social, political, economical and ecological conditions out of control of individual farmers or groups of farmers and determined on other levels of society. Decisions that have an impact on the farmers' livelihoods are usually taken on other levels and in most cases by other interests than the interests of the smallholder and in particular the resource poor. The resource rich farmers usually influence the decisions that affect the farmers, but this project together with the research did not give them the forum to influence the decisions, as there was active participation by the resource poor farmers.

Among the group members of ten farmers there were also about one to two farmers who belonged to the elite class but still felt proud about FFSs and the new farming system where there is use of intercropping and use of indigenous knowledge for most agronomic practices.

⁶ FFW with AffOResT.

⁷ The elite members of the society usually have several cows, they have ploughing equipment and as a result they usually use the entire field and at times they end up renting some more farming space from the other farmers who cannot utilise all their land. In addition the elite farmers can afford and therefore uses a lot of chemicals and fertilizers.

However elite farmers with different views like the ones shown above were not found in all groups. These farmers are practicing the new farming system in their fields and they are among the very innovative farmers.

8.2.1 Observation

It was observed during group interviews and PRA exercises that groups that started schools three seasons ago are more confident and their appreciation of what they learnt is greater, this was also confirmed in interviews with FFWs. This is attributed to the experiences gained over the years. The repeated learning process year after year reinforces the farmers' understanding for example an illiterate farmer narrating the benefits of use of natural enemies such as ladybird beetles which feed on aphids and of mixing crops such as planting sweet sorghum along side cotton to control red boll worm in cotton. One farmer confidently commented during an interview;

'I used to think that I can only learn from a trained extensionist, but I have realised that I can also be an extensionist because my colleagues have something to learn from me and I have something to learn from them.' (Mondo, 2001. Pers comm., August 2001).

8.3 Indigenous knowledge

In this thesis indigenous knowledge is regarded as that knowledge acquired by local people and which constantly change as they learn new things about their environment and ways to manage natural resources in a more sustainable manner. However with outside interference indigenous knowledge became very unimportant, the modernization process and the advent of "quick fix chemical solution to problems" devalued it.

An example taken is the indigenous knowledge farmers had which has become so unimportant in the formal agronomic sciences. There are three historical processes that have done so much to obscure the farmers' indigenous agronomic knowledge in Africa. These are:

- a) The destruction of the means of encoding, regulating and transmitting agricultural practices;
- b) The dramatic transformation of many non-western indigenous societies and the production systems on which they were based as a result of demographic collapse, slaving, colonial and marketing processes; and
- c) The rise of positivist science... the difficulty is further compounded by unrecognized biases of agronomic researchers related to social factors such as class, ethnicity, culture and gender. (Altieri, 1987 p 2)

Historically agricultural management included rituals that were put in place to regulate land use practices and to encode the agrarian knowledge of the non-literate people (Altieri, 1987). Ginzburg (1993) has shown how rural ceremonies were branded as witchcraft, and how such activities became the focus for intense persecution.

'...Spanish and Portuguese explorers set sail and European conquest spread over the globe for 'god, gold and glory', part of their larger project included evangelical activities that often altered the symbolic and ritual bases of agriculture in non-western societies.'

These modifications transformed and often interfered with the generational and lateral transfer of local agronomic knowledge.

The above scenario is also evident in Zimbabwe where in 1919 an American missionary called Alvord was brought to the country (then Southern Rhodesia) and appointed chief agriculturist for the instruction of the natives. What he did first was seeking to destroy the validity of indigenous agricultural practices in order to more effectively convert Africans to Christianity. His second move was to seek to 'civilise' and develop Africans by forcing them into European- controlled cash economy thereby forcing Africans to grow maize and discourage the small grains the natives were used to. Alvord's final move was to strive to prove the superiority of his expertise by applying the principles of agricultural science he had acquired while studying for his MSc in the United States (Page and Page, 1992). Alvord's ideas led to reduction in crop diversity, loss of intercropping and loss of indigenous crop varieties. It also made the whole system of local production very vulnerable to a series of drought years and negatively affected food and nutritional security.

The loss of indigenous knowledge has also evidently taken place in the Zambezi valley; there is evidence that by 1923 cotton was traditional crop of Dande⁸ and that it is from there that it spread around, of course after being hybridized (Ruwitah A, 1994). It is however interesting to note that now farmers are trying to go back to the traditional farming of cotton whereby they grow it with no use of chemicals and that they would mix it with other crops such as sweet sorghum and cowpeas, to control pests and diseases. However because of the lost knowledge, the old cropping system has to be learnt again by many of the farmers.

The research at the Afforest FFS showed that FFSs helped to reactivate the indigenous knowledge as farmers shared their knowledge and experiences. Interviews showed that farmers had some indigenous knowledge on farming practices of their traditional crops and this did not extend to the new crops they were now growing. Through group interviews farmers acknowledged that they knew about the indigenous way of farming or at least that their grand parents practiced it, but they did not practice it because it was regarded as an 'inferior' way of farming by everyone because of 'modernism'. Some of the ideas were being forgotten because of lack of practice. Some farmers felt that information sharing and active experimentation reactivated the indigenous knowledge. Farmers did not like to take the indigenous knowledge in isolation but they felt that the scientific knowledge learnt at the FFS also added to the indigenous knowledge to come up with the new farming system. Farmers also expressed that the use of indigenous knowledge helped in bringing back many food crops such as sweet potatoes, *bambara* nuts, cowpeas and sesame, which were getting into extinction. These crops are now being incorporated into the farmers' fields through intercropping. Some farmers felt that FFSs did not only reactivate indigenous knowledge, but the school also added to it and improved the farming system. One example of edification was the intercropping in lines, which was brought through the schools. Farmers used to know of haphazard intercropping (group interviews, -2001).

⁸ The original inhabitants refer to Zambezi Valley as Dande.

8.4 Differences between conventional extension and Farmer Field Schools

Before the introduction of FFSs, the only extension service available was the conventional extension offered by Agritex. The first FFSs groups in the Zambezi Valley were introduced in 1998 and the others were formed in the following year (Hodzi, August, 2001, pers.comm.). This study compares what goes on in Agritex extension with what goes on in FFSs. The following points came out in attributes that came out in ranking exercises:

8.4.1 *Information Flow*

- Conventional extension: Information flows from the extensionist who has knowledge to farmers who are regarded as ignorant.
- Farmer field schools: FFSs create room for farmers to contribute to the learning process through farmer interaction and information sharing.

8.4.2 *Follow ups*

- Conventional extension: There is little if any follow up by extensionists to the farmers' fields. Should a farmer have a problem then he/she has to go and ask the extensionists. Farmers did not know why extensionists did not follow up. Some farmers said they do not have power to ask for improvement of service from the extensionists because they are answerable to their employer, the government.
- Farmer field schools: Farmers meet their FFW every week and the FFW follows up the farmers often. In FFS farmers get advice from the farmers in the group.

8.4.3 *Farmers' Innovation and Intercropping*

- Conventional extension: Farmers' innovation is not taken seriously; Intercropping is discouraged which has led to the loss of many indigenous varieties and food crops.
- Farmer field schools: Farmers' innovations are taken seriously. Farmers come up with their own cropping systems. High crop diversity is encouraged. This has led to the coming back of the indigenous crop varieties.

8.4.4 *Spread of farmers' ideas*

- Conventional extension: Farmers' innovations do not spread that fast because there is little or no opportunity for farmers to share information and ideas. This may take place only once per year at a field day.⁹

⁹ A day set aside for farmers to visit a successful farmer's field or a demonstration plot and learn from that farmer's experiences.

- Farmer field schools: Farmers' innovation spread fast to all group members and even non-members because the FFS provides a constant forum for information sharing.

8.4.5 *Use of available resources*

- Conventional extension: Extensionists are quiet on use of available resources; hence they are keen on working with farmers who use bought in inputs (fertilizer and chemicals). This sidelines the resource poor farmers.
- Farmer field schools: Lessons at the FFS mostly focus on the use of locally available resources in farming. This approach does not put any farmer at a disadvantage.

8.4.6 *Experimentation and Solutions*

- Conventional extension: Farmers are given recommendations based on research results produced by 'experts'. These recommendations are based on use of external inputs, which will disadvantage the resource poor farmers.
- Farmer field schools: Farmers are encouraged to experiment and find solutions to their farming problems. The experiments are farmer driven and they are based on farmer's existing problems. Farmers are empowered as they realise their potential to detect problems and their capacity to solve them.

8.4.7 *Learning duration*

- Conventional extension: Learning only lasts as long as the extensionists are around. Each farmer works on his/her own with no interaction with other farmers.
- Farmer field schools: Learning is a continuous process throughout the whole season. Farmers learn when they meet at the school, they then continue to learn by active experimentation and information and experience sharing.

8.4.8 *Field support*

- Conventional extension: There is not enough field support to the farmers. Each extensionist covers a wide area making it difficult to visit all farmers. The extensionists do not have enough resources; of particular reference was the limited mileage, which makes it even more difficult to visit the few farmers more often. Some farmers said that an extensionist has never visited them.

- Farmer field schools: Each FFW normally¹⁰ works with a group of ten farmers who in most cases are neighbours to him/her. This makes field visits easy and besides farmers and their FFW meet very often at the FFS.

Group interviews carried out showed that farmers felt that the farming system that they used to practice under the guidance of conventional extensionists was imposed on them. They felt that they did not own the farming system as it had restrictions on what to grow and where to grow it. One farmer pointed out that they were not free to do as they wish in their fields, for instance they were not allowed to intercrop in cotton (for fear of pesticides poisoning) but they would just put a few cucumbers and melons for their children to have something to eat when working in the fields. They felt that it led to depletion of their local varieties of food crops such as bambara nuts, sweet potatoes, cowpeas etc. Participating farmers felt that they own the new farming system they have developed in farmer field schools. This is so because through experimentation they are able to trim down what they feel does not work for their situation and take what is best for them. (Group interviews, August 2001).

8.5 Effect of FFSs on farming system

In separate group interviews farmers confirmed that before the introduction of FFSs they used to grow cotton to all the available land. The acreage later got reduced because of removal of subsidies on inputs. Few farmers grew food crops and for those who grew, maize¹¹ was almost the only food crop grown in the field, and vegetables that were only grown in gardens, measuring about a tenth of an acre. A few old farmers were not practicing the modern farming so they had a lot of intercropping and hence a lot of different food crops in their fields.

After introduction of FFSs, there was a decrease in the acreage of cotton and an increase in the different types of food crops used for intercropping (AfFOResT, 1998). Intercropping and crop rotation increased on the variety of crops grown. Most of the indigenous crops that were now being termed ‘orphan’ crops because they were no longer being grown due to the extension service available (Agritex) which did not have support for them were now resurfacing. One farmer summed it up as follows;

‘I now have a lot of food and variety to my family’s diet and I can sell extra to my neighbours. This is unlike in the previous cropping system where intercropping was not allowed. In the new farming system a lot of indigenous varieties are being grown and farmers are now saving seeds instead of buying seed from seed houses’ (Muraga 2001, pers comm.)¹².

The following benefits from intercropping were pointed out by farmers (which is the major component of the new farming system) and these benefits (see Figure 3) are among those pointed out by Altieri (1987):

- a) Total yields per acre are often higher than the sole crop yields even if yields of individual components are reduced.

¹⁰ The exception is one group with 20 farmers. 18 of them are women and the 2 men who are in the group also have their wives there.

¹¹ Maize constitutes the staple diet for Zimbabwean people.

¹² Female farmer, ward 10

- b) Mixtures result in more efficient utilization of resources (light, water nutrients) by plants of different height, canopy structure and nutrient requirements.
- c) Diseases and pests may not spread as rapidly in mixtures because of differential susceptibility to the pests and pathogens and because of enhanced abundance and efficiency of natural enemies. Intercrops provide insurance against crop failure in times of drought.
- d) The intercrops also enhance opportunities for marketing by ensuring a variety of produce for sale.
- e) Intercrops provide effective cover to the soil and reduce loss of soil moisture.
- f) Crop mixtures spread labour costs evenly and they usually give higher gross returns per unit of labour employed, usually during labour scarcity periods.
- g) In cereal/legume mixtures, fixed nitrogen from the legume is available to the cereal and the soil fertility is improved.
- h) The shading provided by complex crop canopies helps to suppress weeds, thereby reducing the need and cost of weed control.

Summary of Intercropping Benefits



Source: Own compilation

Figure 3: Intercropping Benefits

8.6 Benefits from Farmer Field Schools

Farmers expressed that there is a new farming system as a result of FFSs and they elaborated the changes. However women saw the changes differently from men. Men and women had different views about the benefits of the new farming system that showed a gender division. The following were the different views given by men and women:

8.6.1 *Crop Variety*

- Women: The mixing of crops has helped to increase on the yields on a piece of land. A variety of food crops are now being harvested on a single portion where they only used to harvest a single crop in a mono-cropping system. This increased family nutritional status.
- Men: The new farming system is not expensive, as they now know how to use natural resources around them, so there is no need to buy external inputs. The men farmers felt that the FFS has come at a right time when external inputs are becoming very expensive.

Health improved because of a variety of traditional foods introduced which helped to improve the nutritional status of the family.

8.6.2 *Food Security*

- Women: This new farming system has attributed to food security and most importantly nutritional security. In the old farming system it was mostly maize that was grown if at all and the other crops were forgone because the land was not enough and mixed cropping was not allowed.
- Men: The new farming system helped them to increase on their profit since expenditure is reduced.

With the old farming system, all the available land was put under one cash crop (cotton), and a small part if any might be put under maize, the proceeds of cotton would be used to buy food, mostly maize, so the family's nutritional security would suffer.

8.6.3 *Pesticide-free produce*

- Women: The new farming system helped to improve health of the family because there is no pesticides used which were having a negative effect on their bodies. The variety of food crops increased on the family's nutritional status
- Men: They were realizing good prices for their produce because they could secure a niche market for their unique produce.

Men are mostly interested in cash cropping. They are the ones who sell the crop in the end and in most cases they are the ones who have control over the proceeds from cash sales. In most cases men's focus is mostly in line with cash rather than food security for the family.

8.6.4 *Agronomic practices*

- Women: The new farming system suppresses weeds and so it reduces on the amount of weeding.
- Men: The burden of carrying big sprayers was removed, as this was very labour intensive.

It is the men who normally do the spraying of the cotton while women do other jobs such as weeding and picking the cotton.

8.6.5 *Food crops versus Cash crops*

- Women: ‘The amount of food that we harvest is quite a lot and we would not even afford to buy it. These food crops we are now producing would also be difficult to get from the market, so this is a good investment for the family’.
- Men: The new farming system has a disadvantage in that a lot of intercrops reduce on the acreage for cash crop.

Women’s comments were mostly focused on food security and health while men were focusing on profits. This shows gender differences in interests, and for women it shows that they are not interested in the cash because they do not have control over the cash anyway.

Through the group interviews carried and exercises done, farmers generally expressed that FFS led to a change in the farming system. Farmers expressed that they did not have much information about natural farming before joining FFSs but now farmers are growing crops more naturally than before. This is also helping farmers to stay in harmony with their environment. (Group interview, August 2001).

8.7 Information Sharing

In group interviews held at different FFSs, participating farmers acknowledged that, learning, as a group was important because of sharing of ideas. Farmers emphasized that information sharing was on two levels that is, formal and informal levels. On a formal note participating farmers said they were sharing information and research findings at the school. The participating farmers also shared information on an informal note continually with their colleagues outside school and they also shared information with non-member farmers who sought advice and they began incorporating some aspects of the new farming system in their fields. Participants acknowledged that sharing of information by all farmers helped to enhance the farmers’ knowledge base. This led to the improvement of their cropping system as many ideas were put together.

8.8 Active experimentation

This research found out that most of the participating farmers were actively involved in experimentation and the results were shared among the participants who would then implement in their fields. Sometimes the farmers would even advise their FFWS on what

works best for their situation (Teguru, September 2001. Pers comm)¹³. Active experimentation helped to bring in new innovations, farmers admitted that they experienced low yields first and then later on when they were getting experienced their yields started rising. Farmers take active experimentation as a learning process. One farmer said,

'...research is ongoing, sometimes we make mistakes like spraying over-concentrated herbal spray because we are not so sure of the required concentration, but we do not give up, we keep trying until we get the right concentration. That is the way we learn and then we share that at our school and it help us to know what is best for our situation' (Mazhude, August 2001, pers. comm)¹⁴.

In interviews held, farmers felt that it was very important for each individual farmer to have an experiment portion so that the group would have many experiences to learn from. There was much information and advice sharing among the actively experimenting farmers; they felt empowered to disseminate their experiences and findings. One farmer was very confident to say:

'Active experimentation helped me because I now feel I am a researcher myself' (Makore, 2001, pers. comm)¹⁵.

8.9 Applicability and Relevance

A ranking exercise showed a general feeling that all the topics taught were applicable to the learners' situation (see appendix 2). The applicability very much depended on the particular problems that farmers had. For example putting manure or compost in the whole field or scouting for pests and natural enemies was too much work for other farmers. Farmers who had problems in those particular areas had no choice but to do it. One farmer said, *"....we had to do it because we wanted to see the results"* (Farinisi, August 2001. Pers comm)¹⁶.

One farmer felt that it was not necessary to measure rainfall amounts by a home made rain gauge because farmers have their own ways of knowing rainfall amounts which are more applicable than use of rain gauge.

The ranking exercises also showed that topics taught in the FFSs had different relevance to different groups of farmers. This reflected the different problems farmer groups or individual farmers had. Farmers realised relevance in topics that they felt touched on their problems and they would go for the topic that gave direct benefit to them. For example farmers who had poor soils with very low fertility found the soil fertility and soil conservation topics very important and relevant to them. These farmers put into practice what they learnt, unlike other groups who had never used manure although they had learnt about soil fertility. They acknowledged that they do not have soil fertility problems. So these farmers with soil fertility problems would tend to appreciate this topic more than their counterparts with good fertile soils. The topics on pests were relevant to every group as this was seen to be a common problem. However on the pest control part there were some groups (mostly the old groups) who were more interested in the use of natural enemies for control of pests while some were just interested in the use of herbal sprays. This also revealed groups' relative

¹³ FFW, leading a very successful FFS group.

¹⁴ Woman farmer, from a very successful group.

¹⁵ Woman farmer from ward 10.

¹⁶ Woman farmer.

competence in a given topic. Those who had well understood how the natural enemies work would prefer to use natural enemies for pest control rather than to spray herbal remedies and the reverse was true for new recruits who had not yet understood how the natural enemies work.

However there were some farmers who did not just see the relevance of some topics and did not put them into practice, it was found that these farmers ended up adopting the practice when success was recorded by other farmers who adopted the practice. An example of this was on planting dates, which some farmers felt it was better to plant late than early for fear of mid season droughts. Saving of seed was seen as a very relevant topic especially when the farmers could no longer afford to buy seed.

During interviews, farmers expressed that FFS, as a learning process was good and very relevant to the resource poor farmers of ward 10. The project (organic production) that was linked to FFS was too ahead of the learning stage of the farmers and this affected the farmers' performance because there were too many issues to focus on. There is need to operate FFS for at least two seasons before adding other aspects such as marketing and certification.

The above analysis goes to show that farmers' learning is need driven and that farmers would want to put into practice what they have learnt well. Farmers' priorities to learning also differ and this is determined by the problems a particular farmer has. When there are too many things to learn farmers would want to first of all learn on the areas that affect them more.

8.10 Sustainability

Although FFSs have not been practiced for a long time; through discussions held farmers felt it is a sustainable learning process. A statement from one of the farmers has summed this up:

'The knowledge we get from FFSs is remaining with us farmers; even if I don't have a certificate no one will take the knowledge from my head for as long as I keep on practicing. The FFW who is leading us in the learning process is one of us, so I can always approach her for advice if I so wish. This new farming system has become our way of life because we have seen that it works for our situation, especially that it is incorporating indigenous knowledge and use of traditional seed varieties which were getting lost.' (Garikai, 2001, pers. comm)¹⁷.

8.11 Problems

Some FFSs failed but some succeeded. For those FFSs that failed, the following reasons were attributed for the failure:

- a) Selection criteria- there was a feeling that some of the groups betrayed themselves by poor selection of a FFW. They used wrong or inadequate criteria. In most cases the groups whose FFWs were not performing well had

¹⁷ Woman farmer ward 10.

problems in their selection criteria. Most of them prioritized on high level of education instead of looking on the individual's maturity, ability to read and write, interest in the programme and individual farming capability. Groups with mature FFWs who are good farmers themselves were doing very well. There was a feeling that a good selection would have a balance of personality, age/maturity, literacy and interest on the programme.

- b) SIDA, the funding agency promised to pay the FFWs. It withdrew after 3 months and FFWs were left without payment, this demoralized FFWs and led to some not giving enough time to the school and sometimes not going to the school and visiting farmers' fields because they felt they were loosing out on their time, while they were not getting any incentive. The FFWs who were educated after realizing that there were no more incentives they abandoned their groups and looked for jobs. This happened in three of the interviewed groups.
- c) Some farmers in a group were scattered that it was difficult for the FFW to reach them all without a bicycle for follow-ups. The FFW would end up only working with a few farmers who were close by. This led to group disintegration and subsequent fall of the school.
- d) Project Supervisor did not give enough follow up to schools and that led to demoralization of some farmers. Farmers felt the Supervisor was not in their position so he was not empathetic.
- e) Project supervisor's involvement in politics affected most of the schools, they stopped meeting for the whole farming season as they were being associated with the political party opposing the government. Some FFWs stopped working because of lack of support from the supervisor, who was now busy with political business.
- f) Material gains such as seed loan made some people join the schools for wrong reasons and they pulled out after the loans stopped. This led to some farmers joining on a later stage and that had problems on the learning stages that were differing. Women farmers had problems when their husbands were not going to the FFSs. Sometimes women were not given land¹⁸ to practice what they learnt from FFS because the husband would think the land will be put to waste.
- g) In some cases men did not allow their wives to go for FFSs or they would not give their wives time to attend to their portion of land where they were practicing what they learnt as the men would think women were only wasting time. Some men did not want to give their wives pieces of land to put into practice what they learnt at the FFSs¹⁹. Men were however happy when other group members from the school come to visit their wives' field. Men were also happy when their wives harvested a variety of crops.

¹⁸ According to custom, land belongs to the husband or a male member of the family.

¹⁹ According to custom, land belongs to the husband or a male member of the family in cases where the husband is deceased.

- h) Some literate farmers felt it was necessary to document what is learnt to avoid forgetting, but farmers did not have stationery for this.
- i) New farmers needed more follow up in their fields by the FFW and the Project Supervisor, unfortunately they did not get it and they got demoralized.
- j) There were cases of FFSs whose performance was negatively affected by having immature FFWs who could not be respected by the elderly members of the group. (Wingwiri, August 2001. Pers comm.)

8.12 Solutions

- a) Farmers felt a need to motivate the FFWs, so they suggested looking for funding to pay the FFWs, failure to which farmers in the group should pay a token of appreciation to their FFW at the end of the season.
- b) FFWs should have bicycles so that they are able to visit all farmers within a short space of time and be able to return to work in their fields, because they are also farmers.
- c) Farmers felt that they would want to promote one of their SFFWs to a supervisory position. Having been elected, the new Supervisor will be answerable to the farmers and is expected to provide good service since he/she is also a farmer.
- d) There is need to screen the FFW on the basis that the candidate is interested in the project, has self motivation, is mature and is an exemplary farmer. The candidate should at least be able to read and write. Those who are not interested in the project should be left out.
- e) Women farmers felt that there is need to work with the local leadership such as chiefs and headmen on FFS so that women farmers (who are the majority of those who attend schools) are given land from where to practice if they are not given land by their husbands. There was also a feeling that if this programme includes local leadership then it will include everyone in the area and this will lead to its success.
- f) There is need for a more intense follow up for the newly recruited farmers and FFWs.

8.13 General

It was observed that when an elite farmer comes to join the school, he/she is not very comfortable and he/she often has the 'It does not work attitude'. The elite normally dominate the group when they join and the other farmers do not feel comfortable. As a result he/she is not patient to keep participating in the schools and they normally drop out. This is because of diversity of their interests and expectations.

A good performing FFW had a very motivated group with balanced participation of members who were present at all meetings. Checking on the farmer's register one would notice that the attendance of these farmers at the FFS was very good and they cover many

topics on the school calendar. The group members were very confident, self-organized, very creative and they could take turns to lead a session with little or no difficulties at all. These farmers' yields were quite high and the level of diversity in their fields was quite high.

The poor performing FFW had poor attendance at meetings and even checking on their register, the attendance of the farmers was not as good as that for other groups. Checking on the school calendar it was realised that for those poor performing FFWs, their groups did not cover as much as the well performing groups. While the good performing FFWs' farmers were more confident and empowered, the poor performing groups were shy and in most cases they were not confident. These poor performing groups were mostly as a result of a poor performing FFW and sometimes the performance of the FFW went down because of lack of incentives, which demoralised them. The collapsing of the farmers' organization also demoralized farmers.

Generally the research showed that the learning process at the FFSs was an ongoing process that empowered farmers in the end. The use of indigenous knowledge at the school helped farmers to recover the lost knowledge at the same time recovering the lost crop diversity. This brought about a new farming system that enabled all farmers to participate regardless of their resource base. As a result of this, farmers can grow crops with no chemicals and they can mix crops in one field. Those farmers who can produce surplus for sale can access a niche market because they are producing unique produce. The learning at FFSs included information sharing which helped to broaden the knowledge base. The different topics learnt had different applicability and relevance that led to farmers prioritizing on the topics they wanted to learn. Although there have been some problems at the schools and in the learning process itself, the learning at FFSs has been found to be sustainable as the knowledge acquired will surely stay with the farmers and there is no risk of brain drain.

8.14 Discussion

This research has clearly shown that FFSs can be a platform for farmers to develop a farming system using the indigenous knowledge and active experimentation to acquire new knowledge. Through the FFSs indigenous knowledge has been reactivated and it was edified by the scientific knowledge acquired at the schools through active experimentation. This together has helped to bring in a new farming system from which farmers can claim ownership.

The new knowledge acquired by the farmers at the FFSs gave them a choice of what farming system to practice because they now know what was best for them. The new farming system now enables the resource poor farmers to grow crops with no external inputs, and that enables them to access the cash crop market. The new knowledge acquired also helped them to change from monocropping to intercropping which helped them to increase on their crop diversity and hence food security. This new knowledge also empowered the farmers to make use of the indigenous knowledge, which had been discouraged by the old farming system, which they saw as imposed.

Indigenous knowledge contributed a lot to the learning of farmers at the FFSs as seen by the fact that indigenous knowledge constitute a big part of the resultant farming system. Farmers tapped a lot from the indigenous knowledge that in most cases is very natural and makes use of the locally available resources. The inclusion of the indigenous knowledge made farmers feel ownership of the resultant farming system, this together with the fact that farmers felt

that inclusion of indigenous knowledge would help to bring back the farming system of their forefathers helped to motivate the farmers to learn. The presence of indigenous knowledge shows how much farmers were consulted and how much they contributed, that on its own helped farmers to feel that they were part of the invention of the new farming system and that became a motivation for the learning process.

Active experimentation contributed to the learning as it largely gave confidence to farmers and it also increased their innovativeness. As farmers got results from their experiments they were very eager to share them with other farmers who in turn would then try them in their fields. This helped to enhance learning.

The research showed that farmers were active participants in the FFSs, although not all participated to the same extent. It was showed that those who were very active gained more than the less active ones. Farmers participated in the prioritization of the topics to be learnt and the prioritisation was according to the problems farmers faced. Farmers participated in a greater way in carrying out experiments. This gave them confidence and sense of ownership of knowledge, as they had to participate in order to gain knowledge. By being active participants, farmers gained facilitation skills that enabled them to teach other non-group members. Farmers also gained creativity, for example they could start some activities outside FFSs such as composing songs relating to natural pest control or drama that is related to the farming system.

Farmers cited several problems in the FFS and the possible solutions. Most of these are found in the main text but the following are the major ones and the possible solutions. First of all farmers felt they were let down by the project supervisor who was employed by an agency funding the programme. Although the supervisor was not performing to the farmer's satisfaction, the farmers could not do anything since the supervisor was not answerable to them. So farmers felt that someone appointed by the farmers themselves should hold this position and the incumbent should be a farmer as well so that he/she is empathetic with their situation.

There were so many problems stemming from allowances not being paid to the FFWs. Farmers really felt that for the field schools to run smoothly the FFWs should be paid. This means farmers themselves should source funds to pay the FFW so that they become accountable to them. This money could be sourced externally or farmers paying a percentage of their income every year to their FFW.

Women farmers had problems in accessing land for practicing the new farming system. This problem was then seen to emanate from the approach given to the project. The feeling was that the project should be for the whole community and to include village leaders who would then allocate land for use by women in cases where their husbands were not willing to give them land.

9 Conclusion

This research has shown that FFS can be used as a learning process for the resource poor farmers. FFSs have been done successfully in Indonesia with farmers practicing IPM in rice, and this research has shown that it can also be done successfully in NPM. However it has been found out that the learning process is long in NPM and it takes 2-3 seasons of hard working farmers to be able to come up with a new farming system. This then shows that the success of FFSs lies so much on the determination of the farmers themselves. The period taken by the learning process may also vary depending on the crop grown, the more

chemicals the crop uses for pest and disease control, the more time the farmer will need to adapt to the new system.

It has become evident in this research that when involved, farmers can contribute positively to bring in change that is beneficial to their livelihoods. Farmers have been recipients of research results from research centres (the results of which they did not make much use of) but this research has shown that farmers can be involved in their own research.

The main problem that has been seen in this project is the lack of planning for FFW 's remuneration that has led to the downfall of the project in some areas. Absence of remuneration for FFW has caused them to abandon the FFSs they were facilitating. There are some problems that are not directly related to FFSs but they indirectly affected them. Such issues are certification of produce for sale as organic as well as institutionalizing the project for purposes of marketing. Linking FFSs to such programmes can affect FFSs if not carefully timed. This thesis did not explore these issues, but I would suggest that this is another area that needs to be explored further in another research work.

This piece of research can be of benefit to policy makers when they are designing extension. It has become evident that FFSs is a better cost saving approach of extension especially in countries like Zimbabwe and similar African countries, which do not have much money to spend on extension. Farmers can be trained to be facilitators of extension and they can do the job with minimum costs. This also saves the problem of extension agents not being able to reach some farmers because of lack of human and financial resources. The NPM FFSs will make sure that the resource poor farmers are not left out.

Researchers can also benefit from this research by learning that farmers can carry out meaningful research that can bring about meaningful change to their lives. Farmers also can benefit from this piece of research as it gives them the confidence that they can make a positive change in their lives, and they are the best people to determine what kind of change they want.

The above results came out through the interviews and exercises done by the farmers themselves and in my own view the results give a true picture of how farmers themselves see the project. However, there might have been biases in that the researcher has been involved in training and the overall implementation of the project, so when farmers responded they might have taken the researcher as a stakeholder and therefore might have not been transparent in some cases.

10 References

- Abel N.O.J & Stoking M.A., 1981, *The experience of underdeveloped countries in the appraisal of development schemes and their view of policy*, John Wiley, Chichester.
- African Development Fund, 1981, *Mid Zambezi Valley Rural Development Project, Zimbabwe*, Appraisal Report for ADF, Agriculture and Rural Development Department.
- Afforest Annual report, 1998
- Afforest research report, 1999
- Altieri M.A., 1987, *Agroecology: The scientific basis of Alternative Agriculture*, Westview press, IT Publications, London.
- Altieri M.A., 1983, The question of small farm development: Who teaches whom? *Agriculture, Ecosystems and Environment*, pp401-405.
- Braun A.R., Thiele G. and Fernandez M., 2000, Farmer field schools and local agricultural research committees: Complementary platforms for integrated decision making in sustainable agriculture, *Agriculture Research and Extension Network*, Paper No. 105.
- Brookfields S.D., 1988, *Developing Critical Thinkers*, Jossey-Bass, San Francisco.
- Bruno L., 1999, *Beyond constructivism: Towards a realistic realism. A review of Bruno Latour's Pandora Hope*, Cambridge, MA; London, UK: Harvard University press.
- Conklin H.C., 1972, *Folk Classification, a Topically Arranged Bibliography*, New Haven: Yale Univ., Dep. Anthropology.
- Cooper P.A., 1993, Paradigm shifts in Designed Instruction: From behaviourism to Cognitivism to Constructivism, *Educational Technology research and development*, 12-18.
- City University of New York, Office of academic affairs: Division of education and continuing education, 1993, *Contextualised learning technical assistance project final report and handbook on contextualised learning*.
- Conway G.R., 1985, Agro ecosystem Analysis, *Agricultural Administration*, 20 (31-55).
- Derman B., 1997, The unsettling of the Zambezi Valley: An Examination of The Mid – Zambezi Rural Development Project, *Centre For Applied Social Sciences occasional paper*, University of Zimbabwe, Harare.
- Ellen R., 1982, *Environment, Subsistence and System*, New York, Cambridge Univ. Press.
- FAO, 1993, *IPM Farmer Training: National Integrated Pest Management programme*, FAO-IPM Secretariat, Jakarta, Indonesia.
- FAO, 2000, *Guidelines and reference material on Integrated Soil and Nutrient Management and conservation for Farmer Field Schools*, FAO, Rome.
- Farinisi F., 2001, Pers. comm.

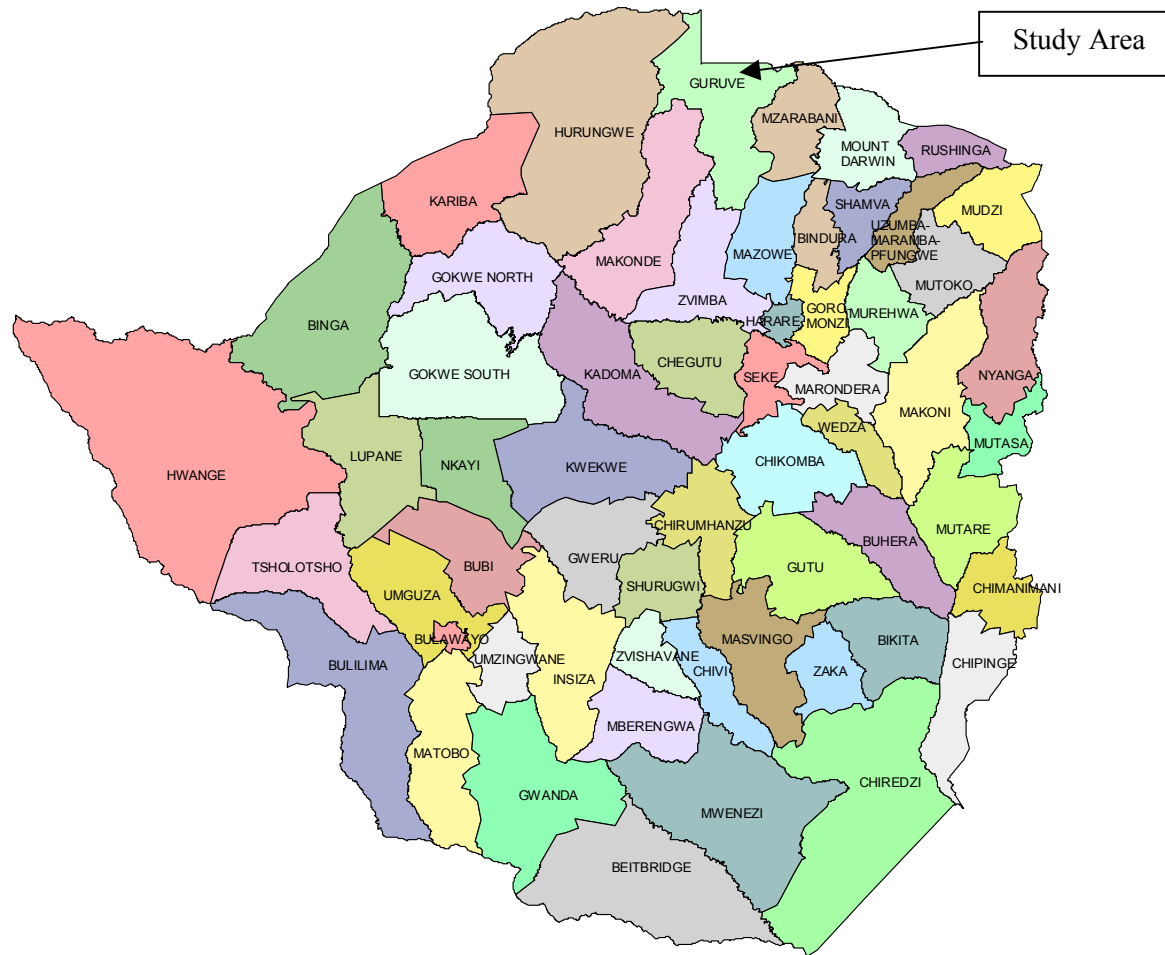
- Gainzburg C., 1993, *The Night Beetles: Witchcraft and Agrarian Cults in the Sixteenth and Seventeenth Centuries*, Routledge and Kegan Paul, London.
- Garikai L., 2001, Pers comm.
- Gibbon D., Lake A. and Stocking M., 1995, Sustainable development; a challenge for agriculture, Cont. in: *People and environment*, ULC Press, England.
- Hanningan J.A., 1995, *Environmental Sociology: A social constructionist perspective*, Routledge, London and New York.
- Hodzi R., 2001, Pers comm.
- Howard L.E., 1953, *Sir Albert Howard in India*, Faber and Faber: London.
- Jonassen D.H., 1991, Objectivism Versus Constructivism: Do we need New Philosophical Paradigm?, *Education Technology , Research and Development*, 39 (5-14).
- King C.A., 2000, *Systematic processes for facilitating social learning; Challenging the Legacy*, PhD Thesis, Swedish University of Agricultural Sciences Uppsala Sweden.
- Knowles M., 1990, *The Adult Learner: A neglected species (4th edition)*, Gulf Publishing Houston, TX.
- Knowles M., 1984, *The Adult learner: A neglected species (3rd ed)*, Gulf Publishing Houston, TX.
- Knowles M., 1984, *Andragogy in Action*, Jossey-Bass, San Francisco
- Knowles M., 1975, *Self-Directed learning*, Follet, Chicago.
- Knowles M., 1970, *The Modern Practice of Adult Education: Andragogy versus Pedagogy*, Associated press, New York.
- Kolb D.A., 1984, *Experiential Learning: Experiences as the source of Learning and Development*, Prentice-hall, New Jersey.
- Lampkin N., 1990, *Organic farming*, Farming press, London.
- Makore B., 2001, Pers comm.
- Mazhude F., 2001, Pers comm
- Mazikana A., 2001, Pers comm.
- Mondo G., 2001, Pers. comm.
- Muraga S., 2001, Pers.comm.
- Musiyandaka S., 2001, Pers comm.
- Page S.L.J. and Page H.E., 1992, *Western Hegemony over African Agriculture in Southern Rhodesia and its continuing threat to Food security in Independent Zimbabwe*, The project on African Agriculture of the Joint Committees on African Studies Social Science Research Council/American Council of Learned Societies, Working Paper # 7.

- Röling N.G. and Wagemakers M.A.E (eds.), 1998, *A new farming practice: Facilitating Sustainable agriculture*, Cambridge, University Press.
- Ruwitah A., 1994, The Mystery of Cotton, *The Zimbabwean Review*, 3:4.
- Scones I. and Thompson J., 1994, *Beyond Farmer First*, International Institute for Environment and Development, Exeter, UK.
- Saito K.A. and Spurling D., 1992, Developing Agricultural Extension for Women Farmer, *World Bank Discussion Paper No. 156*, World Bank, Washington D.C.
- Teguru H., 2001, Pers comm.
- Van de Fliert E., Pontius J. and Röling N., 1995, Searching for strategies to approach training of IPM trainers in Indonesia, *European Journal of Agricultural Education and Extension*, 1:4.
- Wingwiri E., 2001, Pers comm.
- Youngman F., 2000, *The Political Economy of Adult Education & Development*, ZED BOOKS, London & New York.

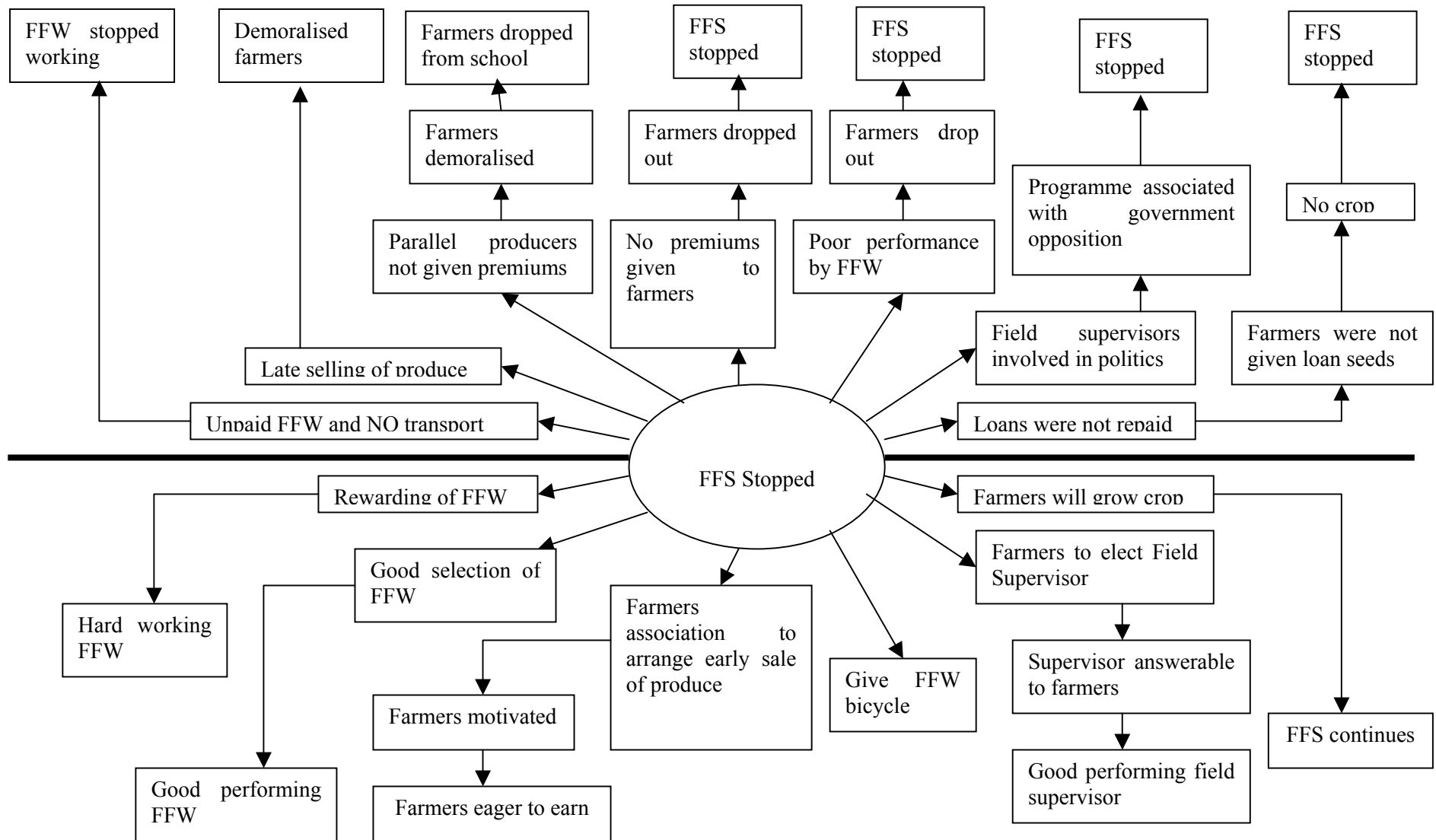
Acknowledgements

In this study I am greatly indebted to the Rockefeller Foundation with whose funding it was possible for me to meet my study expenses. My supervisors, Dr Lisbeth Larsson Liden and Professor David Gibbon who gave me encouraging comments and helped through with my thesis, cannot go unmentioned. I am also grateful to my employer, AffOResT and in particular Dr S Page (my boss) for allowing me to be away to pursue my studies. Last but not least I feel very proud of my husband Ben and my daughter Rudo Anesu who were always there to support me.

Appendix 1 Map of Zimbabwe



Appendix 2 A Sample of Exercises done by Farmers



Matrix ranking FFW: E Wingwiri 20/08/01

Relative importance of Topics learnt

	Soil fertility	Pests and farmers friends	Pesticide problems	Mixed cropping	Post Harvest crop management
Soil Fertility (SF)	xxxxxx	Pests and farmers friends	Pesticide problems	Mixed cropping	Post harvest crop management
Pest and Farmers Friends	Pests and farmers friends	xxxxxxx	Pesticide problems	Mixed cropping	Posts and farmers friends
Pesticide problems	Pesticides problems	Pests and farmers friends	xxxxxx	Pesticide problems	Pesticide problems
Mixed cropping	Mixed cropping	Pests and farmers friends	Pesticide problems	xxxxxx	Mixed cropping
Post Harvest Crop Management	Post Harvest Crop management	Pests and farmers friends	Pesticides problems	Mixed cropping	xxxxxx

Score Ranking*FFW: Josiah Masaire 21/08/01**Score Ranking of Topics Learnt*

Topics Learnt Criteria	Soil Fertility	Pests and farmers friends	Mixed cropping	Scouting for pests and farmers' friends	Soil conservation	Water harvesting techniques
Understandability	38	25	39	22	25	24
Relevance	46	32	37	35	33	28
Applicability	32	24	44	25	12	21
Labour intensiveness	12	16	34	16	30	10
Practicality	41	22	45	29	5	11