LEARNING AND LIVELIHOODS

THE EXPERIENCE OF THE FSIPM PROJECT IN SOUTHERN MALAWI

REPUBLIC OF MALAWI

MINISTRY OF AGRICULTURE AND IRRIGATION

DFID Department for International Development

Natural Resources Institute

Do resource-poor farmers in sub-Saharan Africa face severe crop losses from pests and diseases? What are the different ways that rural households earn a living, and who are the poor? How does social organization shape the way that new technology is used and shared? How can we encourage farmers to participate in the design and evaluation of field experiments, yet still obtain results that are statistically valid? How can we create 'learning projects' that can change direction in response to the needs of their clients and what they find on the ground?

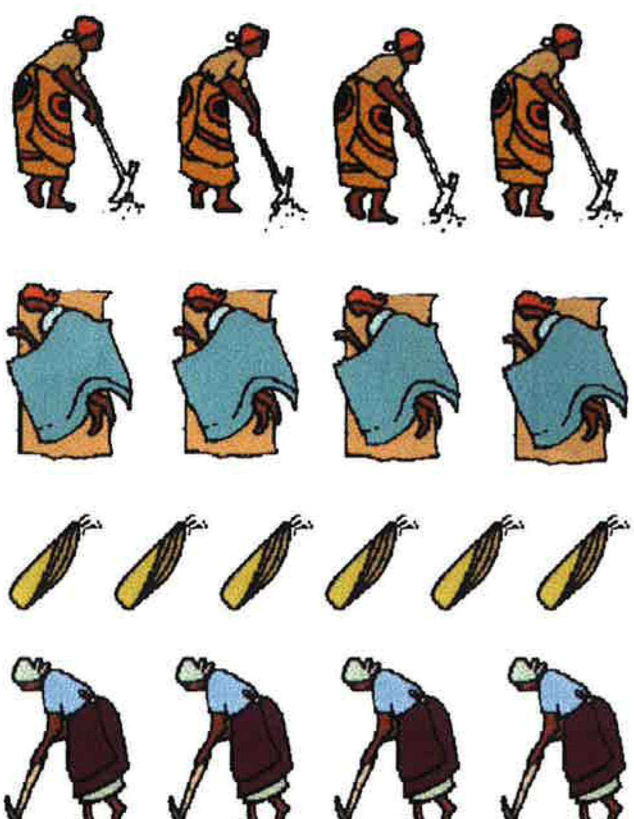
These were some of the questions that challenged the Farming Systems Integrated Pest Management Project during four years of intensive fieldwork with resource-poor farmers in the Blantyre Shire Highlands, southern Malawi. In searching for answers, the project drew on expertise from pest management, agronomy, economics and anthropology. **Learning and Livelihoods: The Experience of the FSIPM Project in Southern Malawi** reflects on the project's experience, reviews the major lessons learned, and outlines an agenda for a follow-up project that addresses smallholders' needs for food security, cash income and information about new technology.

The book will appeal not only to those interested in Malawi but also to those concerned with the wider issues raised by developing technology with resource-poor farmers.

LEARNING AND LIVELIHOODS

THE EXPERIENCE OF THE FSIPM PROJECT IN SOUTHERN MALAWI

A. ORR, B. MWALE, J. M. RITCHIE,
J. LAWSON-MCDOWALL
AND C. S. M. CHANIKA



FARMING SYSTEMS INTEGRATED PEST MANAGEMENT PROJECT

The Natural Resources Institute (NRI) of the University of Greenwich is an internationally recognized centre of expertise in research and consultancy in the environment and natural resources sector. The Institute carries out research and development and training to promote efficient management and use of renewable natural resources in support of sustainable livelihoods.

Orr, A., Mwale, B., Ritchie, J. M., Lawson-McDowall, J. and Chanika, C. S. M. (2000) *Learning and Livelihoods: The Experience of the FSIPM Project in Southern Malawi.* Chatham, UK: Natural Resources Institute.

This publication is an output of the Farming Systems Integrated Pest Management Project, jointly funded by the United Kingdom's Department for International Development (DFID) and the Ministry of Agriculture and Irrigation (MoAI) of the Government of Malawi. However, the views expressed are those of the authors and are not necessarily those of the DFID or the MoAI.

Copies of this book can be obtained by writing to NRI Catalogue Services, CAB International, WALLINGFORD, Oxon OX10 8DE, UK. When ordering, please quote **ECN14.**

Natural Resources Institute
ISBN: 0 85954 524-5

University of Greenwich, a charity and company limited by guarantee, registered in England (Reg. No. 986729).
Registered Office: 30 Park Road, Greenwich, London SE10 9LS.

CONTENTS

Acknowledgements		iv
Glossary		v
Acronyms		vi
Summary		1
Introduction		3
Chapter 1	Rationale	7
Chapter 2	Livelihoods and the Farming System	11
Chapter 3	Working with Farmers	27
Chapter 4	What Did We Learn?	37
Chapter 5	Starting Over	49
Notes on Sources		55

ACKNOWLEDGEMENTS

R. J. Cooter (NRI), T. Barrett (DFID) and T. G. Wood (formerly NRI) for information about project origins; S. Orr (Kadale Consultants) for advice on institutional analysis; Harry Potter (DFID Field Manager, Malawi) for support and advice; Sarah Markes (Kadale Consultants) for the cover design and production; Paul Kite (Kris Offset) for some of the photographs; and Faber and Faber for permission to reproduce the extract from *Four Quartets* by T. S. Eliot on page 49.

Members of the FSIPM Project:

Dr A. T. Daudi	Project Manager
Dr J. M. Ritchie	Team Leader, Pest Management Specialist
Mr C. S. M. Chanika	Agronomist
Dr A. Orr	Farming Systems Economist
Mr P. Jere	Agricultural Economist
Mr B. Mwale	Agricultural Economist
Mr A. M. Koloko	Field Supervisor
Ms D. Saiti	Field Supervisor
Ms J. Lawson-McDowall	Anthropologist
Ms C. A. Kaunda	Research Assistant
Mr P. Kapalula	Research Assistant
Mr W. K. Fero+	Senior Technical Officer
Mr C. B. K. Mkandawire	Field Supervisor
Mr T. H. Maulana	Technical Assistant
Mr D. Z. M. Mkwamba	Technical Assistant
Mr H. H. Mputeni	Technical Assistant
Mr E. R. Shaba	Technical Assistant
Mr T. T. K. Milanzi	Technical Assistant
Mr F. S. Muyaso	Administrative Officer
Mr M. F. W. Nuka	Administrative Assistant

+deceased

GLOSSARY

Chichewa words

banja	household
chakki	rotary hand mill
chikamwini	matrilocal marriage
chipere ganyu	exchange labour
chitengwa	virilocal marriage
dambo	low-lying land
dimba	irrigated land
ganyu	piecework
geni	trading
kachasu	local gin
kanthu nkako	'our own thing'
katipula	preparing a fine tilth for *dimba* cultivation
kukhusa	burning crop residues and weeds
kukhwaza	leaving weeds and crop residues uncovered to decompose
kukwazira	burning crop residues and weeds
kukwezera	weeding technique that reduces damage from termites
kusosa	leaving weeds and crop residues uncovered to decompose
kuwojeka	burying weeds and crop residues
kuwunga	ridging
madeya	maize bran
masalanga	flour made from unripened maize
mbumba	matrilineage group
mbwera	relay crop
mudzi	village
munda	upland
mwini mbumba	the eldest brother of sisters in a lineage, who takes responsibility for them and their children
ndiwo	relish
nkokwe	maize granary
ufa	flour made from fully ripened maize
umphawi	poverty

Other

Gini coefficient	Index between 0 and 1 that measures equality of income, 1 = perfect inequality

The official exchange rate for the Malawi Kwacha in 1999 was MK 44 = US$ 1

ACRONYMS

ADD	Agricultural Development Division
ART	Adaptive Research Team
BLADD	Blantyre ADD
CIMMYT	International Center for the Improvement of Maize and Wheat
DARTS	Department of Agricultural Research and Technical Services
DAET	Department of Agricultural Extension and Training
DFID	Department for International Development
DO	Development Officer
EPA	Extension Planning Area
FAO	Food and Agriculture Organization of the United Nations
FSIPM	Farming Systems Integrated Pest Management
FSR	Farming Systems Research
GoM	Government of Malawi
GNP	Gross National Product
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IIED	International Institute for Environment and Development
IPM	Integrated Pest Management
ISNAR	International Service for National Agricultural Research
MGPPP	Malawi – German Plant Protection Project
MoAI	Ministry of Agriculture and Irrigation
NGO	Non-Governmental Organization
NRI	Natural Resources Institute
PRA	Participatory Rural Appraisal
PMS	Pest Management Strategy
RDP	Rural Development Project
UNDP	United Nations Development Programme
USAID	United States Agency for International Development

SUMMARY

The Farming Systems Integrated Pest Management (FSIPM) Project worked successfully to develop low-cost, sustainable IPM strategies for four food crops – maize, beans, pigeonpea and sweet potato – grown by smallholders in the Blantyre Shire Highlands, southern Malawi. However, the project soon discovered that the priority constraint for farmers was not pests or diseases causing crop losses but poor soil fertility and the high cost of chemical fertilizer, which resulted in low maize yields. Thus, the project's focus on pest management could not, on its own, meet the most pressing needs of smallholders. Besides producing IPM recommendations, however, the project also generated new knowledge about the farming system and learnt some important lessons. In this report we review these aspects of the project's experience for the benefit of researchers, policy-makers, and donor agencies in Malawi.

Participating farmers were selected from each lineage group in the village. Since households share resources and information first with relatives, this ensured that the benefits from the project were widely distributed. Households were classified into five types according to crops grown, sex of household head and food security. Modelling the impact of IPM strategies for each household type suggested an average increase in household income of 13%. Although agriculture was the most important source of livelihoods, the nature of the farming system – small farms, low productivity and a single growing season – meant that a large share of household income had to be earned off-farm. Case studies of household income suggested that 'vulnerable' households with low food security were not necessarily poorer than others because a higher share of their total income was earned off-farm. Thus, a livelihoods approach gives a deeper understanding of the nature of poverty in southern Malawi.

Although the project was supposed to work only with 'resource-poor' farmers, it proved expedient to include local leaders and better-off households with the time and resources to participate in meetings and field trials. In practice, therefore, projects may find it more effective to work with a cross-section of villagers in resource-poor communities and not just with the poorer farmers. We developed several strategies to encourage farmer participation. Compensating farmers for low yields in project trials was important in allaying suspicions and winning trust. Simplifying experiments, teaching farmers about pest biology, and allowing farmers to design their own trials made farmer evaluation of new technology more meaningful. However, the emphasis on farmer participation limited the number of households with which the project could work. Projects that adopt a participatory approach must, therefore, plan an exit strategy that links their farmers with other agencies – NGOs, extension networks – so that others may benefit from their experience and skills.

The project saw learning as an integral part of the project, not something delegated to external reviewers. Indeed, learning became an output in its own right, accorded equal status with the attainment of the project's technical objectives. The project systematically reviewed the lessons from each

season's fieldwork and incorporated its 'new learning' into the research programme. Examples include: the potential of IPM for smallholders, the variability of pest attack and the implications for field trials, and the scope for farmer-to-farmer extension. Attempts to redesign the project, to make it more relevant to farmers' needs by focusing on soil fertility rather than pests, proved largely unsuccessful, however. We used the McKinsey 'Seven S' framework to analyse the institutional lessons from this experience. The framework highlights the importance of project structure and of shared values between key actors in determining the scope for changes in strategy.

Future initiatives to improve the incomes of smallholders in the Blantyre Shire Highlands will require a broad mandate focused not just on better crop management but on linking resource-poor farmers more closely with markets. Farmers need food, but they also need cash and information. Food security may be enhanced through green manure crops in combination with chemical fertilizer. To raise cash income, new varieties of legumes – especially beans and pigeonpea – are required that are not just superior in terms of yield or pest resistance but also have the qualities that processors and consumers want. Information about how households can exploit these new technologies will spread faster and more efficiently if they are organized into producer groups. Finally, the experience of the FSIPM Project illustrates the need for flexibility in the use of logical frameworks to allow continuous learning to be incorporated into the project cycle.

INTRODUCTION

Malawi is one of the world's poorest countries, by any standard of measurement. An average Malawian has an income of less than half a dollar a day. One in five children dies before reaching their fifth birthday, and half are stunted by chronic malnutrition. Fewer than half the adult population can read and write. Four in ten rural Malawians live below a poverty line based on the basic needs of food, clothing and shelter, unable to live an active, healthy life. Income inequality is the highest recorded in sub-Saharan Africa. If such degrees of deprivation have any meaning, life in Malawi is even harder than in Bangladesh, a symbol of poverty world-wide (see below).

For most of Malawi's history as an independent state, poverty was officially denied to exist. With the advent of multiparty rule in 1994, however, the alleviation of poverty has become a national priority. Foreign aid flows have increased in consequence, reaching US$ 500 million in 1996. Malawi is now the second largest recipient of UK aid after India, overtaking Bangladesh.

Malawi's 11 million people occupy a long, narrow plateau on the eastern side of the Great Rift Valley in east-central Africa. Sandwiched between Tanzania, Mozambique and Zambia, Malawi's nearest port, at Beira on the Indian Ocean, is over 640 km away. There is little mineral wealth. By African standards, the countryside is densely populated, with one-half of rural households farming less than half a hectare.

This litany of grim statistics is partly balanced by more positive indicators. In agriculture, smallholders are responding to the new economic opportunities opened up by recent changes in price and marketing policy. The surge in households growing burley tobacco, Malawi's premier cash crop, is one example. Other changes are more subtle and, though evident at the field level, have yet to be captured in national statistics. They include

Indicator	Malawi	Bangladesh
GNP per capita (1995)	170	240
Life expectancy at birth	48	58
Under-five mortality (000)	211	115
Adult literacy (%)	43	58
Gini coefficient	.62	.28
Poverty line (% rural households below)	43	40
Foreign aid (million US$)	500	1255
Aid per capita (US$)	50	10

diversification away from maize and the cultivation for sale of what were once traditionally seen as food crops.

WHAT IS THIS REPORT ABOUT?

This report synthesizes insights from the Farming Systems Integrated Pest Management (FSIPM) Project in the Blantyre Shire Highlands, southern Malawi.

The project formed part of the Plant Protection Services Commodity Group, belonging to the Department of Agricultural Research and Technical Services (DARTS), that in turn was part of the Ministry of Agriculture and Irrigation (MoAI). The project was staffed by 12 Malawian scientists and technicians and three expatriate scientists. It was located at Bvumbwe Agricultural Research Station in the southern region.

The project produced a number of pest management recommendations for several important food crops. In this report, we turn the spotlight away from crop pests and diseases to illuminate the stage and the actors. The focus is, therefore, on the farming system and the farmers themselves.

Two themes are paramount: learning and livelihoods.

Learning is critical for the success of any project that seeks to better smallholder livelihoods. We use the experience of the FSIPM Project to illustrate the need to acknowledge mistakes and show how continuous learning results in more relevant outputs. The 'learning wheel' reproduced on the cover reminds us that learning is a cycle:

- reflecting: what underlying beliefs affected our thinking and acting?
- connecting: what new understanding do we have now?
- deciding: what should be our approach?
- doing: performing a task.

When the task is finished we move back immediately to the reflecting stage and ask, how well did it work?

Livelihoods sums up the diversity found among smallholder households. This is reflected not just in the variation found between households but in the variety of different ways that the same household may earn its living.

WHO IS THIS REPORT FOR?

By setting out our main findings and describing how we reached them, we hope that others may learn from our experience. We have written this report with a broad audience in mind:

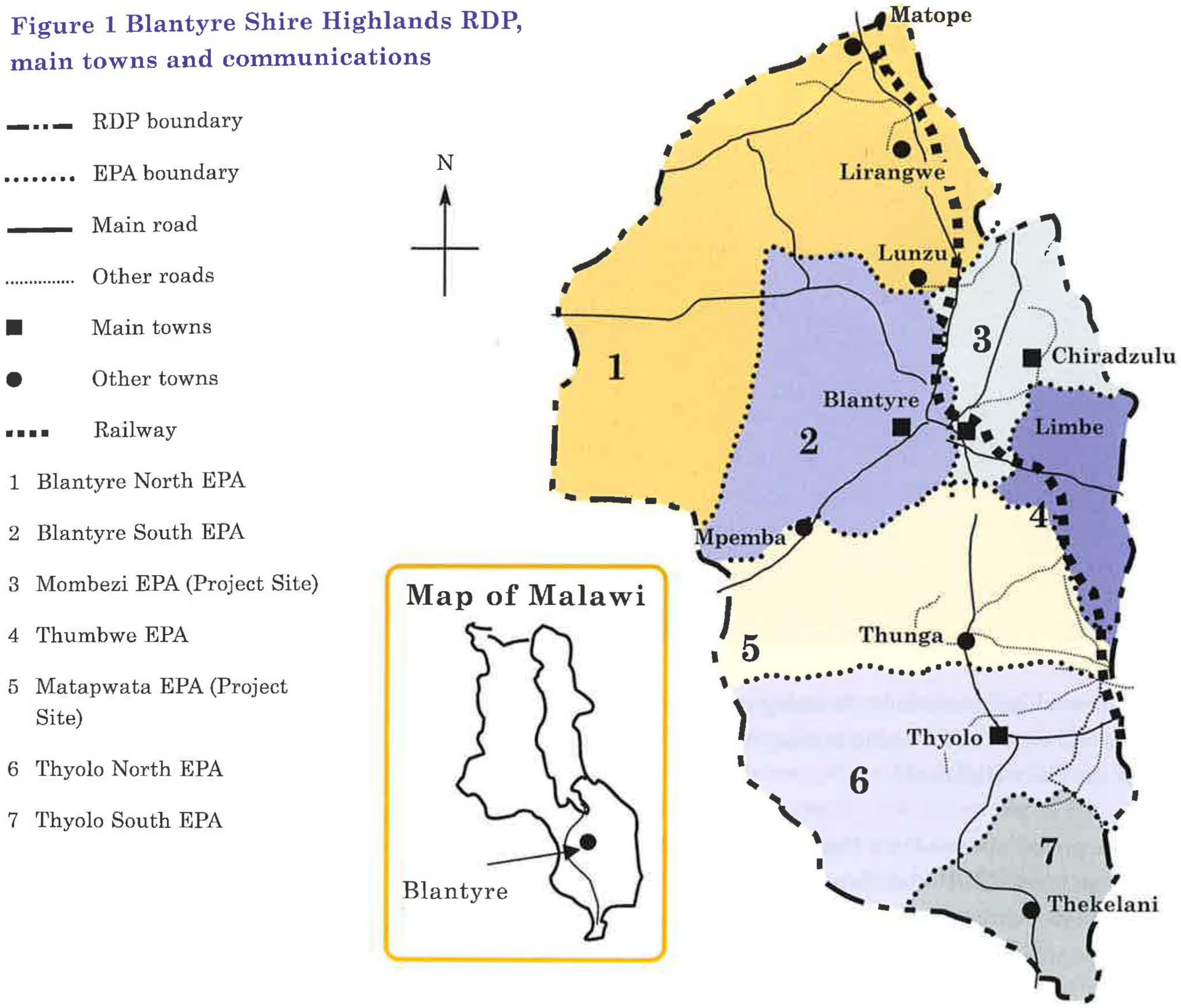
- agricultural researchers and development agencies seeking to work with smallholders in the Blantyre Shire Highlands or elsewhere in Malawi;
- donors seeking ideas for future initiatives and successor projects focused on the needs of poorer smallholders;
- policy-makers in search of insights at the micro-level that shed light on how poorer smallholders have coped with recent policy changes.

WHAT IS IN THIS REPORT?

Chapter 1 – *Rationale* – explains why we wrote this report and sets our findings in the context of the project.

Chapter 2 – *Livelihoods and the Farming System* – presents an overview of smallholder livelihoods in the Blantyre Shire Highlands.

Figure 1 Blantyre Shire Highlands RDP, main towns and communications



Chapter 3 – *Working with Farmers* – looks at the process of field research from diagnosis to designing solutions and evaluating results.

Chapter 4 – *What Did We Learn?* – summarizes the main technical, economic and social lessons that emerged from three seasons of field research.

Finally, Chapter 5 – *Starting Over* – sets out some ideas about what could be done to improve the income of resource-poor farmers in the Blantyre Shire Highlands, and suggests the form of project that this might need.

It is not possible in a short report to include all aspects of the project's experience or to discuss topics in great detail. Readers who wish to know more about specific aspects may consult the Note on Sources at the end of this report (see page 55).

THE SETTING: BLANTYRE SHIRE HIGHLANDS RDP

Imagine, then, an upland landscape, with steep, bare hills and rocky outcrops, dissected by small streams that flow down to rivers and marsh. After rain when the air clears, the horizon expands to reveal panoramic views: villages of mud and thatch houses glimpsed through dense canopies of bamboo and fruit trees, red dirt tracks, grasslands of low-lying *dambos*, and maize that covers the land like a green tide,


Upland landscape in Matapwata EPA

surrounding homesteads, sweeping upwards to the hill crests and clinging to steep slopes. This is the Shire Highlands.

The project operated in a Rural Development Project zone (RDP) that formed part of the Blantyre Agricultural Development Division, one of the eight ADDs in Malawi (Figure 1). The RDP is divided into smaller units known as Extension Planning Areas (EPAs) staffed by a Development Officer (DO) and other members of the extension service.

The location of the RDP close to the major commercial centres of Blantyre and Limbe means that it enjoys unusually good communications with urban markets. Tarred roads link Blantyre and Limbe with Chiradzulu as well as the smaller towns of Lirangwe, Matope, Thunga and Thekelani. Off these primary roads, villages are linked by dirt tracks that are often poorly maintained and may become impassable for vehicles during the wet season. Since the railway from Malawi to Beira was destroyed during the Mozambique Civil War, the only rail link to the coast is from Nkaya, near Liwonde to Nacala.

The project's research sites were located in four villages in Matapwata and Mombezi EPAs. Both EPAs are ranked among the poorest in the country. In 1987, population density averaged 287 and 285 persons/km^2 of land area, respectively, the highest and second-highest in Malawi.


The flood-prone Chitera *dambo*, Mombezi EPA

CHAPTER 1

RATIONALE

The FSIPM Project worked with relatively few farmers in one corner of a small impoverished country. It conducted research on pest management which produced a handful of seemingly dry technical recommendations. Why then should its experience interest anyone except a few specialists? In this chapter, we try to show why the project's approach and findings are relevant for a wider audience.

PROJECT ORIGINS

The FSIPM Project was a classic example of a solution in search of a problem. Its origins lie in a coalition of interests – research scientists, the host government and the donor agency – that believed in the value of IPM and assumed that better pest management was a high priority for resource-poor farmers in sub-Saharan Africa.

Integrated pest management (IPM) originally developed in the United States as an environmentally friendly way to control pests and diseases that caused economic damage in agriculture. It has been defined as:

"an holistic approach that views the agro-ecosystem as an interrelated whole and uses a variety of biological, cultural, genetic, physical and chemical techniques to hold pests below economically damaging levels with a minimum amount of disruption to the farming system and the environment".

Following the Green Revolution, IPM was extended to rice production in Asia. Here IPM scored several striking successes, notably in Indonesia where the introduction of simple methods allowed farmers to halve the cash they had spent on pesticides. Impressed by such achievements, in 1986 the UK's Minister for Overseas Development launched an 'IPM Initiative' to sponsor IPM projects in developing countries.

In Africa, the initial focus of interest was the Sudan, where there was recent experience of pest management with smallholders. A £2.8 million project – 'Pest management in African small-scale rainfed farming systems' – was developed, but Sudan's alignment with Iraq during the Iran-Iraq War made the project politically impossible.

In 1990, the project was reformulated for a southern African context and eventually found a home in Malawi where the Director of Agricultural Research – an entomologist – provided the necessary local ownership. Malawi also seemed a logical choice because the project would complement work on soil pests being conducted by another DFID-funded project in the southern region.

After a lengthy process of design and appraisal involving several rewrites, the Project Memorandum was approved in May 1995 and in early 1996 the Farming Systems Integrated Pest Management Project finally appeared in the Blantyre Shire Highlands.

THE FSIPM PROJECT

The original goal of the project was "Improved incomes for resource-poor farmers through use of low-cost, sustainable pest management strategies". At a stakeholder workshop in June 1996, the goal was split into a "Supergoal – Improved incomes for resource-poor farmers" and the goal became simplified to "Farmers adopt low-cost sustainable IPM strategies".

Unusually the project initially had two purposes: "develop the capacity of DARTS to undertake farming systems IPM research *and* provide government and NGO extension systems with pest management recommendations suitable for resource-poor farmers". At the stakeholder workshop, the purpose was expressed more simply as "Local capacity for IPM improved".

The three project outputs were to:

- develop the capacity of DARTS to undertake farming systems research for IPM;
- identify IPM strategies suitable for resource-poor farmers;
- prepare extension materials for dissemination.

The time-table for these ambitious targets was three crop seasons. Although the Project Memorandum called for the project to focus on different regions of Malawi in each of these three seasons, the Stakeholder Workshop agreed that the project should confine its activities to the Blantyre Shire Highlands.

THE 'WRONG' PROJECT?

Within the first season it became evident that IPM was not the highest priority for farmers. There were several reasons for this.

- The average yield of maize, the staple food crop, was extremely low because of poor soil fertility. The collapse of formal seasonal credit in 1992 left many farmers without the means of obtaining fertilizer. Consequently, many households faced a sudden reduction in food security. Their priority was not pests but fertilizer.
- IPM has been successful where it has saved farmers money on pesticides. In Malawi, where smallholders did not usually apply pesticides for field pests of food crops, IPM offered them no immediate savings in cash costs.
- Beans and pigeonpea, two of the crops targeted by the project, were intercrops cultivated by women that were of little direct interest to male members of the household. In any case, average yields from these crops were low.

Given these constraints, it was clear that IPM was not the most effective means of improving the income of smallholders in the Blantyre Shire Highlands. An independent, mid-term review concluded that: *"in terms of the stated goal the project exhibits a serious lack of relevance... there is little evidence that the project was formulated in response to demand considerations... Alternative approaches for reaching the goal do not appear to have been given adequate consideration before deciding on an IPM approach".*

It is tempting to dismiss FSIPM as simply the 'wrong' project but projects are never simply 'right' or 'wrong'. Most projects require some re-engineering to reflect changes in their basic assumptions or in the conditions under which they operate. The point, surely, is that projects must be able to learn from their experience and, having learnt, be able to change. Regrettably, while the FSIPM Project was able to learn, it had only limited freedom to change. We shall explore the reasons for this later in the report.

WHAT WAS INNOVATIVE ABOUT FSIPM?

Despite its flaws, the FSIPM Project did have several redeeming features.

A farming systems perspective

Although farming systems research was not new in Malawi, the project was unusual in having an explicit farming systems approach. The project

BOX 1 IPM AND AGRICULTURAL RESEARCH IN MALAWI

The Department of Agricultural Research and Technical Services (DARTS) forms part of the Ministry of Agriculture and Irrigation (MoAI). The Department is headed by a Director and is divided into seven Commodity Groups, one of them being Plant Protection Services. The official philosophy for plant protection in Malawi is IPM.

Staffing

In 1999, the three core disciplines of entomology, pathology and nematology employed 16 DARTS researchers. Of these, seven had PhDs. This number excludes others on study leave or working in the university research system. According to the Master Plan for Agricultural Research, research on pests and diseases occupied 36% of total scientific research time, compared with 18% on crop improvement and just 9% on soil fertility. In legumes and vegetables, research on pests and diseases occupied 30% and 60% of total scientific time, respectively.

Funding

In 1998, 70 projects were undertaken through or with the MoAI and 20% of total funding from these projects went to agricultural research. There were 16 projects in agricultural research (with seven more in the pipeline) with an estimated cost of MK 914 million (US$ 21 million in 1999 prices); 16% of this funding was devoted to IPM projects. Of these, the largest was the 12-year-old Malawi-German Plant Protection Project (MGPPP) that focused on IPM for vegetables, cassava and maize storage pests.

Research priorities

In the Master Plan for Agricultural Research, senior Malawian professionals ranked the production constraints facing smallholder agriculture. The figure below shows the importance of pests and diseases (*y* axis) and soil fertility (*x* axis) for major smallholder crops. The grid shows that soil fertility is a high priority constraint for maize, but a low priority constraint for pigeonpea and sweet potato. By contrast, pests and diseases are a high priority for pigeonpea and beans but a medium priority constraint for maize, the staple food crop.

Conclusions

The high profile of pest management in Malawi reflects the historical priorities of donors and scientists rather than of farmers. In terms of staffing, research funds and training, plant protection has enjoyed a relatively privileged position that is hard to justify in terms of its potential benefits compared to more pressing problems such as research to address declining soil fertility. Since most agricultural research in Malawi is donor-driven, there is a need to rationalize the allocation of research funds in ways that are more in line with farmers' own priorities.

Research priority grid for major smallholder crops in Malawi

Pests and diseases (y)	Low	Medium	High
High	Cowpea $\boxed{\text{Pigeonpea}}$ Groundnut Cassava	$\boxed{\text{Beans}}$ Irish potato Sorghum Tomato Cabbage	Tobacco
Medium	$\boxed{\text{Sweet potato}}$ Paprika	Millet Chillies	$\boxed{\text{Maize}}$ Rice
Low	Soyabean	*Amaranthus* Sugarcane	Pumpkin Onion

Soil fertility and plant nutrition (x)

FSIPM target crops $\boxed{}$

targeted resource-poor farmers (particularly women) and it tried to see IPM in the context of the farm as a whole, where farmers may have priorities other than pest management. Research was conducted by a mix of disciplines, including pest management, agronomy, social anthropology and agricultural economics.

Focus on food crops

The project did not focus on cash crops such as cotton or tobacco that were the preserve of a few, but on staple food crops that were grown by the poor majority. This gave its findings about the role of these crops in the farming system and in the livelihoods of smallholders a much wider relevance.

Farmer participation

Gradually, the project gave farmers more and more control over the design and implementation of IPM technologies. By the end, farmers were designing experiments jointly with researchers and even designing and running their own experiments from which researchers might learn.

A focus on learning

At the end of each season, the project identified the major lessons and the implications of this 'new learning' for future activities. By treating learning as an activity in its own right, the project encouraged openness about its assumptions, methods and objectives.

CONCLUSION

Although the project developed technical recommendations that are likely to benefit resource-poor farmers in the Blantyre Shire Highlands, these were mainly crop management recommendations with an IPM component rather than IPM recommendations as such.

The real value of the project, it can be argued, lies in what it learnt in the process of developing these recommendations. This included important lessons about the role of IPM in Africa, the farming system, smallholder livelihoods, working with resource-poor farmers, and the limitations of a conventional blueprint project. This knowledge is worth preserving because these lessons are relevant not only for Malawi but for work with smallholders in other developing countries.

It is also worth preserving because, despite the growing amount of research on rural Malawi, this tends to remain the province of separate disciplines. We believe that there is a need for a more integrated approach that links technical information about the farming system with insights from the social sciences.

CHAPTER 2

LIVELIHOODS AND THE FARMING SYSTEM

A farming systems approach gave the project a broad perspective on smallholder agriculture. A systems approach demands that we study the whole farm rather than single components, and see farmers' welfare as dependent on a wider range of variables than the conventional yardsticks of yield or profitability. The project, therefore, studied not only pests and diseases but also what crops farmers grew and why, how they allocated labour, relationships between households, and the various ways in which smallholders made a living.

The result is a fuller understanding of smallholder livelihoods in the poorest region of one of the world's poorest countries. A livelihood is defined as 'the capabilities, assets (including both material and social resources) and activities required for a means of living'. Think of it as a 'portfolio': a set of options that matches the household's skills and resources and provides various streams of income at different times of the year.

Although agriculture is only one component of livelihoods, livelihoods are closely linked with the farming system. This is partly because agriculture remains the single most important component of livelihoods. But the farming system also dictates the need for alternative sources of income and the scale and timing of these needs. Understanding livelihood strategies, therefore, requires a prior knowledge of the farming system.

This chapter presents some of our main findings. We begin with the farming system, then move to the village, and end by comparing the livelihood strategies of individual households.

THE FARMING SYSTEM

The key features of the farming system can be summarized as follows.

- While the warm tropical climate is suitable for year-round crop production, rainfall is concentrated into a single, 5-month wet season between November and March. Since the farming system is almost entirely rainfed, upland crops must be grown in a relatively short period. An important contrast between our sites was the longer growing season in Matapwata that extended the period available for cropping.

- The majority of farms are small by African standards, with three-quarters below 0.5 ha. This, combined with a single wet season, helps explain the prevalence of mixed row cropping – growing two or more crops simultaneously arranged within a single row in the same field.

Blantyre Shire Highlands RDP: facts and figures	
Land area	449,400 ha
Area cultivated	139,168 ha
Population	1,115,956
Farm households	336,000
Female-headed households	34%
Average farm size	0.54 ha
Farms under 0.5 ha	74%
Maize yield	836 kg/ha for local varieties

- The concentration of crop production creates a seasonal labour bottleneck, particularly during the first critical 6 weeks after the planting of maize – the '6-week window' – when the planting of intercrops, weeding, second weeding and fertilizing follow each other in quick succession (Figure 2). Smallholder agriculture in southern Malawi is unmechanized and all the operations listed above must be done manually with the aid of a hoe. New technology that needs extra labour in this period may encounter a labour constraint.

- Yields of maize, the staple food crop, are low because of poor soil fertility and the high cost of chemical fertilizer. Without fertilizer, yields are poor. In the project's first year (admittedly, a wet season) we harvested around 600 kg/ha from our unfertilized research plots.

- Low maize yields combined with limited land means that most households run out of their own maize by November or earlier. The need to buy maize explains the high share of 'food crops' that are marketed to earn cash, and the importance of 'off-farm income' (labouring, petty trade, gifts) in the household economy.

The red-flowered witchweed reduces maize yields in infertile fields

CROPS

A livelihoods calendar (Figure 2) shows the timing of the major crops in relation to other activities.

- Maize occupies 90% of the cropped area and accounts for half the total value of crop production. Maize is planted with the first rains in late November and harvested in early May. Long before this, however, households will have begun to harvest the immature crop, starting in mid-February with green maize and, from March onwards, pounding unripe cobs to produce sweet-tasting flour called *masalanga*.

- Beans are planted alongside maize in January and harvested from late February onwards. Farmers prefer to eat fresh rather than dried beans and so plant several varieties with different maturity dates. The early maturing variety Kaulesi is prized for providing fresh food in the hungry season and for earning a price premium in local markets, while the late maturing variety Kayera wamkulu has tasty leaves and provides fresh beans until the end of July.

- Pigeonpea is planted in November with maize but not harvested until later. Early maturing varieties like Chilinga are harvested in June, while local varieties are slow to mature and continue to produce fresh pods as late as October.

- Sweet potato is normally planted in February when farmers have finished the second weeding of maize. It is usually grown as a sole crop or intercropped with field pea. Sweet potato planted in February is harvested in June after the harvest of maize.

Hence it is not eaten during the hungry months but used to eke out the household's supply of stored maize during June–August. Recently, farmers have begun to plant more sweet potato and to plant it earlier, both for food and for sale to city traders.

- Relay-planting (*mbwera*) of beans, field pea and sweet potato occurs in mid-March. The yield of the relay bean crop depends on rainfall between May and June and is particularly critical for long duration bean varieties. Many farmers prefer field pea to beans as a relay crop because it is more tolerant of drought stress.

- Vegetables grown in *dimbas* – fields irrigated from streams or wells – are grown mainly in the dry season when there is less risk from pests and diseases. Farmers will also plant tomato, cabbage, rape and mustard in the wet season in order to provide themselves with cash to buy maize during the hungry period.

- Burley tobacco – Malawi's most lucrative cash crop – accounts for 5% of the total value of crop production. Planted as a sole crop that competes with maize, it is harvested in February ready for sale on the auction floors between April and June. Relatively few households grow burley, however, because of fluctuating prices and high labour requirements.

The livelihoods calendar shows a marked 'hungry season' between October and early March when most farm households have run out of maize from their own granaries. During this period they rely heavily on coping strategies to provide them with food and small amounts of cash income. For example, households may earn income from *ganyu* (casual labour) or eat inferior forms of maize porridge made from bran (*madeya*) or immature grain (*masalanga*). Those with skills and capital may also earn cash income from off-farm sources such as trading maize flour. The later part of the hungry period can be a time of real hardship. Usually hungry, and sometimes weakened by illness, families must somehow find the energy for land preparation, planting and two weedings.

The calendar shows that income from agriculture is insufficient for livelihoods in two periods.

- During November and March, 3 months may pass with no income from upland crops. This changes only with the sale of beans in February and field pea in April. Only households with *dimbas* that can grow fast maturing rape and mustard have much income from agriculture in the hungry months.

- During September–October, households run out of relish (*ndiwo*) and may resort to eating weeds, wild plants and tree leaves.

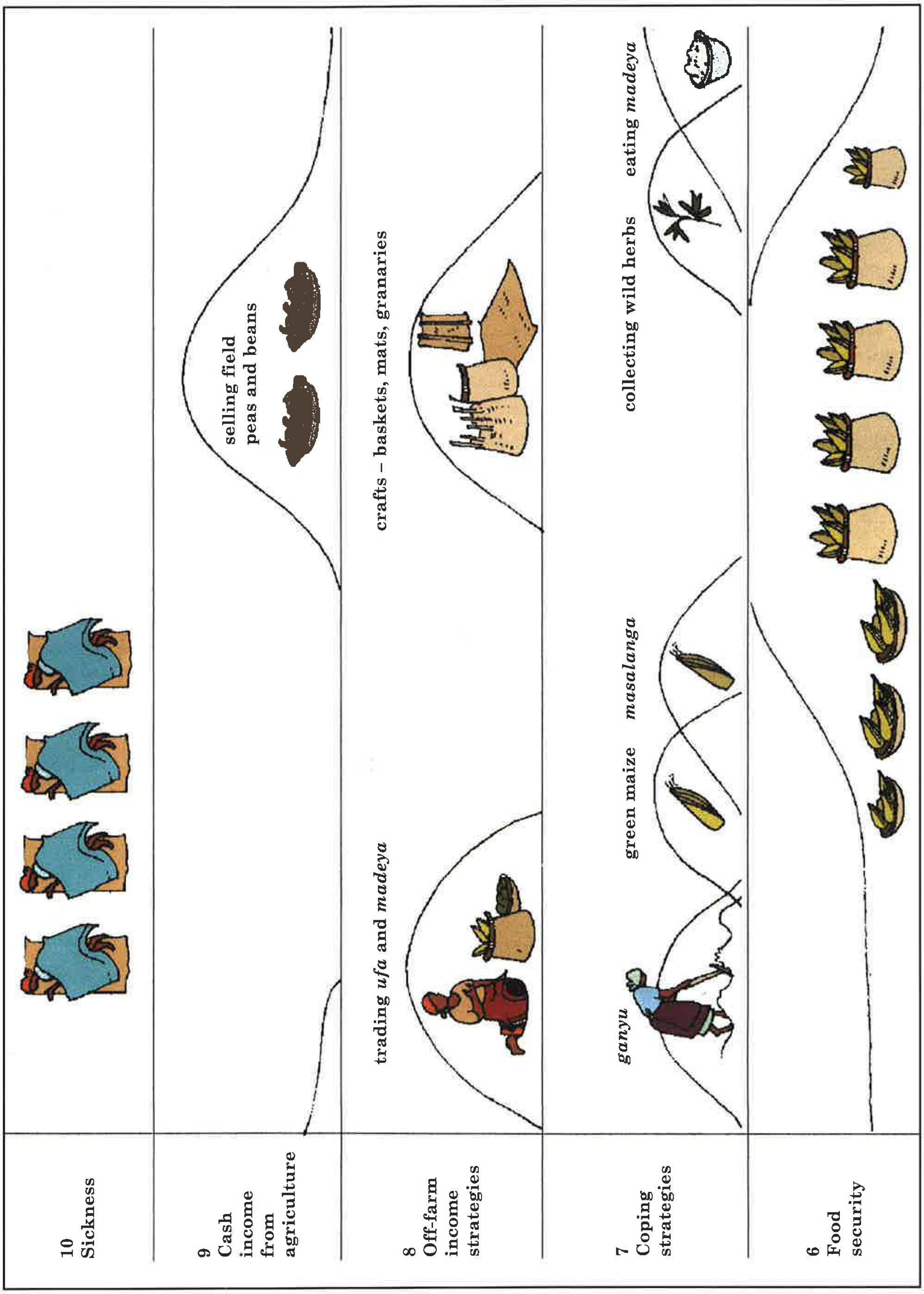
INDIGENOUS KNOWLEDGE

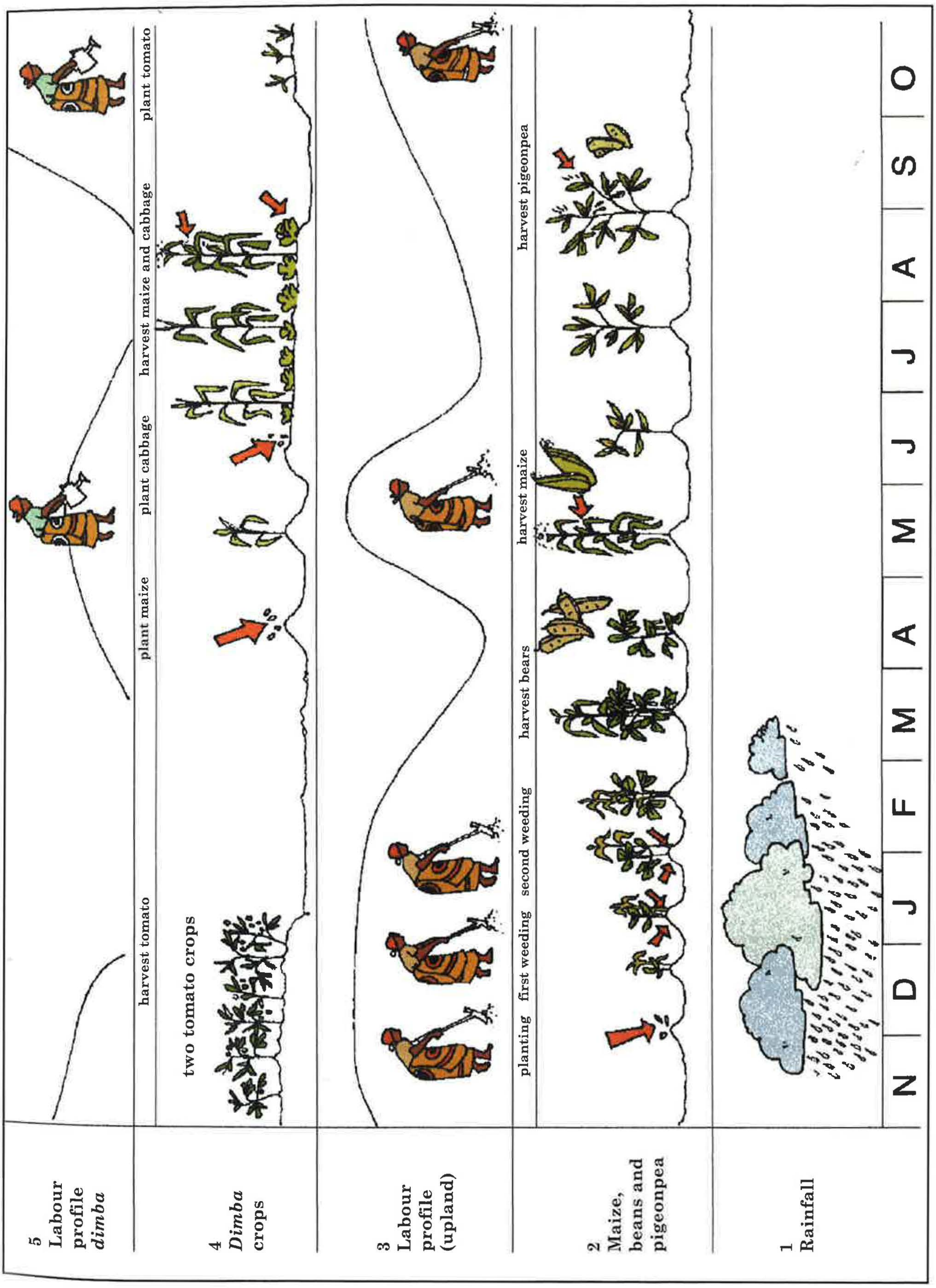
The combination of a rainfed farming system, hoe agriculture and intercropping has produced a sophisticated set of cultivation practices. This is reflected in a rich farming vocabulary. The English verb 'to hoe' has no fewer than 36 equivalents in the local language, Chichewa. These variations in farmers' management practices are subtle and often escape the notice of researchers. Nevertheless, it is important to learn about these practices before introducing new technology in farmers' fields (Box 2).

A WHOLE-FARM PERSPECTIVE

Changes in farmers' pest management may also affect other components of the farming system. Cash spent on pesticides, for example, may reduce the amount that can

Figure 2 Livelihoods calendar





5 Labour profile *dimba*
4 *Dimba* crops
harvest tomato
two tomato crops
plant maize
plant cabbage
harvest maize and cabbage
plant tomato
3 Labour profile (upland)
2 Maize, beans and pigeonpea
planting
first weeding
second weeding
harvest bears
harvest maize
harvest pigeonpea
1 Rainfall
N
D
J
F
M
A
M
J
J
A
S
O

BOX 2 FARMERS' TILLAGE PRACTICES

The project evaluated two green manure crops – *Tephrosia vogelii* and *Crotalaria ochroleuca* – as a way of enhancing soil fertility on the fields of resource-poor farmers. To maximize the biomass from these crops, researchers knew that farmers had to bury *Crotalaria* in May and *Tephrosia* in November just before planting. But how did this fit with farmers' existing tillage practices? To find out, we interviewed a group of key informants. They identified seven distinct tillage practices, each with a local name, that farmers selected according to their cropping pattern or the amount of labour that they had available. These practices were divided into four groups:

Kuwojeka* + *kuwunga* and *kukhwaza* or *kusosa* + *kuwunga

Farmers buried crop residues and weeds under a shallow soil covering to help decomposition (*kuwojeka*) or simply left them to decompose uncovered (*kukhwaza* or *kusosa*). Some farmers began *kuwojeka* in June and most finished by August to give residues sufficient time to decompose before planting of maize in November. After the residues had decomposed the soil was ridged (*kuwunga*).

Kukwazira* or *kukhusa* + *kuwunga

Farmers burned crop residues and weeds (*kukwazira* or *kukhusa*) when weeds were too bushy to allow incorporation or when there was insufficient time left for them to decompose before the planting of maize. Burning usually occurred from September onwards, just before or at final ridging (*kuwunga*).

Kukwezera

Farmers used *kukwezera* when they relay-cropped maize with beans or field pea, or where they grew sweet potato after maize. The weeding given these crops left little biomass for farmers to bury. Consequently, they simply repaired the old ridge on which they planted the next season's maize.

Kutipula

Kutipula was used in *dimba* gardens where crops are planted on flat beds rather than ridges. It is also used to describe the practice of using a hoe to remove noxious weeds that farmers wish to extirpate from their fields, and which are not incorporated with other weeds during *kuwojeka*. The normal practice is to burn these weeds after drying them.

We concluded that the incorporation of green manure crops was easiest on upland fields where farmers grew maize without relay-crops. Farmers were accustomed to burying weeds and crop residues on these fields wherever possible. *Crotalaria* was best incorporated with other crop residues and weeds during *kuwojeka* in June, one month later than required by researchers. It would be possible for farmers to incorporate *Tephrosia* before the rains in November while they were completing final ridging (*kuwunga*). However, earlier incorporation, along with other crop residues and weeds during *kuwojeka* between July and August, fitted better with farmers' existing tillage practices and also avoided increasing the demand for labour during final ridging.

be spent on fertilizer. One way of understanding these interactions in the farming system is to build a model and then simulate the changes that are being proposed.

We modelled the farming system for five household types representative of smallholders at our research sites. The model used a linear programming algorithm that maximized net revenues subject to constraints on land, labour, cash, and the need for household food security.

The results (Figure 3) showed that:

- IPM strategies increased net returns by an average of 13%; this assumes that households experience damage from several pests in the same year;
- food security also increased for all households;
- except for households that grew burley, more labour was allocated to off-farm activities because these gave higher returns;

- doubling the households' supply of cash gave an increase in net returns similar to that from IPM, suggesting that lack of cash for the purchase of fertilizer is as much a constraint as crop losses from pests and diseases.

INSIDE THE VILLAGE

'Villages' are usually the first point of contact between projects and farmers. Once a project has decided its working area, the search begins for suitable sites for its activities. In the case of the FSIPM Project, we held discussions with extension officials, made visits accompanied by the Field Assistant, met the village chief, toured farmers' fields, and held a general village meeting. Eventually, we selected four villages that were relatively small, had a range of land types and problems with pests, and that were accessible throughout the year.

Only when the project was already underway did we begin to learn about the forms of social organization inside the village, and the role that these played in determining where households lived, their relationships with other villagers, and their access to land and other resources.

With this information, we were better equipped to understand how farmers saw the project, and to include a fairer representation of villagers in the research programme.

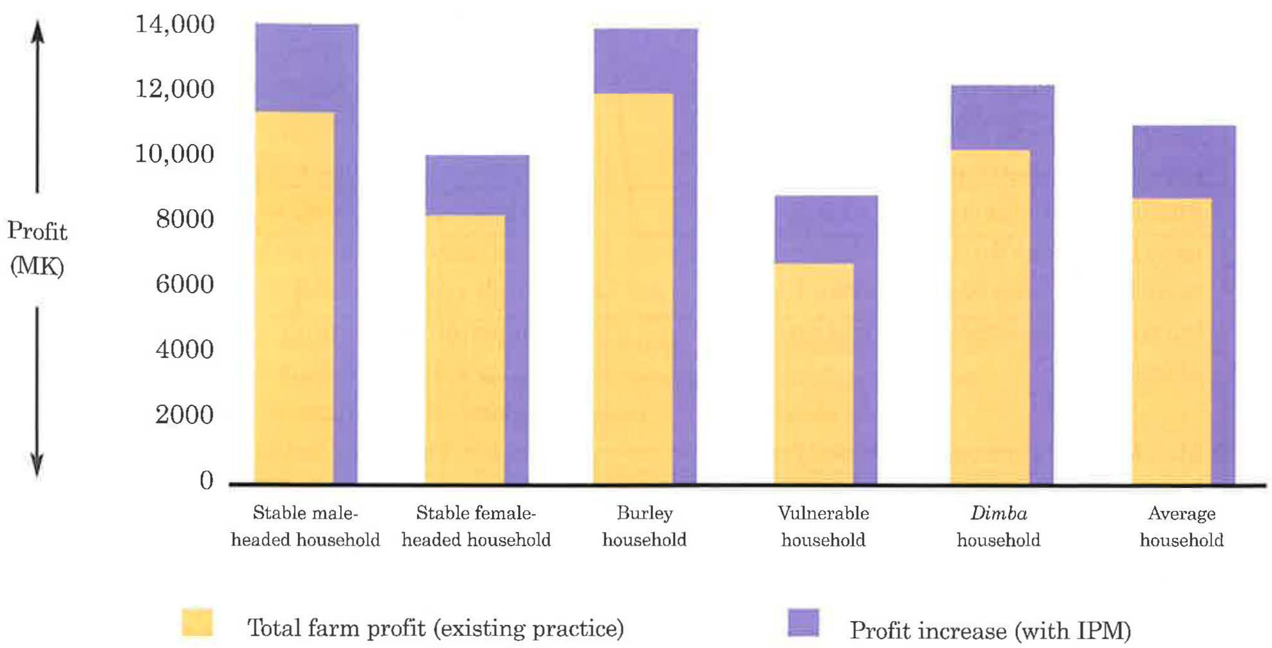
Mudzi

A 'village' (*mudzi*) in fact consists of a collection of hamlets, supposedly under the authority of one chief. Some, though not all, of these hamlets will be related, sharing a grandmother or great-grandmother who was usually the original founder of the village.

Mbumba

Since inheritance follows the female line, the most common residential pattern is a mother and her adult daughters, their spouses and young children, living independently in their own home but clustered together in a hamlet. A single hamlet or a collection of related hamlets forms a *mbumba* or matrilineage. Members of the same *mbumba* share close ties that are demonstrated during rites of passage, by assistance during illness, or in the everyday sharing of food. Traditionally, the eldest

Figure 3 Impact of IPM at the household level



BOX 3 SOCIAL ORGANIZATION: THE NKUTHO HAMLET

The Nkutho hamlet (not its real name) consists of five households and spans three generations. Mai Machewa, the eldest member of the hamlet, inherited land in Magomero village, Matapwata EPA, from her grandmother and sister in the late 1950s ((i) in the figure opposite). Since then, land has been divided twice between her daughters and in the future will be divided again between her eight grand-daughters. The shares are not equal since the fields differ in quality. Although Mai Machewa's share is the largest, for example, it is mostly stony and inaccessible hillside. Mai Machewa allowed her daughters to use her land in the 1970s when she remarried and went to live in her husband's village. Much to their resentment, however, she reclaimed it when she returned home after her husband's death.

(ii) in the figure opposite shows the three generations among the five households.

- Mai Machewa (household A) is the mother of Mai Masula (household B), Mai February (household C) and Mr Phiri (household D). Two sons and one daughter live in town. She has a precarious relationship with her third husband, an elderly man who is usually absent during the hungry months between November and March, leaving her to cope with fieldwork alone.

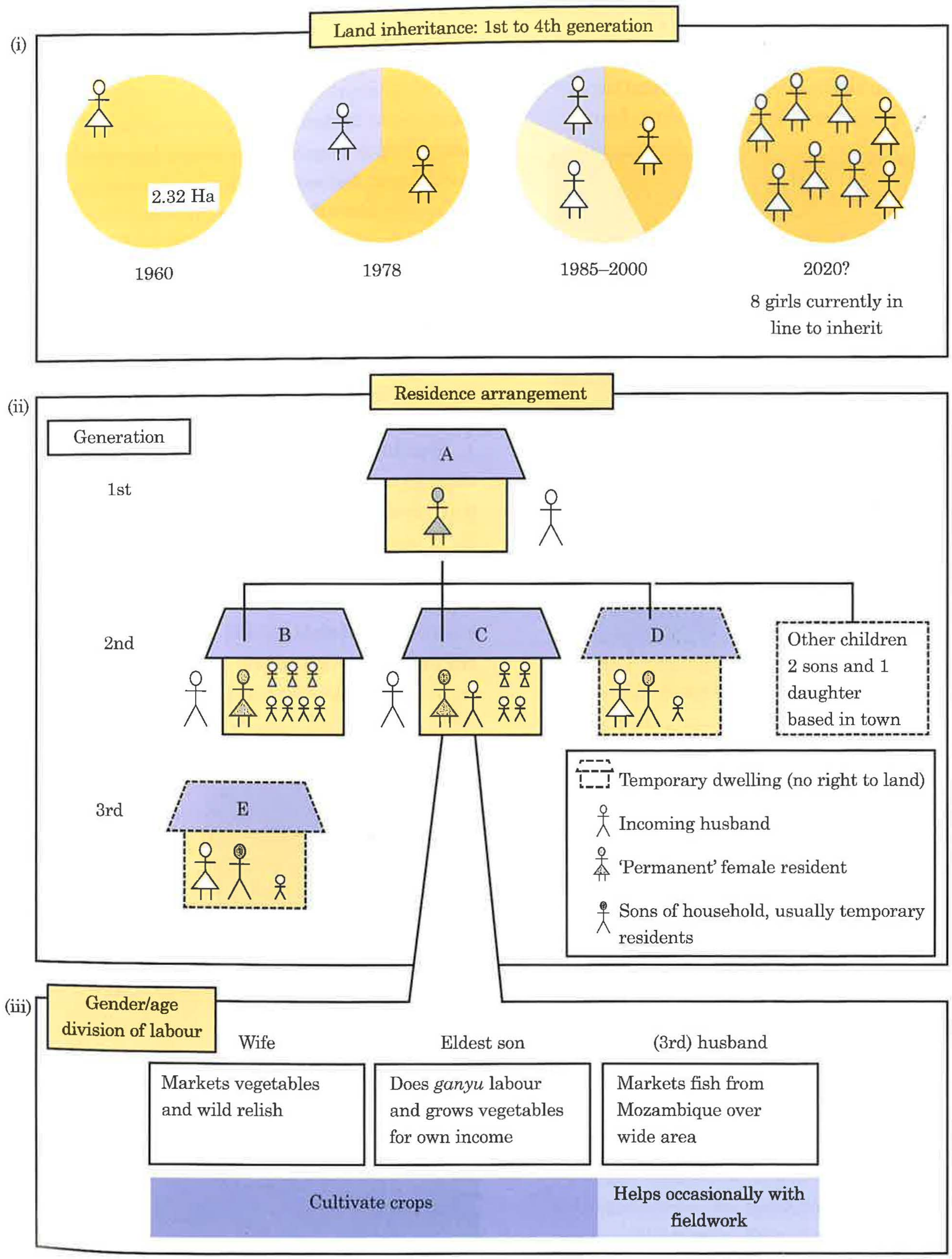
- Mai Masula (household B) is 37 and has been married for about 20 years to Mr Masula with whom she has seven children. He works as a guard at a nearby estate. Together they grow vegetables that Mai Masula sells.

- Mai February (household C) is 35 and lives with her five children and third husband who is the father of her youngest child.

- Mr Phiri (household D) is aged 23 and is Mai Machewa's youngest son from her second marriage. Previously he worked in Blantyre but returned 18 months ago with his young wife and now has a young son. Mr Phiri lives by earnings from *ganyu* and has begged a small piece of his mother's land to grow vegetables. In due course, he hopes to build a house at his wife's home.

- David Masula (household E) is a son of the Masula's. About the same age as his uncle Mr Phiri, he has finished school and has recently set up home with a young wife and new baby. He is looking for work and is also unlikely to be a permanent resident.

(iii) in the figure opposite shows the division of labour in Mai February's household. Mai February spends most of her time marketing vegetables that she buys from growers in Magomero and surrounding villages. She sells these in Blantyre, willingly tolerating hours of travel for the sake of higher profits. Although still at school, her eldest son Peter does most of the farming in exchange for the use of fertile *dimba* land on which he grows vegetables to supplement his income from *ganyu*. Mr February helps occasionally with fieldwork, but his main occupation is drying and marketing fish that he buys from Mozambique.


(i)
Land inheritance: 1st to 4th generation
2.32 Ha
1960
1978
1985–2000
2020?
8 girls currently in line to inherit
(ii)
Residence arrangement
Generation
1st
2nd
3rd
A
B
C
D
E
Other children 2 sons and 1 daughter based in town
Temporary dwelling (no right to land)
Incoming husband
'Permanent' female resident
Sons of household, usually temporary residents
(iii)
Gender/age division of labour
Wife
Eldest son
(3rd) husband
Markets vegetables and wild relish
Does *ganyu* labour and grows vegetables for own income
Markets fish from Mozambique over wide area
Cultivate crops
Helps occasionally with fieldwork

brother of the sisters (the 'owner' of the lineage, *mwini mbumba*) has authority over the *mbumba*, although this may be shared with older women in the lineage. Children then inherit movable goods from their mother's brother rather than their father, while women inherit land from older female relatives such as their mother, grandmother or aunts.

Banja

The household (*banja*) is made up of a woman, her husband and their children. After marriage a husband normally moves to his wife's village (*chikamwini* marriage). There he is expected to build a house for his wife and help with fieldwork (depending on what his other means of earning a living might be). Some men, often sons of the chief or the *mwini mbumba*, inherit land and bring wives home with them (*chitengwa* marriage). However, their daughters usually inherit this land while sons find wives elsewhere. It is also quite common for men to marry within their village of birth and to farm land owned by their parents. In the long run, however, their tenure is not secure as nieces and female cousins have a prior claim and land is in short supply.

GENDER ROLES

Women enjoy substantial autonomy because they 'own' agricultural land, control much of their income and labour, and stay in the village of their birth surrounded by their own relatives. Consequently, decision-making is usually shared between husband and wife who are effectively joint heads of the household. Each spouse may pursue a different set of livelihood strategies (e.g. petty trading, marketing, cash cropping, formal employment) so that they have separate responsibilities in addition to the shared enterprise of farming. Divorce is surprisingly common. Women may fear divorce less because children 'belong' to the mother and the *mbumba*.

TYPES OF HOUSEHOLD

Farmers in Malawi are not homogeneous but vary in their access to resources like land and labour, the use they make of these resources, the share of total income that they earn from agriculture, and their capabilities. Using cluster analysis, we classified households at our research sites into five different types. Examples below from each of the five cluster groups capture the diversity masked by the label of 'smallholder'.

1. 'Burley households': households that grow tobacco but not vegetables and are reasonably food-secure

Mai Linny Mpenda (36) lives in Lidala village, Mombezi EPA. She lives with her widowed mother (aged 50) and three young children, the eldest aged 15. She separated from her husband 2 years ago after 6 years


'Burley' householder, Mai Mpenda

of marriage. She has been the only female member of the Tiyambe burley club since 1992. The club provides fertilizer on credit for both tobacco and maize. Linny and her mother cultivate their own fields but pool their maize harvest. They are usually self-sufficient in maize until January. Mai Mpenda and her mother do *ganyu* during the period for weeding. The household has no other off-farm income. Total household income in 1998/99 was estimated at MK 11,700 (US$ 266).

2. '*Dimba* households': households that grow vegetables but not tobacco and are often reasonably food-secure

Bambo Tomato (33) lives in Kambuwa village, Matapwata EPA. He is married with two young children. The household has three upland fields and one *dimba* garden. He does all the fieldwork in the *dimba* garden and most of the work in the upland. His wife assists in marketing *dimba* vegetables. Bambo Tomato never does *ganyu*. The household was self-sufficient in maize until March. They own four goats. A careful farmer, Bambo Tomato keeps a set of accounts for his *dimba* garden. Total income in 1998/99 was estimated at MK 4208 (US$ 96).

3. 'Vulnerable households': households that do not grow tobacco or vegetables and that are food-insecure

Mai Diana and Mai Idesi Chilinkhonde, two elderly sisters, live in Chiwinja village, Mombezi EPA. They cultivate 0.85 ha, most of which lies in the Chitera *dambo*, where maize is frequently lost to floods. In 1996, for example, their crop was almost entirely destroyed. Although the two women cultivate separate fields and have their own maize granary, they eat together, along with their elderly brother Isaac who lives next door. They rarely do *ganyu* except to earn firewood. Their main source of cash is selling snuff, which they do from home. They own a sow and four piglets. Total income in 1998/99 was estimated at MK 9500 (US$ 216).

Mai Chilinkhonde: her household is characterized as 'vulnerable'

4. 'Stable female-headed households': households that do not grow tobacco or vegetables, are reasonably food-secure, and headed by a woman

Mai Muhemwe (63) lives with her elderly mother Mai Wesele and two daughters Eliza and Grace in Lidala village, Mombezi EPA. Willard, her brother, eats with them when not living with his wife in Zomba. The household cultivates four fields (0.54 ha) and the four women each have their own maize granary. During weeding, the household works on each other's fields in rotation. They eat together as one household. In 1999, they ran out of maize in February. Most household income derives from the sale of beans, field peas and pigeonpea. Grace briefly traded in fried fish in June and in August Mai Wesele started brewing local gin, something she had not done for 6 years. Estimated total income in 1998/99 was MK 22,739 (US$ 517).

Mai Wesele: part of a stable female-headed household

5. 'Stable male-headed households': households that do not grow tobacco or vegetables, are reasonably food-secure, and headed by a man

Bambo Basikolo (53) and his wife live in Kambuwa village, Matapwata EPA. The household has four children. A married daughter lives a few metres away. The harvest from the household's *dimba* and upland fields rarely lasts up to September. The household does a lot of *ganyu* to buy maize. The eldest daughter Eliza (21) is regularly employed as an estate worker during school holidays. Bambo and Mai Basikolo have several sources of off-farm income besides *ganyu*. Sometimes, Mai Basikolo sells cooked velvet beans. In 1999, the household was assisted by a 50 kg bag of maize as part of a programme for malnourished children. The household also managed to secure a fertilizer loan for the past two seasons. Estimated total income in 1998/99 was MK 8319 (US$ 189).

Some implications for projects

Knowing more about social organization and about the differences between households is important for several reasons.

Selecting households from different lineage groups spreads the potential benefits from projects more widely and more quickly, since households tend to share information and resources with their relatives first.

Just as households vary, so too will the benefits from new technology. Farmers that specialize in tobacco or vegetables, for example, may benefit little from new varieties of beans or pigeonpea. Similarly, households with fields that are marginal for maize may benefit more from project activities that increase their earnings from other crops or from other types of income.

Members of the same household may pursue livelihood strategies individually, or contribute jointly but in different ways. It is important to know who benefits from project activities and who, if anyone, loses out.

LIVELIHOOD STRATEGIES

Malawi is usually described as a nation of small farmers. In fact, the nature of the farming system means that most smallholders rely heavily on income earned 'off-farm' in a variety of ways. To describe off-farm activities as coping 'mechanisms' – unthinking reactions, devoid of volition – is misleading. Many enterprises show initiative, careful planning, teamwork, and make use of inherited skills.

Geni

Geni – buying and selling – was popular among households headed by women, who were responsible for most food marketing. *Geni* was sometimes quite specialized and involved travel to markets beyond the village, sometimes in partnership with other women. Most forms of *geni* were annual, rather than seasonal. Women who specialized in *geni* were able to combine trading with farming. Among the off-farm enterprises we studied, *geni* had the highest average turnover.

Ganyu

Ganyu – piecework or work that involved a contract – varied from agricultural labour to skilled jobs such as carpentry that involved some market specialization. *Ganyu* was seasonal except for employment on tea or coffee estates or in cases where workers were employed permanently by one household. Turnover from *ganyu* enterprises was generally low.

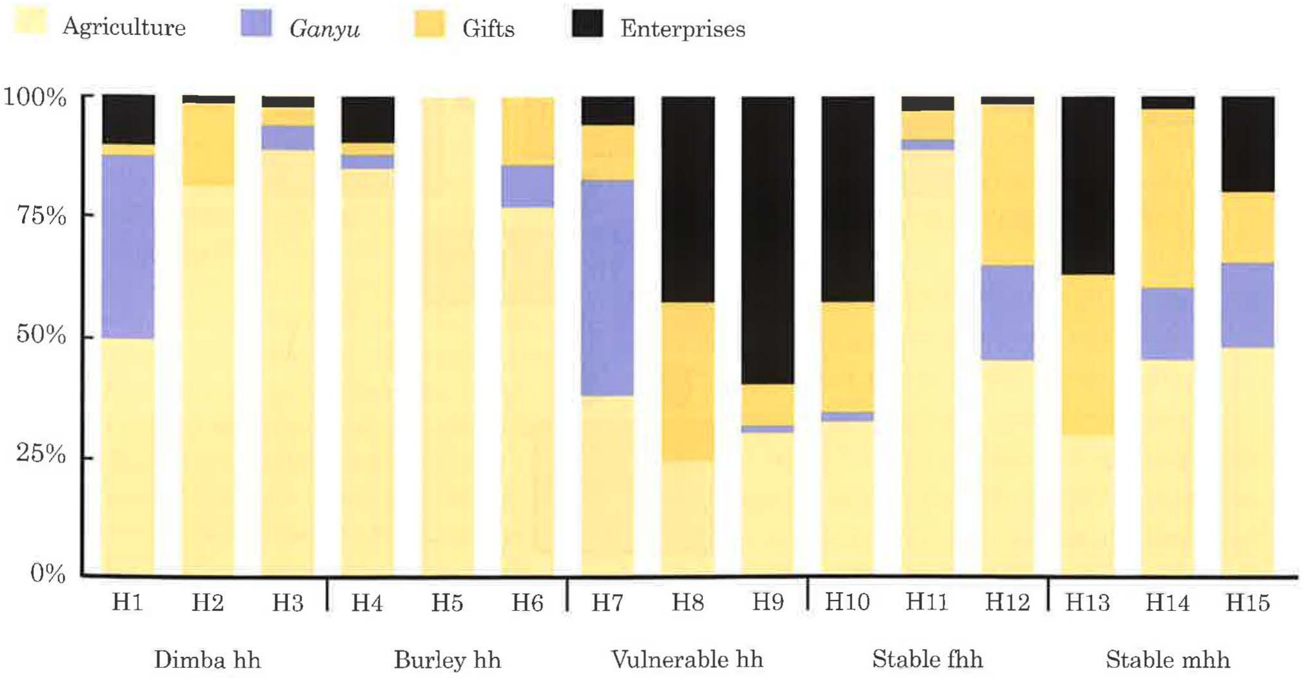
Crafts

Crafts used common property resources such as reeds or thatching grass, required minimal working capital, and were mostly produced to order from home or neighbouring villages. Crafts were popular with elderly men who lacked the physical strength for *ganyu*. Among off-farm activities, they were the most seasonal, being found in the dry season when raw materials became available. Turnover from crafts was lower than for *geni*.

Gifts

Umphawi – a Chichewa word for poverty – literally means 'being without relations'. Gifts of food, cash and clothing from relatives and friends are an important source of income, especially for poorer households. Households may regularly share food during the hungry season with sick or elderly relatives (Box 4).

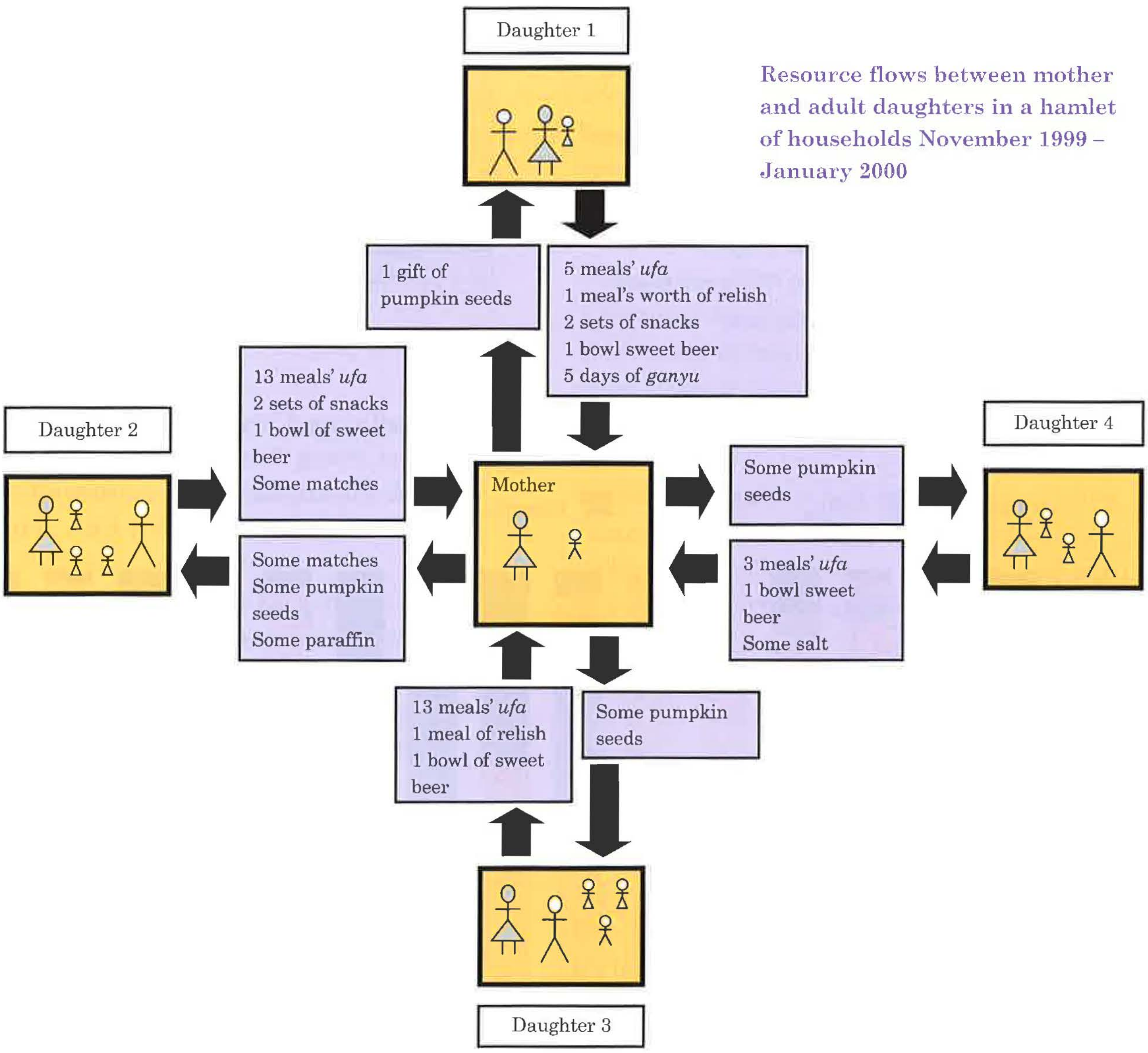
Figure 4 Sources of household income December 1998 – November 1999



BOX 4 IS THERE A VILLAGE 'SAFETY NET'?

In the long-term, improving income for resource-poor smallholders must depend on making agriculture more productive. In the short-term, however, welfare measures are needed to protect the poorest households. They include public works, targeted credit programmes, and income transfers through subsidized fertilizer and seed. Collectively, these measures are called 'a safety net'. At the village level, informal safety nets operate to protect households or individuals during serious episodes of poverty or vulnerability. Elderly people, the sick or young people who have recently settled in the village may rely heavily on help from others.

The project studied resource-flows for 18 households for 10 weeks between November 1999 and January 2000. The topic was not easy to investigate. For instance, villagers found it hard to remember gifts of small sums of cash or plates of flour made irregularly over a long period. Those who received assistance were mostly elderly parents, the sick and young women lacking male support who were pregnant or had small children. The amount of support given varied greatly. In the case of elderly parents, for example, the level of support ranged from near maintenance to virtual neglect.



Resource flows between mother and adult daughters in a hamlet of households November 1999 – January 2000

Near maintenance

The flow diagram opposite shows support from four married daughters to their 60-year-old, widowed mother. Over a period of 70 days, they gave her roughly 35 meals' worth of maize flour. Since at this time their mother was eating only one meal of maize flour and relish each day and otherwise living on snacks like cassava, her daughters provided for approximately half her food needs. In addition to the flows shown here, two sons in the village provided about 3 weeks' food and relatives gave gifts. In total, she received 56 meals from her children.

Virtual neglect

In a nearby hamlet, a woman in her late 60s who is nursing her dying son and whose husband is senile faced very different circumstances. Over a 70-day period, she received only three meals' worth of maize flour and 15 meals' worth of relish. Yet the households in her hamlet were better off than those in the hamlet of her near neighbour. When food became very scarce in January, she was reduced to asking her son for employment as *ganyu* labour. *Ganyu* is a way that households may give assistance whilst getting something in return. Her daughter-in-law denied that this was *ganyu*, however, and insisted that her elderly mother-in-law had helped just because she wanted to.

These results, and those from other households in the study, suggest that village safety nets indeed exist, but that they are often too weak to support those who need them most. Other research on safety nets suggests that increasing poverty is forcing villagers to think twice about their obligations towards each other and there is a greater inclination to get something in return like *ganyu* labour. It is possible that village safety nets are becoming weaker because of persistent food insecurity and the increased demands made on the extended family by the AIDS pandemic. Our evidence showed that some households were not getting the help they needed, but we cannot yet say whether this was because others cannot help or do not want to help.

Household incomes

Certain livelihood strategies are important for different types of household. We monitored a small sample of 15 households – three from each cluster group – to find out their main sources of income over a year. The results surprised us (Figure 4).

- In most cases, off-farm income accounted for half or more of total household income.
- Agriculture was the most important livelihood strategy for burley and vegetable growers. It was also important for one household (H 11) where three generations of the same family lived together, each cultivating their own fields. Agriculture was least important for the three households – all headed by elderly women – that we classed as 'vulnerable' because of their low food security.
- Although 'vulnerable' households had low food security they had developed other livelihood strategies that gave them *income security*. One relied on earnings from *ganyu* done by her sons, while the others relied on brewing local gin or selling snuff. As a result, they were *not* the poorest households. It is misleading, therefore, to classify households as poor simply because they run out of maize more quickly than others. Low food security makes households vulnerable but it does not necessarily make them poor.
- Market-led agriculture paid off handsomely for burley growers, two of whom had the highest net incomes, but it was a mixed blessing for vegetable growers. Although assured of a cash income during the hungry months, two households in this cluster had the lowest incomes in the sample. Growing vegetables left them little time for *ganyu* or other off-farm enterprises. As a result, they were poorer than households that were less

dependent on farming. One could hardly wish for a better illustration of the importance of off-farm income.

CONCLUSION

A farming systems approach gave us a clearer picture of our clients, how they managed their resources, and what benefits they might expect from better pest management.

Village households were woven into strong networks of kinship that influenced how information and new technology were used and shared. By working with households chosen from different lineage groups the project was able to reach a more representative sample of villagers and spread its resources more fairly.

Working exclusively with poorer households proved to be difficult and farmers who participated in field experiments represented a cross-section of villagers. Given the scale of poverty in southern Malawi, we believe it is more appropriate to target poor communities rather than poor households.

Classifying smallholders according to the mix of crops they grew, their level of food security, and the sex of the household head revealed important differences between households. These differences may influence their ability to adopt new technology and the benefits they can expect to receive. The increase in income from adoption of IPM technology – 13% of existing income from agriculture – was relatively small. Greater increases in farm incomes depend on farmers having more cash to buy fertilizer.

Smallholders who specialized in growing tobacco or vegetables formed a distinct group with a high share of income from agriculture. But limited land, low productivity, and a single wet season meant that most smallholders had to find alternative sources of income besides farming. The nature of the farming system limited livelihoods that depended solely on agriculture.

Poverty was not synonymous with low maize production. 'Vulnerable' households that were self-sufficient in maize for only a few months of the year also received income from off-farm enterprises such as petty trade. Consequently, they had higher average incomes than *dimba* households that produced more maize but derived most of their income from farming. Livelihood diversity was a more important determinant of poverty than the level of maize production.

CHAPTER 3

WORKING WITH FARMERS

'Farmer participation' has become a popular catchword. The benefits of a participatory approach are widely acknowledged: a clearer picture of farmers' priorities, more relevant technology, and higher rates of farmer adoption. But farmer participation also has costs. It cuts heavily into staff time and reduces the number of farmers that the project can reach. And there are limits to the degree of participation that farmers can offer when they are preoccupied with making a living, feeding their family, or surviving a poor season.

Working with farmers was an integral part of the FSIPM Project. Since farmers were not involved in the design of this project, farmer participation occurred during the implementation phase. The main focus of their participation was the on-farm trial. We planned, managed and evaluated trials with farmers. This chapter shows how this partnership evolved and what it contributed to the project.

'STYLES' OF PARTICIPATION

With hindsight, we can see that the project used four different 'styles' of farmer participation in on-farm trials.

- In Year One we used a *contractual style* in which we diagnosed farmers' problems, chose the treatments, and designed the experiment. We also used a *consultative* style by asking farmers to suggest pest management strategies that we might test, and later to evaluate the trials.

One of the project's first farmer meetings, Mombezi EPA

- In Year Two we used a *consultative* style in which farmers had some say in the design of the trials and helped to evaluate them.

- In Year Three a *collaborative* style included more emphasis on farmers helping with trial design and assessing 'losses' from pests, as well as evaluation. We also introduced a *collegiate* style in which farmers designed and managed their own experiments.

Figure 5 provides an overview of how relations between researchers and farmers developed over the three seasons of the project.

WHO PARTICIPATES?

The FSIPM Project was tasked to work with 'resource-poor' farmers of whom half had to be women. How did we select them?

- Social mapping

We used 'social mapping' to identify the *mbumbas* in each village, and the households in each *mbumba*. This was done separately with representatives for each *mbumba*. With 33 major *mbumbas* and 605 households, this was a lengthy process. We then used a set of indicators to screen out the better-off households in each *mbumba* in favour of poorer ones.

- Including all *mbumbas*

To avoid claims of favouritism, we included households from all the *mbumbas* in the village. It was also important to include the village chief.

- Gender balance

We deliberately chose households headed by women to make up one third of our collaborators, roughly the same proportion as for the RDP as a whole.

- Enthusiasm

We included those who had participated willingly in the diagnostic exercises that preceded the first season.

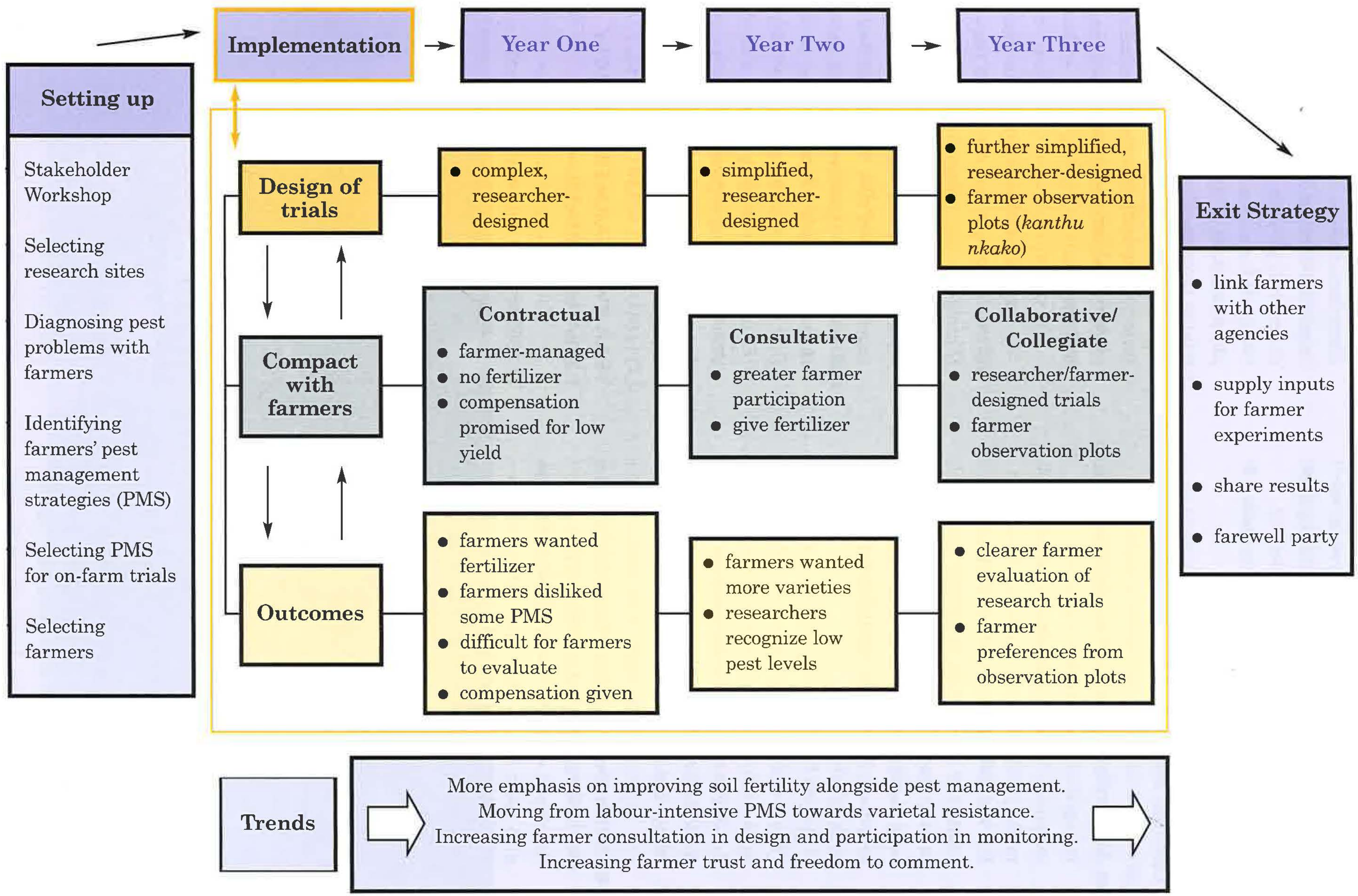
As a final check, we ran through our selection with the village chiefs and their advisors. On their advice, some of the households that we had selected were not included because they had no fields or were otherwise unsuitable.

Altogether, one third of the 67 households that participated in on-farm trials in Year One did not meet our poverty criteria but were selected for other reasons. The baseline survey showed that, as a group, our participating farmers were not significantly poorer than average. Working in a participatory mode, it was difficult to exclude everyone but the poor, and in Malawi, where the majority of rural households classify themselves as poor, it may be more sensible to target poor communities rather than poor households. Still, our farmers were certainly more representative than if we had simply delegated the task of farmer selection to the Field Assistant.

YEAR ONE: RESEARCHER-DESIGNED TRIALS

In 1996/97, the project faced the need to screen a wide range of potentially useful IPM strategies for three different crops. The most economical way to achieve this was by running one trial that tested several treatments at once over a large number of farms, with a unique combination of treatments on each farm. The trial, therefore, had to be designed wholly by researchers. At the outset, we discussed each IPM strategy in detail with farmers and each household received a description in the local language of the treatment on their plots. Farmers managed the trials and took part in land preparation, planting and weeding. Since we were trying to

Figure 5 Researcher-farmer linkages in on-farm trials, FSIPM Project



model the poverty of the farming system, no fertilizer was applied in the first year (against farmers' wishes) although we promised to compensate farmers for low yields on their trial plots.

Lessons learnt

- Just as farmers had told us (though we had interpreted it primarily as a bid for expensive inputs), the major constraint on maize yields was not crop losses from pests but low soil fertility. Lack of fertilizer and unusually heavy rains in 1996/97 resulted in very low yields. Some farmers did not even bother to weed their plots because they anticipated that there would be little return to their labour.

  "The project is in the same boat with the farmers this season because your trials failed due to too much rain and no fertilizer". (Farmer, Magomero village, Matapwata EPA)

- Neither the IPM technologies inherited from the Soil Pests Project, nor the farmer-developed strategies were effective. Farmers also made it clear that they disliked labour-intensive strategies when they were already busy with urgent tasks such as weeding.

- The complex factorial design of the trial meant that many farmers did not understand what the trial was about and so were unable to comment on the process or the results with confidence. Another problem was farmers' lack of scientific knowledge of the biology of certain pests, as they were not sure how our interventions could affect the pest.

- Compensating farmers for poor yields proved to be a turning point in our relations with farmers. Many were surprised that we had kept our promise. Later we learnt that many farmers had been extremely suspicious of our motives. In their experience, projects usually worked with better-off farmers and discouraged criticism. Moreover, none of them had ever staged a trial in their own fields or had seen a demonstration plot. This meant that farmers had much less context in which to place the project and its objectives than we had thought.

  "Why would you burn all that fuel in coming to the village if it was not to steal the land?" (Farmer, Lidala village, Mombezi EPA)

  "When I saw white people, I immediately expected trouble, even though you had a Field Assistant with you. Did you know that the reason only a few people came to the first meeting was because villagers feared the team was planning to claim Chitera dambo for a sugar plantation or for rice farming?" (Village chief, Chiwinja village, Mombezi EPA)

YEAR TWO: FARMER-FRIENDLY RESEARCH TRIALS

In 1997/98, the trials were simplified to allow farmers to evaluate the results by comparing adjacent plots with and without the technology being tested. This time we tested far fewer strategies. Farmers received fertilizer as well as seed, although it was at the rate they used themselves rather than the higher rate recommended by researchers. Finally, the project used field days and field schools to teach farmers pest biology so that they might comment more constructively on the trials.

Lessons learnt

- Providing fertilizer was critical in maintaining farmers' interest in the trials. A typical response was *"I am learning something this year because the team has* *changed to using fertilizer and as a result there will be a crop"* (Farmer, Magomero village, March 1998)

- At a farmers field day in 1998 farmers asked, *"How can we teach others if you won't teach us?"* In response, we tried to make the project more accountable to farmers, meeting with them more regularly and recording their opinions about the progress of the trials. This required a change of attitude among project staff without previous experience of farmer participation.

- A third lesson, more technical in nature, was how variable both pest populations and the results could be over different seasons between farms or even on the same field. This problem has continued to dog the project and would offer similar difficulties to other researchers working on-farm and dealing with problems that varied between seasons.

YEAR THREE: FARMER-DESIGNED TRIALS AND FARMERS' EXPERIMENTS

In mid-1998, the project devoted a week to a workshop on farmer participation. This resulted in several new approaches to on-farm trials in the final year of the project.

- Selecting 'pest groups'

  To overcome the patchy level of pest attack, we selected groups of farmers with previous experience of severe infestation by whitegrubs or termites to try the relevant technologies.

- Involving farmers in trial design

Farmer participation led to a radical re-design of some trials (Box 5). We further simplified the design of some research trials by confining some treatments to the specialized pest trials.

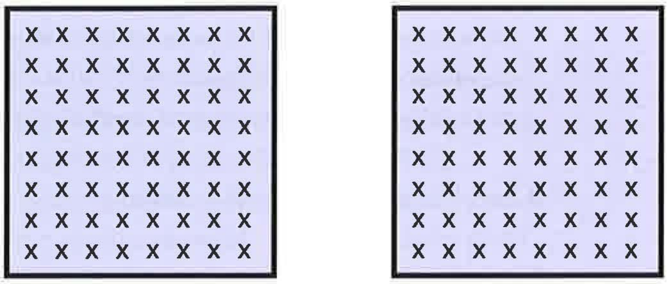
- Facilitating farmer-designed and managed trials

Farmers were encouraged to design and manage *kanthu nkako* ('our own thing') plots to test new varieties of beans and pigeonpea and chemical seed dressing. The project provided the same varieties as those planted on the research plot, plus some new varieties, and the farmer provided the rest.

Farmer at *Striga* field school

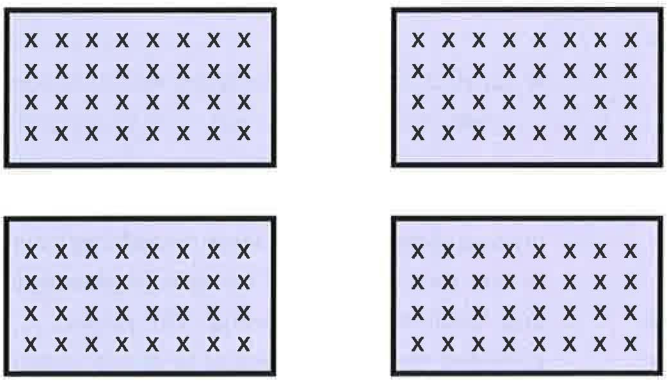
BOX 5 HOW TRIAL DESIGN INCREASED FARMER PARTICIPATION

Year 1



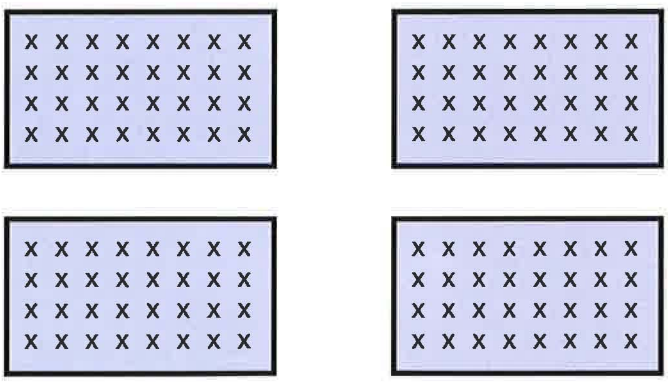
- 2 plots: one for research and one for farmer's own practice
- Large number of treatment combinations, different on each farm

Year 2

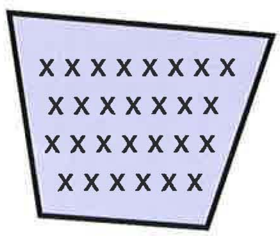


- Four research plots in same area as two in year 1
- Smaller number of treatments
- All major treatment combinations present on every farm

Year 3



Kanthu nkako plot



- Even fewer treatments, replicated on each farm
- Some treatments moved to another trial on other farms
- Farmers given same seed to plant on observation plots (*Kanthu nkako*)

Lessons learnt

- A parallel system of research plots and *kanthu nkako* plots on each farm solved several problems faced by the project. Farmers appreciated having their own trial plots and more inputs while they were no longer distracted from the purpose of the trial by differences in the layout of research plots.
- The gain from selecting farmers with a more serious pest problem was partly lost because rains reduced damage by these pests and the smaller number of farmers involved gave less statistically valid results.
- The specialist pest groups were also interviewed to discover more about farmers' perceptions of pest problems. This revealed that farmers with a termite problem were changing the agreed treatments on the research plots because they believed that the risk of lower yields from weeds or waterlogging outweighed the risk of damage from termites. This gave us a valuable insight into how farmers reacted to pests on their own fields.
- Researchers tend to regard damaged seeds or tubers as a total loss. By asking farmers to comment on the value of damaged pigeonpea seeds or sweet potato tubers we found that farmers accept some damaged yield which may still be used to eat or feed to animals. This implies that researchers had overestimated the damage from these pests.

TAKING STOCK

What were the benefits of farmer participation and what were the costs? Although we cannot answer this question precisely, we can identify the relevant issues.

The benefits

Better recommendations

Without farmer participation, we would have spent more time testing strategies that farmers regarded as unworkable because of labour or material constraints. It was partly for these reasons, for example, that after only one season we abandoned mulching, earthing-up plants, and high density planting of seed as strategies for bean stem maggot.

Another important benefit was that the project learnt rapidly about other characteristics that farmers valued in crop varieties, such as early maturity in beans, that may be more important to them than resistance to pests.

Farmer participation did not generate new technology. Two IPM strategies developed by farmers were tested but proved ineffective. The main role of participation was to ensure that the project developed technology that was appropriate for farmers' needs.

Quicker evaluation

Because of their number and the amount of data collected, a statistical analysis of the on-farm trials did not usually arrive until well into the next season, too late to help the project decide whether to continue testing a particular IPM strategy. This decision was usually based on personal impressions by researchers and on the farmers' own evaluation of the trial. In Year One, a short farmer evaluation (and informal comments from farmers) resulted in the project abandoning many IPM strategies that either did not work or that farmers complained were too difficult. In Years Two and Three, however, farmer evaluation became more complex and the results became less timely and so less useful for planning purposes. Instead, the project relied more on

BOX 6 OPTIMIZING FARMER PARTICIPATION: THE EXAMPLE OF SOIL CRACK-SEALING AGAINST SWEET POTATO WEEVIL

The sweet potato weevil (*Cylas puncticollis*) lays its eggs inside sweet potato tubers. The eggs then hatch and damage the crop. The project tested different methods of controlling this pest over three crop seasons. Here we describe how researchers learned to *optimize* farmer participation to make the trial more relevant without jeopardizing its scientific results.

An on–station trial: the wrong location
In Year One, the project tested a technique that prevented the weevil laying eggs close to the growing tubers, by filling-in any cracks that developed on the ridges where sweet potato was planted. The results were not meaningful, however, because the trial was made at the research station where there were very few weevils. The project then searched for a 'hot spot' in farmers' fields where the pest was present in greater numbers.

An on–farm trial: the wrong design
In Year Two, the project selected five commercial sweet potato growers to participate in an on-farm trial. In addition to the two weedings that farmers normally gave, the experimental design required that cracks were sealed up to nine times during the growing season. The trial also tested six varieties of sweet potato for resistance to the weevil. A farmer evaluation suggested that:

- farmers believed that crack-sealing was effective, though a formal statistical analysis showed otherwise;
- farmers found it difficult to estimate the impact of crack-sealing on yields because they were not familiar with the varieties of sweet potato being grown;
- farmers were unaware of any connection between the adult weevil and the larvae inside the tubers, and so had not fully grasped the purpose of the trial;
- farmers objected that crack-sealing required too much labour, while an economic analysis suggested that crack-sealing more than twice gave no economic benefits.

A farmer-designed, on-farm trial
In Year Three, we repeated the trial with more farmers. This time, we showed them samples of adult weevils and larvae inside the tubers to help them understand the purpose of the experiment. Farmers wanted to plant early to ensure a high yield, while researchers wanted to plant later to ensure higher damage from the weevil. We compromised by planting one month after the start of the rains. Researchers insisted that farmers plant only one variety of sweet potato (to make it easier for them to evaluate the trial) and that cracks were sealed no more than three times. At harvesting we learned about farmers' perceptions of damage by asking them about alternative uses for tubers classified as 'damaged' by researchers. A farmer evaluation showed that:

- most farmers now understood the connection between the adult weevil and larvae inside the tubers;
- farmers' estimate of weevil damage was lower than ours, since they salvaged damaged tubers to eat at home or feed to livestock;
- farmers still believed that crack-sealing improved yields but our statistics showed that crack-sealing more than 7 weeks after planting had no further effect on weevil damage and actually reduced yields.

Conclusion
Unlike simple variety trials, some IPM strategies may prove difficult for farmers to plan and evaluate. There may be important gaps in their knowledge of pest biology. They may find it hard to distinguish the effect of the treatment from other factors that influence yields. They are usually reluctant to waste scarce resources by planting in a field or at a time that will risk low yields.

In this context, intoning the mantra of 'farmer participation' creates confusion rather than clarity. As this case study shows, the trick is to optimize farmer participation and accept that this may be limited where farmers have imperfect information. In this example, researchers monitored the incidence of weevils using pheromone traps, compared yields between sealed and unsealed plots using statistical methods, and read the publications of other researchers. As a result, they were much better equipped than farmers to tell whether or not the technology actually worked, and why.

preliminary summaries of the data and contacts with farmers during data collection, interviews, field days and village meetings.

More complex evaluations were helpful, however, in giving information to the MoAI's Technology Clearing Committee that decides whether or not a technology may be recommended to farmers.

The costs

Staff time

By Year Three, farmer evaluation of on-farm trials had been replaced by continuous monitoring throughout the season, allowing farmers to evaluate technology at several stages. This occupied the anthropology field assistant for most of the season. In addition, the technical teams were required to involve farmers as closely as possible in their visits to the research plots. Planning the numerous meetings and field days involved most members of the project.

Farmer time

Farmers were invited to planning meetings, asked to participate in land preparation, planting, fertilizing, weeding and harvesting, questioned about the progress of the trial, and asked to evaluate the results. Many also participated in field days. Despite these demands, only one farmer voluntarily dropped out of the trials.

Limited outreach

The emphasis on farmer participation also helps explain why the project worked with fewer than 100 farmers in only two EPAs. Extension workers wanted to see more farmers involved, however, and we tried to reach more farmers by hosting field days in each village.

'GO WELL': PLANNING AN EXIT STRATEGY

In Malawian culture a departing visitor is not left to walk away from your door, but is escorted on the first leg of their journey home. Early in the life of the project we recognized the need for an exit strategy that left farmers feeling empowered by their experience. This process had four main elements.

Linking with other stakeholders

Field days were held in Years Two and Three to introduce farmers to representatives of agricultural research, extension and industry. These included the Project Steering Committee, the MoAI Technology Clearing Committee, ICRISAT, DARTS Bean Improvement Programme, and the Grain and Legumes Development Association Limited. Members of these organizations visited the trials and experienced farmers' reaction to them at first hand. We felt that farmers would be more empowered if they were organized as groups that might continue to collaborate with research and extension, and with other organizations. Subsequently, several farmers became involved with an NGO bean multiplication scheme.

Training

The project held field days in which farmers demonstrated the benefits of particular crop management strategies to other farmers. In addition, we arranged training for specific groups of farmers, such as rapid seed multiplication of new sweet potato varieties, pigeonpea utilization and the manufacture of rotary hand mills (*chakkis*) for grinding pigeonpea. Farmers were invited to annual field days at the research station and were encouraged to believe that it exists to serve their needs.

Sharing results

We held meetings in each village to discuss the outcomes of the trials with farmers. We asked them which seeds they would like to keep trying out and to multiply for the next cropping season. A farewell workshop was also held at the research station where farmers discussed in small groups what they had learnt and presented their findings back to the whole meeting. After the farmer presentations, a member of the research team gave their view of the lessons learned from the trials, some of which will form the basis for extension recommendations.

Saying good-bye

About 100 farmers and extension staff attended the one-day farewell meeting. After a meal, they watched a video showing a selection of project activities. They were clearly delighted to see themselves and their friends on screen, speaking with authority about agricultural issues in a medium normally associated with powerful urban 'personalities'. At the end of the day, each farmer received a pack of seeds. They were photographed receiving their pack and shaking hands with the Project Manager. Finally group photographs were taken of each of the village groups, together with their extension agents. Copies of the individual and village photographs were later distributed to each farmer as a memento.

CONCLUSIONS

Any project enters into a particular context. Farmers have expectations and fears about what outsiders may bring. It takes time and effort for researchers to build up a relationship with them so that both sides can negotiate openly about what they really hope to gain from a project. It is important, then, to earn farmers' trust early in the project and to maintain this trust by keeping promises.

Scientists and farmers have different agendas. An experiment plays only a minor role in the livelihoods of farmers, whereas it may be the sole justification for a project. Scientists usually have a longer perspective and will test an experiment for several seasons, accepting failure if this adds to knowledge. Farmers, on the other hand, do not waste resources and want to respond when they see a problem developing in their fields. It goes against their instincts to continue with an experiment unless the conditions are right. Finally, scientists may wish to model the farmer's existing situation as far as possible, while farmers hope for a share of the project's material resources. Understanding the farmers' agenda helps to identify likely areas of conflict and lessens the chance of researchers simply dismissing farmers as 'lazy' or 'unco-operative'.

Farmer participation saved the project time by helping to eliminate technology that was unsuitable. Involving farmers earlier in designing experiments would also have saved time lost by poor planning. Farmers were also important in steering the project towards strategies that were suitable and effective though their role here was not decisive since both farmers and researchers usually agreed about what worked and what did not. Because the trials were complex and followed experimental layouts, they were not easy for farmers to relate to. We learnt more about farmer preferences when they were invited to evaluate trials they had designed themselves in ways they knew.

Working closely with farmers also cost the project time and limited the number of households it could work with. Hence the importance of treating participating farmers as a valuable resource and planning an exit strategy that links them with extension, NGOs, or industry so that their skills and experience are not lost but may be shared with others.

CHAPTER 4

WHAT DID WE LEARN?

Projects are like ships: built on land, launched in water. Their designers cannot anticipate all the problems that projects will face when they venture into this new element. The long gestation period of many projects means that the original design may be overtaken by events or by problems that have higher priority. The lack of ready-made technical solutions for resource-poor farmers in marginal environments creates greater uncertainty regarding outputs and impact. Globalization and market liberalization have produced a fast-changing economic climate where discontinuities, risk and opportunity make flexibility an essential feature of project design. Finally, the need for ownership and participation by local stakeholders requires projects to become more adaptable in agreeing objectives and activities.

The result is to place a premium on projects that can learn. Project learning is usually seen as an external activity entrusted to outsiders who are responsible for reviews or *ex-post* evaluations. Less emphasis is laid on learning as a continuous process by project personnel, or on using this learning process to refine the original design of the project.

The FSIPM Project made this learning process explicit. At the end of each cropping season, project members sat together to identify 'new learning'. Alongside each lesson we then listed the mistaken assumption that preceded it and the 'change to the project' that resulted from the lesson. While some lessons were purely technical, others were more general and concerned basic assumptions in the design of the project and its objectives.

This chapter reviews some overall lessons from our experience in the Blantyre Shire Highlands. Some lessons relate specifically to pest management while others concern livelihoods, extension, or project management.

PEST MANAGEMENT

IPM for resource-poor farmers

Donors, scientists and governments have embraced IPM as suitable for resource-poor African farmers. Experience with rice in Asia and with maize in Latin America suggests, however, that IPM has been most successful with food crops where farmers spend significant sums on chemical control. Farmers trapped on a pesticide treadmill are eager to adopt methods that cut their cash costs without sacrificing yield.

Contrast this with Malawi, and Africa in general. Smallholders use virtually no chemical forms of crop protection for staple food crops. While they may invest in pesticides to protect their crops from damage in storage, the use of pesticides against field pests is rare. In practice, therefore, IPM has enjoyed most success with cash crops for the simple reason that these have high market value and it pays farmers to protect them from pest damage. In Malawi, for example, IPM has the potential to reduce expenditure on pesticides among farmers who grow high-value vegetables.

Where IPM has been successful with African food crops, the cost of these strategies was borne almost entirely by the publicly funded agricultural research system and required little or no investment from farmers. The best-known

BOX 7 CREATING A 'LEARNING PROJECT'

Each season the FSIPM Project used a simple framework that captured the key lessons and identified the actions that were needed to ensure that this learning was reflected in work plans for the next season. Formalizing the learning process had important benefits. It ensured that we took learning seriously as an output in its own right. Often, the effort of defining a problem more clearly helped us to identify a solution or a new approach. Finally, willingness to share our assumptions and mistakes created a climate of openness that helped us learn faster. The examples below, from various years, show the range of issues discussed in these sessions.

No.	Initial assumptions, expectations	New learning	Comments	Changes to project
Year One	Crop losses from pests are a major constraint on food crop yields	No objective estimates available of crop losses from pests in farmers' fields	Direct physical measurement of crop losses attributable to individual insects and diseases would require major diversion of project resources	On-farm trials to measure crop losses from weeds
		The key constraint on maize yields is low soil fertility	Fertilizer politicized through collapse of formal smallholder credit system	Combine IPM trials with green manure crops and inorganic fertilizer to raise average maize yields
Year Two	*Striga asiatica* is a widespread pest of maize in the study area	*Striga* reported present on one-third of cultivated area but only one-tenth had 'a lot' Of 10 *Striga* on-farm trials, only one was severely infested	Farmers' perception of *Striga* as a major pest reflects high losses on badly infested fields	Relocate on-farm trials in one EPA, and concentrate them on fields known to be badly infested
Year Three	Participatory rural appraisal (PRA) provides a quick and effective means of discovering farmers' pest management strategies (PMS)	Group discussions provided few farmers' PMS for termites and whitegrubs	Group dynamics suppress variations in farmers' PMS	Interview key informants from our specialist pest groups whose fields have experienced severe damage from the target pest

example is classical biological control of the cassava mealy bug that was successfully contained using a parasitoid wasp. Unfortunately, the scope for such control is limited because many important pests are indigenous and not recent introductions. Another effective and relatively cheap IPM strategy is to develop crop varieties that are resistant to specific pests. The project found this to be the best strategy for wilt disease of pigeonpea.

Pests and the project cycle

The project had three seasons in which to devise, evaluate, validate and disseminate IPM strategies for three crop-pest combinations. In reality, however, the variation between seasons, high start-up costs and the first year learning curve mean that a longer-term project could reap additional benefits, especially in relation to issues such as soil fertility.

Witchweed (*Striga asiatica*) is a parasitic weed that reduces maize yield to zero in fields with severe infestation. Its presence is a sure sign of low soil fertility. *Striga* was present on 60% or more of the fields at our project sites, and 7% of these fields were severely infested. As continuous cropping and limited use of chemical fertilizer rapidly depletes soil fertility in southern Malawi, the problem of *Striga* is expected to grow both in extent and severity. Despite the limited time available, the project was able to demonstrate that it was possible with a green manure crop (*Tephrosia vogelii*) to achieve a significant increase in maize yields within 2 years.

Soil fertility is a long-term, structural constraint on smallholder agriculture. Reversing this trend requires a longer time-horizon than the 3-year project cycle. In Machakos, Kenya, where farmers have successfully reclaimed infertile, eroded soils, the change was spread over two generations. Anyone looking for project 'impact' after just 3 years is likely to be disappointed.

Spatial and seasonal variation

The pests investigated by the project (*Striga*, termites, whitegrubs, pigeonpea wilt and pod pests) were patchily distributed both in space and time. This created several problems.

- Location of trials

Many trials gave inconclusive results because the pest was not present. This may happen even where farmers are consulted about the location of trials. For example, farmers volunteered for a *Striga* trial even when they had none because they mistook this weed for another, or because they were afraid they would miss out on scarce inputs if they admitted they did not have *Striga*. This problem might have been avoided by devoting the project's first season to studying the incidence of pests, but this would have left only two seasons for on-farm trials.

- Conflict with socio-economic targeting

As we have seen, the farmers who participated in on-farm trials were selected primarily because they were resource-poor. Only later were farmers assigned to trials and fields for the trials selected. When it became apparent that only a minority of these farmers had problems with pests, it was difficult to drop them from the trial programme.

In Year Three, trials on termites and whitegrubs were conducted with groups of about 10 farmers whom we knew, from work in previous seasons, had more severe problems with those pests. Treatments were restricted to these groups and it was also possible to conduct detailed interviews about the problem with the individual farmers. Such small groups may be unrepresentative, however, and in this case still did not show enough pest damage to give good results, possibly due to seasonal weather factors.

- Reduced damage from pests

Seasonal variation in pests is not surprising in a rainfed farming system. The project coincided with a period of above-average annual rainfall that reduced the expected level of damage from whitegrubs (killed by waterlogging in *dambo* fields) and from termites (higher foraging activity in dry years).

- Farmer 'performances': scrapping the script

Cultural control methods may involve a specific technique such as the widespread farmer practice of *kukwezera*, or keeping weeds clear of the maize planting station at second weeding in order to reduce damage from termites. The project tried to test this method first with a large number of farmers and then with a small group whose fields had a history of severe termite attack. The season was unusually wet, however, so many farmers did not follow the treatment laid down in the experiment. Instead, they used quite different methods of weeding that protected their maize crop from waterlogging, which they rightly saw as a greater threat than termites.

Decision-making in a rainfed farming system is a 'performance' that values improvization and flexibility over pre-determined plans. Unlike on-farm trials where a strategy is determined ahead of time, farmers' use of pest management strategies will depend on the pattern of events in a particular field in a particular season. This may limit the relevance of certain IPM techniques.

LIVELIHOODS

The importance of markets

Smallholder livelihoods were closely integrated with markets. While some market activity may be obvious – burley tobacco, milk production – this represents only the tip of the iceberg. A striking feature of the farming system is that there is no clear-cut division between 'food' and 'cash' crops. The 'food crops' that the project worked with – maize, pigeonpea, beans, sweet potato – were also widely sold. In fact, the three most important sources of crop income came not from tobacco or high-value vegetables but from field pea, beans and pigeonpea. Field pea, the most popular cash crop, is an orphan crop excluded from the national crop statistics.

The importance of market strategies was clearly shown by comparing households that used fertilizer with those that did not. Households without fertilizer had higher maize deficits. In consequence, more of them sold food crops such as pigeonpea, groundnuts and sweet potato, and more relied on earnings from *ganyu* to buy maize.

Why this dependence on markets? The answer lies in the economics of the new seed-fertilizer technology. Although fertilized maize is profitable if grown for home consumption, many smallholders cannot afford to buy it. These households are 'pushed' into markets in order to earn the cash they need to buy maize. Even if households can afford fertilizer for maize, they may choose to grow more profitable crops like field pea or sweet potato. These households are being 'pulled' into the market by economic incentives. The lesson, then, is that in the absence of affordable seed-fertilizer technology, smallholders are responding to maize deficits with market strategies to improve income security.

IPM must be market-driven

Given this context – limited economic incentives for IPM on food crops and the need for cash income – the adoption of IPM in the Blantyre Shire Highlands is likely to be market-driven. Take pigeonpea, for example. The variety ICP 9145 was developed for resistance to *Fusarium* wilt, rather than for its taste and processing qualities. Therefore, although it is higher yielding, it has no price premium on the market and farmers continue to plant local varieties. By contrast, improved varieties that are tasty and have large seeds have won approval from both farmers and the processing industry. This illustrates the importance of seeing pest management in the wider context of the market.

Linking pest management and markets may provide the basis of a new approach to IPM for resource-poor farmers, particularly for food crops on which they do not apply pesticides. In essence, the approach involves three steps.

Tomato sellers at Bvumbwe market

- Identify the crop varieties or practices that give a competitive advantage on local markets.
- Isolate the particular component that creates this competitive advantage.
- Combine IPM strategies with this desirable component to encourage farmer adoption.

SPREADING THE WORD

Collaboration with NGOs

Although the Project Memorandum specified that "on-farm trials were to be made in conjunction with NGOs", our collaboration with NGOs was limited. In Year One, the project hosted an NGO field day in which NGO representatives visited our on-farm trials and gave useful advice. The experience also showed that:

- despite the mushrooming of NGOs that has followed multiparty rule in Malawi (there are now 300 or more) very few have a significant presence at the field level;
- only three NGOs had major agricultural programmes and these did not operate in the Blantyre Shire Highlands;
- of these three NGOs, only one had an IPM programme; this was part of a wider food security project restricted to vegetables on small kitchen gardens where pests were easily seen and dealt with;
- NGOs were more interested in extension of IPM than research; for example, the NGO with an IPM programme had not tested the effectiveness of the strategies it recommended;

BOX 8 THE RISE AND FALL OF 'ADAPTIVE RESEARCH' IN MALAWI: A CAUTIONARY TALE

Farming Systems Research (FSR) in Malawi dates back to the establishment of the Farming Systems Analysis Section at Chitedze Research Station, Lilongwe, in 1981. In 1983, an Adaptive Research Programme Co-ordinating Unit was formed at Chitedze to lead Adaptive Research Teams (ARTs) that were to be stationed at each of the eight ADDs. Both these developments were a component of the Malawi Agricultural Research and Extension Project (1979–89) funded by USAID. By 1989, there were functioning ARTs posted at seven ADDs, employing nine agronomists, nine socio-economists, and an expatriate agronomist and agricultural economist. Machinga ADD had an ART funded by GTZ, while Shire Valley ADD never had a team. The main objectives of the ARTs were to:

- strengthen the research-extension linkage
- improve the adoption of new technology
- facilitate and direct research towards problems faced by farmers.

Working closely with extension workers, the ARTs made diagnostic surveys to identify farmers' problems, conducted a wide range of on-farm trials on maize and intercrops, and published a series of detailed research reports. In 1992, however, the second triennial review of DARTS concluded that adaptive research had "failed effectively to perform its primary function of linking research programmes with extension personnel and farmers" and recommended that the ARTs be dissolved. Within the space of a decade, FSR in Malawi had come and gone.

WHAT WENT RIGHT?

Despite their early demise, the ARTs did have a significant impact on agricultural research in Malawi.

- On-farm trials

ARTs popularized the concept of the on-farm trial. Before 1981, research in farmers' fields was largely confined to a programme of District Trials that produced blanket fertilizer recommendations. Most trials were conducted on research stations, with crops grown in pure stand. By contrast, the first on-farm trials under the adaptive research programme stressed the need to: (1) "work with the poor majority" (including women) rather than just with better-off farmers; (2) simulate farmers' conditions by intercropping maize with legumes or other crops; and (3) simplify trial design to allow farmers to evaluate outcomes jointly with researchers. Today, the majority of research trials are done on-farm, although many continue to be planted in pure stand and little emphasis is laid on targeting poorer households or understanding farmers' circumstances.

- Diagnostic research

The ARTs demonstrated the importance of problem diagnosis in collaboration with farmers and extension workers. Many of the technical problems identified by ARTs became part of the research programme of the different Commodity Teams. In Blantyre Shire Highlands, for example, the ART's diagnostic survey in 1984 clearly identified the main production constraint as soil fertility, noted a growing problem with witchweed (*Striga*), identified the need for a site-specific fertilizer recommendation based on an economic rather than a technical optimum, and highlighted the use of bean and pigeonpea intercrops. All these remain highly relevant today. Significantly, the only pest problem identified was *Fusarium* wilt with local pigeonpea.

- Technology development

Diagnostic surveys in Lilongwe and Phalombe in 1981 revealed that poorer smallholders preferred local varieties of maize to hybrids because their 'flint' (hard starch) characteristics made them easier to pound using a pestle and mortar and more resistant to weevils in storage. This provided what was perhaps the first clear evidence of the need for a shift in emphasis in Malawi's maize breeding programme. A review of the FSR programme in 1983 noted how this had stimulated maize breeders to "increase their efforts to identify high-yielding open-pollinated composite varieties which have the flinty characteristics preferred by subsistence farmers". In 1987, a programme to breed flinty hybrids was begun under the leadership of Dr B. Zambezi. The first semi-flint hybrids (MH 17 and MH 18) were released in 1990. In 1995 several open-pollinated varieties were released, including Masika, the variety used by the FSIPM Project.

WHAT WENT WRONG?

Several explanations may be given for the 'failure' of the ARTs.

- Lack of integration with DARTS

The first head of the Farming Systems Research Section, the anthropologist Art Hansen, adopted an inclusive approach where the Farming Systems Section worked alongside researchers on specific problems and produced joint solutions based on field research. With the advent of specialist ARTs, however, this vision was lost. The ARTs saw their role as fine-tuning technology supplied by the Commodity Research Teams. This proved a recipe for mutual distrust and conflicts of interest.

- Excessive expectations

ARTs were expected to address a wide range of production constraints, including crop varieties, soil fertility, livestock and farm mechanization. This was too much to ask from one- or two-man teams (women were conspicuously absent) of newly trained researchers who never formed a 'critical mass'. The ARTs quickly became over-extended and the quality of on-farm trials suffered. Often the problems identified by farmers (like witchweed) lacked easy technical solutions. Others, such as the high cost of fertilizer or lack of markets, lay outside their control.

- Vested interests

The discovery in Phalombe in 1981 that, on the fields of poorer farmers where maize was intercropped, there was no significant difference in yield between local maize and the composite variety recommended for semi-arid areas, even with fertilizer, caused a furore within DARTS. The Farming Systems Section was banned from conducting further on-farm trials without supervision by agronomists. Today, when the importance of low soil fertility is well recognized, such a finding seems quite plausible, but FSR lacked a senior Malawian 'champion' to protect it from professional jealousy within DARTS. Researchers outside the ARTs resented the access to funds and equipment provided to relatively junior staff. The ARTs were seen as belonging to the extension service, rather than to DARTS. Consequently, once donor funding ended in 1989, continued funding from DARTS was limited.

CONCLUSION

The rise and fall of 'adaptive research' in Malawi illustrates the important role that institutions play in determining the fate of a management innovation. In retrospect, the choice of the ART model was a mistake, isolating FSR from DARTS and creating friction between members of the ARTs and other researchers. Good science, however relevant to farmers' needs, cannot compensate for poor institutions. Although DARTS has internalized many of the strengths of the ARTs, the potential of FSR in Malawi has yet to be fully exploited. The challenge today is to recapture the original vision that saw FSR as a 'way of seeing' problems through farmers' eyes that was not confined to specialist teams but was one that all researchers could share.

- although some NGOs had experience of collaborating in trials with research and extension, they required substantial technical help from the project.

We achieved closer collaboration with NGOs in Year Three, when seed from promising bean varieties was distributed to three farmer groups that were members of an NGO seed multiplication programme.

The limits of farmer-farmer extension

While formal extension networks comprise services operated by government, the private sector or NGOs, informal networks consist of people telling each other about new ways of farming. The project found that farmers who were not members of specialist commodity or fertilizer credit groups were unlikely to have any contact with their Field Assistant. These farmers obtained information about agriculture from two main sources:

- *the radio* – although few owned one, farmers agreed that they learnt a lot by listening to the radio

- *other farmers* – information was freely shared among networks of closely related or closely associated groups, such as immediate family, good friends or those with neighbouring fields.

Outside this network, however, farmers said that the only people who might look at their fields were people they trusted or others with a legitimate purpose, such as an extension agent. Generally, farmers were wary of taking too close an interest in their neighbours' activities or fields for fear of attracting accusations of theft or witchcraft. This climate of mutual distrust means that information about new technology spreads faster where farmers are organized in a group and feel authorized to talk about what they are learning because it is already 'public' business.

INSTITUTIONAL LESSONS

Farming systems research (FSR) in Malawi fell victim to the wrong choice of institutions (Box 8).

Similarly, the success of a project depends to a large degree on its institutional framework. The FSIPM Project had to manage a number of interfaces – with the donor, with research, with extension, with the university, and with its client group of resource-poor farmers. The frequently conflicting 'missions' and objectives of these stakeholders had to be reconciled to meet the project's goal of improving incomes for smallholders. Figure 6 uses the McKinsey Seven 'S' framework to summarize some institutional lessons from the project.

Structure

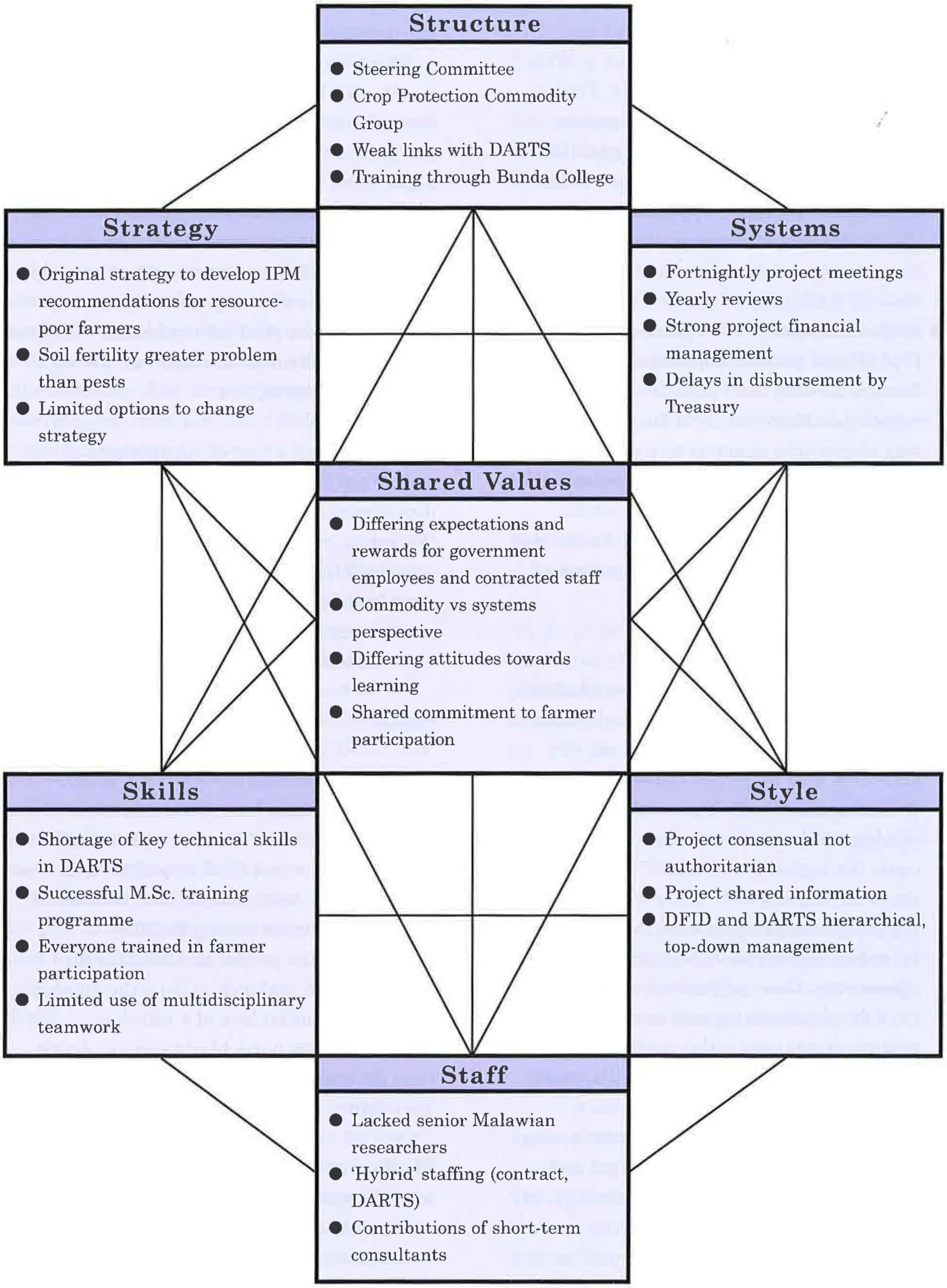
The project formed part of the Plant Protection Commodity Group, one of seven such groups within DARTS. However, the Project Manager's administrative duties as leader of the Plant Protection Commodity Group limited his role with the project and thus weakened the project's links with DARTS and its ownership of the project. Management and technical leadership devolved on the expatriate Team Leader, an IPM specialist.

The project was directed by a Steering Committee that included representatives from the donor, research, extension, the College of Agriculture and NGOs. Broad representation meant that no one party could control the Committee and it increased their accountability to each other.

Strategy

Although the flaw in the project's original strategy was discovered early, we had difficulty in adopting a new strategy that focused on soil fertility rather than pests. Why?

Figure 6 Applying the McKinsey Seven 'S' Framework to the FSIPM Project



- Professional biases
  Agricultural research in Malawi is divided along commodity and disciplinary lines. DARTS personnel were averse to any change in strategy that relegated pest management to a secondary role. From a farming systems perspective, however, IPM only makes sense where agriculture is sustainable, since farmers have little incentive to protect crops that produce low yields. Without this perspective, the need for a change in strategy was less evident.

- Project mandate
  IPM offered greater scope for crops where farmers already used pesticides, such as vegetables. However, IPM for vegetables was already the mandate of a project funded by another donor. Plans to demonstrate IPM strategies developed by that project for vegetable pests were abandoned when these were found to be at a preliminary stage of development.

- Managerial flexibility
  The project had a logical framework that showed the connections between the goal of the project, the outputs, and the activities that delivered those outputs. Once the project saw the need for a new strategy, arguments developed over "Who owns the logical framework?" Although the project's outputs were theoretically negotiable, in practice once the project was launched there was little room for manoeuvre. Once projects have begun it is hard for the donor agency to accept a change in strategy if this requires an increase in budget, different skills, and a new institutional framework. Like a missile, it seems that projects are programmed to hit only one target and there is no correcting mechanism to change targets in mid-flight.

Shared values

Whereas the rewards for Malawian and expatriate consultants (new contracts, publications) lay in the project's technical results, the incentives for DARTS personnel were often different. Researchers attached to the project risked losing their place in the department hierarchy, thus jeopardizing their prospects of promotion and opportunities for training and trips abroad. Consequently, the project had difficulty in attracting them. By contrast, there was no problem attracting dedicated junior staff who welcomed the short-term financial gains ('allowances') offered by intensive fieldwork.

Staff developed a shared commitment to farmer participation in technology development. This was due largely to a Workshop on Farmer Participation that involved all members of the project. More team-building of this kind earlier in the project might have improved collaboration between technical and social scientists.

Skills

The project successfully upgraded skills, training 11 Malawians to M.Sc. level in various disciplines. The shortage of applicants from DARTS meant that several awards were made through open competition. Because of the difficulty in attracting DARTS researchers, the project lacked skills in agronomy and pathology. Given the emphasis on FSR, the initial lack of a full-time agronomist was particularly serious. A part-time agronomist finally joined the project in Year Two.

The limited use of teamwork was due partly to differences over methods. The scientists on the project wanted to verify IPM strategies using statistical methods. Similarly, they felt that a one-off evaluation at the end of the season should be replaced by monitoring farmers' opinions as the trial progressed. This produced a paper on evaluation methods and information on farmer preferences for pigeonpea that was presented to the Technology Clearing Committee in support of the release of a new variety.

However, the time required for the collection of 'hard data' limited teamwork to developing a more qualitative understanding of farmers' pest management practices. The economists were left to explore when and why farmers used certain strategies. Information from key informants on their strategies against termites was later incorporated into a leaflet for extension workers.

Systems

Management systems worked well. Work programmes were discussed at fortnightly meetings attended by most members of the project. The project developed its own accounting systems for management of the imprest account and project operations. The project was reviewed each year by DFID and mid-term by an Independent Review. Slow disbursement of capital aid funds by the Malawi Treasury delayed the project's building programme for 3 years. Construction only began in the last year of the project when the funds were transferred back to the donor.

Style

A collegiate management style operated among senior professionals on the project, where individuals were responsible for their own work plans and outputs. Information was shared at fortnightly meetings and through a flow of research reports. By contrast, management in the civil service culture shared by DFID and DARTS was top-down and hierarchical. Important decisions about the project required agreement from the centre.

Staff

The project's 'hybrid' staff structure was the result of a shortage of suitable personnel in DARTS. An office manager, two field supervisors, and counterparts for the farming systems economist and social anthropologist had to be recruited externally. Staff from outside DARTS were paid more, causing resentment in the first year of the project.

The project bought-in skills by hiring short-term consultants who made important contributions.

- In Year One, a visiting agronomist posed the question:

"Is the project to develop IPM for a degraded environment (to what extent is impact possible?), or is it more feasible to look at a situation in which fertility can be maintained, i.e. IPM for a sustainable system?"

Echoed by farmers' calls for fertilizer, this challenge sparked a reappraisal of the project's strategy.

- In Year Two, a visiting entomologist produced frequency distributions that showed the low incidence of pest damage on trial plots. This led directly to the selection of specialist pest groups in Year Three.

Interactions between the seven 'S's

The dynamics between Structure, Shared Values and Strategy proved to be crucial in determining the fate of the project. Its *structure* in the Plant Protection Commodity Group left the project with limited room for manoeuvre in changing *strategy*. This was because the Commodity Group and the project team did not share the same *values* in regard to the role of pest management or listening to farmers. Similarly, the *structure* of the project in relation to the donor limited the options for change. Again, this was due partly to a lack of *shared values* reflected in differing attitudes towards learning. Whereas the consultants wanted to change the *strategy* in the light of new learning, DFID stressed the need to deliver outputs specified by the existing logical framework.

CONCLUSION

The lessons outlined in this chapter were not part of the project's original logical framework, which was concerned purely with IPM strategies, training and extension messages. As in most projects, the focus was on 'results' and not on what was learnt in the process. When the flaws in the project became obvious, however, we began to pay more attention to our mistaken assumptions, what we were learning, and what changes were needed to put things right. Learning became an important output of the project in its own right for which space was eventually made in the logical framework.

The FSIPM experience shows the value of a 'learning project' where learning is institutionalized. The habit of reflecting, learning and changing is a legitimate output that is as worthy of evaluation as technical results. More learning creates more effective projects.

CHAPTER 5

STARTING OVER

What we call the beginning is often the end
And to make an end is to make a beginning
The end is where we start from.
T. S. Eliot

What would the FSIPM Project look like if we could reinvent it, knowing what we know now? This is not an idle question, since the project's original goal of improving incomes for resource-poor farmers remains valid. What have we learnt from our experience in the Blantyre Shire Highlands that might help in planning a follow-up project to meet this goal?

Our aim in this final chapter is not to provide planners with a 'better blueprint', still less a complete logical framework. It is to say where we have got to, suggest where we might go from here, and how we might get there.

WHAT KIND OF PROJECT?

We envisage a very different project from FSIPM. It is technology-based but not research-driven. It is client-focused but not simply about extension. It looks beyond the farmer to the market, but it is not an enterprise project. It is a hybrid because we have learnt that all three elements are important for improving smallholder livelihoods.

The need is for a project that can:

- identify technology 'best bets';
- integrate this with the farming system of its clients;
- link these farmers with markets; and
- learn and adapt as it goes along.

As before, the project purpose remains to increase the incomes of resource-poor farmers in the Blantyre Shire Highlands. To achieve this, we believe that a future project must address three needs: the need for food, for cash, and for information (Figure 7). The outputs would be measured in terms of higher maize yields, greater disposable income from crop sales, and greater knowledge of the technology that is currently available. We also believe that meeting those needs requires a very different design and structure of project from FSIPM.

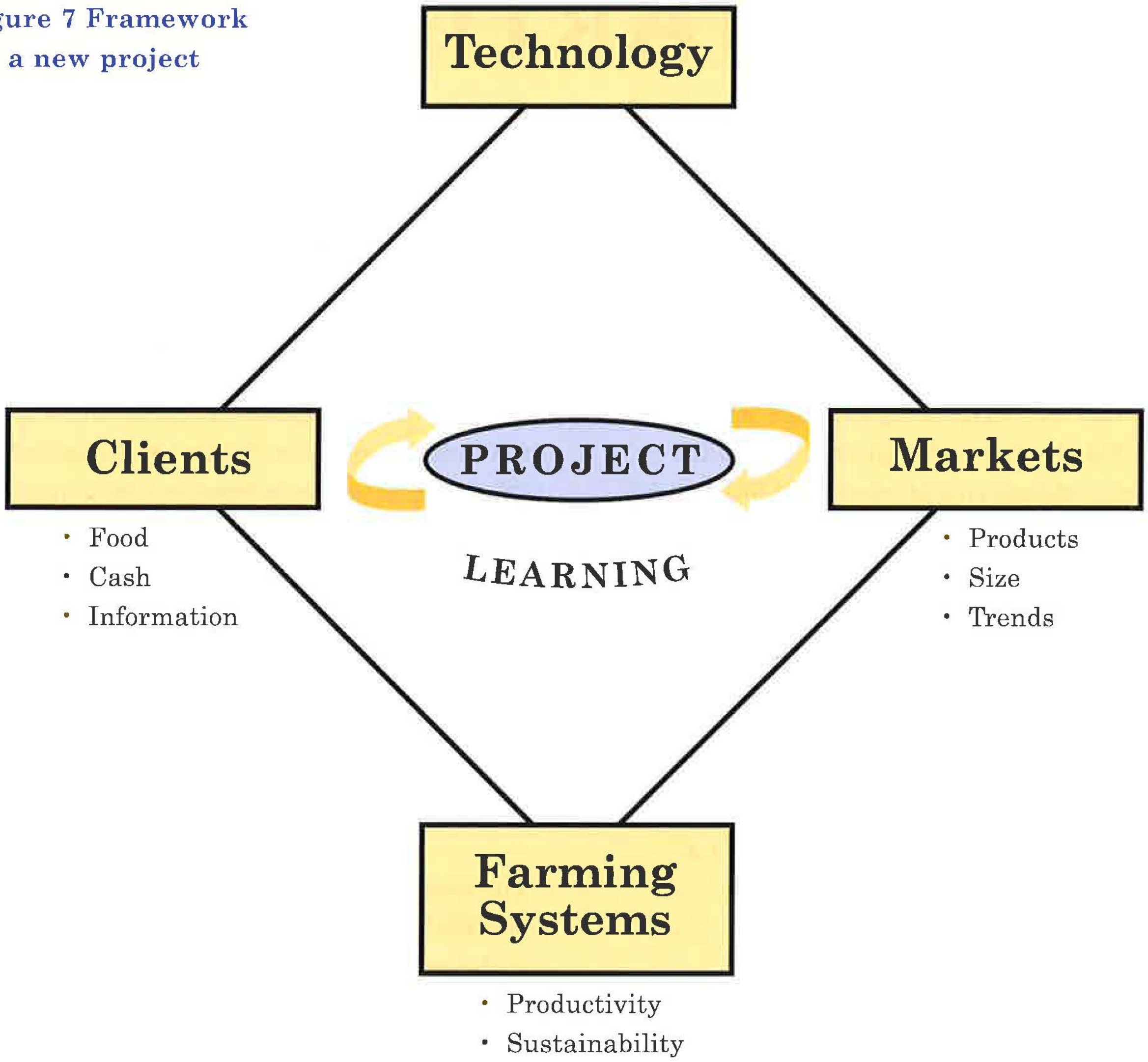
The ideas presented below are not the product of a PRA exercise in which we sat together with farmers and asked them about their priorities. They are based on our experience of listening to farmers, of course, but also on our knowledge of the farming system, and our view of where technology can have most impact.

Since ours was a project that dealt with farmers and their crops, our suggestions are about how to increase income from farming. This is not meant to imply that there are no other ways to raise the incomes of rural households in the Blantyre Shire Highlands. As the largest single component of household income, however, farming offers greater leverage than other aspects of livelihoods, as the dynamism in this sector shows.

FOOD

"Tell your government that we cannot farm here without fertilizer". (Farmer, Mombezi EPA, 1998)

Figure 7 Framework for a new project



What clearer message could there be? The priority for resource-poor farmers in the Blantyre Shire Highlands is higher maize yields. The collapse of smallholder credit in 1994 and recent increases in fertilizer prices have made it hard for many farmers to apply sufficient fertilizer to maize. Without fertilizer, they have watched their yields steadily decline through low soil fertility. Hence the constant calls for fertilizer, which is the only way that farmers know to improve household food security. How might a project help?

- Fertilizer is still the quickest and most effective way to increase maize yields. Soil fertility is simply too low for green manure crops to have much of an impact alone. They have to be used in combination with chemical fertilizer. With quite low rates of inorganic fertilizer, our research trials gave yields of 2 t/ha or more.

- Two green manure crops – *Tephrosia vogelii* and *Crotalaria* – gave good results in combination with fertilizer. At first, farmers were sceptical about *Crotalaria* as a green manure crop because they knew it only as a weed, but they saw an increase in maize yields after only two seasons.

Both these green manure crops can be grown as part of the existing cropping pattern of maize intercropped with beans and pigeonpea. *Crotalaria* is short duration and can be incorporated along with weeds and crop residues before September while *Tephrosia* is long duration and can be incorporated at final ridging between October and November.

- Soyabean will improve soil fertility and also give farmers a cash return. Farmers see soyabean as a cash crop. Hence farmers have first to be assured of a market if they are not to be discouraged by low prices.

- Most of the crops that increase soil fertility – green manures, soyabean, pigeonpea, cowpea – will also help remove *Striga*, the weed that parasitizes maize, by killing *Striga* seeds in the soil. The value of crop losses from *Striga* is probably higher than for any other pest.

Shelling unripe maize for *masalanga* during the hungry season

- IPM has a role to play in this process, though a small one, by:

  • studying the effect of green manure crops on nematode populations and pigeonpea diseases

  • assessing the effects of green manure crops and patch weeding on *Striga* infestation.

These are clouds on the horizon where some basic research now might avoid problems in the future.

CASH

Farmers in the Shire Highlands are closely integrated with markets because they need cash to buy maize, seed and fertilizer. The greater the household's maize deficit, the greater its need for cash. How might a project help?

- Each legume crop has varieties that occupy separate niches in the farming system. Early maturity, taste, seed size and colour, and growing habit, are important for particular niches. Farmers usually grow a mix of varieties to fill each niche. Early maturity is important for beans because they avoid pest damage, supply food during the hungry period, and command a price premium on local markets. Breeders have focused on medium or late maturing varieties. We have identified early varieties that would help increase farmers' cash incomes. The seed of these varieties, however, is often too expensive for farmers to buy. Seed multiplication can, therefore, play an important role.

- Most grain legumes are not only food crops but cash crops. Markets are well developed and there is a large domestic processing industry eager to buy. But farmers need better products and more direct links with


Transporting milk: taking advantage of nearby urban markets

buyers. Pigeonpea is an important cash crop, exported abroad. The market wants varieties with large, white seeds that are easy to dehull. We helped to test suitable new ICRISAT varieties. Now, farmers need access to the seed. We also taught farmers to make and use a simple quern to mill their own seed, offering another potential source of income.

- More and more farmers are growing sweet potato to sell, and also for home consumption. Farmers are enthusiastic about the new varieties that we tested in on-farm trials. Farmers need access to these vines.

- Pest management has a role to play in developing a variety of cowpea that is resistant to the legume witchweed *Alectra vogelii*. Since a resistant variety might take 5 years to develop, this is a research issue that would give benefits in the longer term.

A future project might also help answer the following questions.

- Cowpeas are a valuable crop elsewhere in Africa but perform poorly in Malawi. We do not know why. Research can tell whether there is a missed opportunity here.

- Field peas are the most popular cash crop, but the seed is expensive. What scope is there to expand the market and get more resource-poor farmers growing the crop?

INFORMATION

Most of our farmers never saw an extension worker or visited a demonstration plot. They lacked information about technology and markets. An important function for a project is to link farmers and researchers, extension workers and entrepreneurs.

The FSIPM Project worked with individual households not with groups. We believe that the type of project that we are describing here would work best with different sets of producer groups. Farmer-farmer extension exists but its usefulness is limited by mutual suspicion. Membership of a group encourages farmers to share information more openly.

PROJECT DESIGN

The FSIPM Project taught us the need for greater flexibility in project design. A project must be able to learn from its clients and respond to them. This requires re-thinking the traditional project cycle of identification, preparation, appraisal, approval, implementation and evaluation. The World Bank is moving towards a 'learning cycle' for its rural development projects. This new cycle comprises:

- *listening* to clients
- *piloting* on a small scale
- *demonstrating* on a larger scale before
- *mainstreaming*

  the project through government institutions. Essentially, this is a learning cycle in which project design is part of the implementation process itself. The pilot phase allows projects to experiment and discover the approach and structure that works best.

Structure

There are several possible scenarios.

Partner government research or extension

This would give the project greater credibility with the GoM but it would also lead to conflicts over strategy (research vs extension), staff shortages, and the types of problems that we experienced with FSIPM.

Partner an NGO

This would strengthen the project's relations with its clients and increase access to skills that it will need, but what is the incentive for this partnership among NGOs? They already have access to donor funds, their own ideas and programmes, and may be reluctant to link with the private sector.

Shelling beans: an important source both of food and cash income

A free-standing project

This structure would have advantages:

- clearer strategy
- greater flexibility in responding to clients
- skills would be 'in-house' or bought-in as necessary.

Local ownership would derive from the project steering committee with representatives from the donor, DARTS, Department of Agricultural Extension and Training (DAET), an NGO, and business. A disadvantage of this structure is that it does not allow the càpacity-building that was achieved by FSIPM.

Paradigms of development

"Development is not movement towards a fixed goal but continuous adaptation to maximize well-being in changing conditions." Robert Chambers

Underlying the design of blueprint projects is a particular view of the development process. This assumes that the goal of development can be clearly defined, and that a set of outputs can be specified and activities planned that will lead in linear fashion towards that goal. This model, which derives from engineering and manufacturing, works well in certain contexts, but it is less useful as a model for improving the livelihoods of resource-poor farmers. Where so much is unknown and where conditions change so quickly, the process of development is neither predictable nor smooth. There are false starts, mistakes, discoveries, unforeseen obstacles and unplanned victories. It is wise to recognize this and design projects to expect the unexpected.

CONCLUSION

Landeg White's book *Magomero* tells the history of a village in the Blantyre Shire Highlands. The book ends with a description of a dust storm, a metaphor for the relationship between the village and the outside world. The metaphor also symbolizes what is good and bad about projects: they generate energy and flurries of activity but often when the dust settles we discover that little has really changed.

Was this the case with the FSIPM Project? We began by showing that the project was designed with an unverified assumption that crop losses from pests and diseases were the most important constraint for smallholders in Malawi. It turned out that farmers' priorities were different, but the structure of the project meant that it was not able to fully address them.

Despite this, the project produced crop management recommendations that will benefit smallholders in the Blantyre Shire Highlands, though less than was originally hoped. To have a greater impact, projects must address the problems that most deeply affect the livelihoods of their clients. Although the FSIPM Project failed in this respect, we now understand why this was so, what will work and what will not, and are, therefore, better equipped to get it right next time.

Getting it right will require not just listening to farmers, but also being able to respond to what we learn when we listen. Projects need more flexible designs and structures than in the past, because they face very different circumstances. Farming systems and smallholder livelihoods are moving targets that refuse to stand still. Hitting these targets is easier when projects are given greater freedom to listen, to learn, and to experiment.

The experience of the FSIPM Project in southern Malawi increased our knowledge of farmers' priorities, their livelihoods, of the opportunities to help them, and of the role that learning can play in this process.

NOTES ON SOURCES

The project documents cited in this report may be found in Ritchie, J. M. and Muyaso, F. (comps) (2000) *Farming Systems Integrated Pest Management Project: Selected Reports 1996–2000.* Bvumbwe Agricultural Research Station, Malawi: FSIPM Project, three volumes. Copies have been deposited in major libraries and resource centres in Malawi. A compact disk containing reports and original data files from the FSIPM Project is also available and may be obtained on request from the DFID Office, British High Commission, Lilongwe.

INTRODUCTION

GoM (1996) *Malawi Social Indicators Survey 1995.* Lilongwe: Ministry of Economic Planning and Development, National Statistical Office, and the Centre for Social Research.

Figures for foreign aid are taken from World Bank (1998) *World Development Indicators 1998.* Washington, DC: World Bank.

Poverty data for Malawi is for 1991/92. See World Bank (1996) *Malawi Human Resources and Poverty: Profile and Priorities for Action.* March 19. Report No. 15437 – MAI. Washington, DC: World Bank.

Poverty data for Bangladesh is for 1995/96. See World Bank (1998) *World Development Indicators 1998.* Washington, DC: World Bank. Other data from World Bank (1996) *Annual Economic Update: Recent Economic Developments and Medium-Term Reform Agenda.* Washington, DC: World Bank.

For the learning wheel, see Senge, P. M., Roberts, C., Ross, R. R., Smith, B. J. and Kleiner A. (1994) *The Fifth Discipline Fieldbook: Strategies and Tools for Building a Learning Organization.* London: Nicholas Breasley Publishing Ltd.

CHAPTER 1 RATIONALE

The definition of IPM is from Malena, C. (1994) *Gender Issues in Integrated Pest Management in African Agriculture. NRI Socio-economic Series,* No. 5. Chatham, UK: Natural Resources Institute.

ODA/Malawi Government (1995) Project Memorandum for the Farming Systems Integrated Pest Management Project, Malawi. Lilongwe: British Development Division for Central Africa (unpublished).

DFID (1998) Final Report of the Independent Evaluation Mission to the FSIPM Project, Malawi. July. London: Department for International Development (unpublished).

CHAPTER 2. LIVELIHOODS AND THE FARMING SYSTEM

The definition of livelihoods is from Scoones, I. (1998) *Sustainable Rural Livelihoods: A Framework for Analysis. Working Paper,* No. 72. Brighton: Institute of Development Studies, University of Sussex.

For the project area, see Orr, A., Koloko, A. M. and Mkandawire C. B. K. (1996) Background Information on the Blantyre Shire Highlands Rural Development Project. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished).

Information on agro-ecological zones is from UNDP/FAO (1991) *Land Resources Appraisal of Blantyre Agricultural Development Division.* Land Resources Evaluation Project, Malawi. AG: DP/MLW/85/011. Lilongwe: Food and Agriculture Organization of the United Nations.

For farm modelling, see Mwale, B., Orr, A. and Saiti, D. (2000) Modelling the impact of integrated pest management at farm level. pp.102–107. In: *Integrated Crop Management Research in Malawi: Developing Technologies with Farmers. Proceedings of the Final Workshop of the Farming Systems Integrated Pest Management Project, Club Makokola, Mangochi, Malawi, 29 November – 3 December 1999.* Chatham, UK: Natural Resources Institute.

For social structure, see Morris, B. (1998) *The Power of Animals: An Ethnography.* London and New York: Berg. One of the few contemporary works on Malawi culture, with useful historical and social context.

Peters, P. (ed.) (1997) Revisiting the puzzle of matriliny in South-Central Africa. *Critique of Anthropology,* **17** (2): 125–146. Collection of papers arguing that matrilineal societies were 'misread' because researchers assumed that gender relations must be hierarchical, whereas a form of 'gender parallelism' with autonomy in spheres of production and authority is a better description of the situation. Very useful for potted history of studies of the area.

For household types, see Orr, A. and Jere, P. (1999) Identifying smallholder target groups for IPM in southern Malawi. *International Journal of Pest Management,* **45** (3): 179–187.

For off-farm income, see Orr, A., Saiti, D. and Mwale, B. (1999) *Osauka satopa*: Economic Case Studies of Off-farm Enterprises in Blantyre Shire Highlands RDP. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished). Also Orr, A., Saiti, D. and Mwale, B. (2000) Off-farm Income and Smallholder Livelihoods in Blantyre Shire Highlands RDP. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished).

CHAPTER 3. WORKING WITH FARMERS

For modes of farmer participation, see Biggs S. D. (1989) *Resource-poor Farmer Participation in Research: A Synthesis of Experiences from Nine National Agricultural Research Systems. OFCOR Comparative Study Paper,* No. 3. The Hague: International Service for National Agricultural Research (ISNAR).

For gaps in farmer knowledge, see Bentley, J. W. (1989) What farmers don't know can't help them: the strengths and weaknesses of indigenous technical knowledge in Honduras. *Agriculture and Human Values,* **63** (Summer): 25–31.

Okali, C., Sumberg, J. and Farrington J. (1994) *Farmer Participatory Research: Rhetoric and Reality.* London: Overseas Development Institute (ODI). Offers a comprehensive framework of concepts and issues used in thinking about research with farmers.

Scoones, I. and Thompson, J. (eds) (1994) *Beyond Farmer First: Rural People's Knowledge, Agricultural Research and Extension Practice.* London: Intermediate Technology Publications Ltd.

Van Veldhuizen, L. and Waters-Bayer, A. (eds) (1997) *Developing Technology with Farmers: A Trainer's Guide to Participatory Learning.* London: Zed. Covers theoretical issues and offers a wide range of tools and training activities to those wanting to implement participatory technology development.

For a hard-headed view, see Bentley, J. W. (1994) Facts, fantasies, and failures of farmer participatory research. *Agriculture and Human Values,* **11** (Spring–Summer): 140–150.

For the FSIPM Project, see Lawson-McDowall, J., Chingwalu, F., Simkoza, E. and Chilango T. (1999) Great Suspicions and Lesser Expectations: An Investigation into Farmer Perceptions of the Farming Systems Integrated Pest Management Project. May. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished).

Sutherland, A. (1998) Report on Training Course in Participatory Approaches to On-farm Pest Management Trials and Related Aspects of the FSIPM Project, Bvumbwe Agricultural Research Station, 19–27 August. Chatham, UK: Natural Resources Institute, Social Sciences Department (unpublished).

CHAPTER 4. WHAT DID WE LEARN?

The classic 'learning' text is Senge, P. M. (1993) *The Fifth Discipline: The Art and Practice of the Learning Organization.* London: Century Business.

For IPM, see Orr, A. (1997). IPM for Resource-poor African Farmers: Is the Emperor Naked? Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished).

For *Striga*, see Chanika, C. S. M., Abeyasekera, S., Ritchie, J. M., Riches, C. R., Mkandawire, C. B. K., Mputeni, H., Makina, D. and Daudi, A. T. (2000). On-farm trials of technologies for the management of *Striga asiatica* in Blantyre/Shire Highlands. pp. 216–225. In: *Integrated Crop Management Research in Malawi: Developing Technologies with Farmers. Proceedings of the Final Workshop of the Farming Systems Integrated Pest Management Project, Club Makokola, Mangochi, Malawi, 29 November–3 December.* Chatham, UK: Natural Resources Institute.

For farmer 'performance' in relation to termites, see Orr, A., Mwale, B. and Saiti, D. (1999) Termites Revisited. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished). Also Ritchie, J. M., Abeyasekera, S.,

Chanika, C. S. M., Ross, S. J., Mkandawire, C. B. K., Maulana, T. H., Shaba, E. R. and Milanzi T. T. K. (2000) On-farm trials of a farmer-developed cultural pest management strategy for termites in Blantyre Shire Highlands. pp. 77–89. In: *Integrated Crop Management Research in Malawi: Developing Technologies with Farmers. Proceedings of the Final Workshop of the Farming Systems Integrated Pest Management Project, Club Makokola, Mangochi, Malawi, 29 November–3 December.* Chatham, UK: Natural Resources Institute.

For markets, see Orr, A., Mwale B. and Saiti D. (2000) Markets and livelihoods: lessons from farming systems research in the Blantyre/Shire Highlands. pp. 279–291. In: *Integrated Crop Management Research in Malawi: Developing Technologies with Farmers. Proceedings of the Final Workshop of the Farming Systems Integrated Pest Management Project, Club Makokola, Mangochi, Malawi, 29 November–3 December.* Chatham, UK: Natural Resources Institute.

For an example of market-led IPM, see Ritchie, J. M., Abeyasekera, S., Chanika, C. S. M., Mwale, B., Jones, R. B., Silim, S. N. and Daudi, A. T. (2000) A Recommendation for the Release of Pigeonpea Variety ICEAP 00040 in Malawi. Submitted to the Technology Clearing Committee of the Ministry of Agriculture and Irrigation, March (unpublished).

For farmer to farmer extension, see Lawson-McDowall, J., Kapulula, P. and Chiumia-Kaunda, C. (2000) Innovation in agriculture: networks of communication among project farmers. pp: 138–144. In: *Integrated Crop Management Research in Malawi: Developing Technologies with Farmers. Proceedings of the Final Workshop of the Farming Systems Integrated Pest Management Project, Club Makokola, Mangochi, Malawi, 29 November – 3 December.* Chatham, UK: Natural Resources Institute.

For the government extension service in the project area, see MoAI (1993) Extension Monitoring Survey, 1992/1993. Blantyre: BLADD (unpublished).

Ramirez, R. (1997) *Understanding Farmers' Communication Networks: Combining PRA with Agricultural Knowledge Systems Analysis. Gatekeeper Series*, No. 66. London: International Institute for Environment and Development (IIED).

CHAPTER 5. STARTING OVER

The opening quotation is from T. S. Eliot's *Four Quartets*. London: Faber and Faber.

The farmer's voice is from Gondwe, F. (2000) A Study of Factors Influencing the Adoption of Land Conserving Technologies in Malawi: The Case of Blantyre/Shire Highlands Rural Development Project. M.Sc. thesis, Bunda College of Agriculture, University of Malawi (unpublished).

For a discussion of research opportunities, see Ritchie, J. M. (2000) Some opportunities for demand-driven research in Blantyre/Shire Highlands. pp. 292–295. In: *Integrated Crop Management Research in Malawi: Developing Technologies with Farmers. Proceedings of the Final Workshop of the Farming Systems Integrated Pest Management Project, Club Makokola, Mangochi, Malawi, 29 November–3 December.* Chatham, UK: Natural Resources Institute.

For the 'learning project' cycle, see Picciotto, R. and Weaving R. (1994) A new project cycle for the World Bank? *Finance and Development,* (December): 42–44.

For development paradigms, see Chambers, R. (1993) *Challenging the Professions: Frontiers for Rural Development.* London: Intermediate Technology Publications Ltd.

White, L. (1987). *Magomero: Portrait of an African Village.* Cambridge: Cambridge University Press.

TEXT BOXES

Box 1 IPM and Agricultural Research in Malawi

For the allocation of scientists' time and research priorities, see Agricultural Sciences Committee (1999) Malawi Agricultural and Natural Resources Research Master Plan. March. Lilongwe: Agricultural Sciences Committee (unpublished). Information in Figure 2 from Table 5.6, pp. 98–100.

For an inventory of agricultural projects, see MoAI (1998) New and Ongoing Projects Project Status Report. January–June. Lilongwe: Planning Division, Project Preparation Section, (unpublished).

Box 2 Farmers' Tillage Practices
Orr, A., Chanika, C. S. M. and Koloko, A. (1998) Farmers' Tillage Practices in Relation to Green Manuring with *Tephrosia vogelii* and *Crotalaria juncea*. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished).

Box 6 Optimizing Farmer Participation: The Example of Soil Crack-sealing Against Sweet Potato Weevil
Orr, A., Mkandawire, B., Koloko, A., Milanzi, T. and Kapulula P. (1998) Sweet potato trial, 1997/98: farmer diagnosis and evaluation, with economic analysis. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished). Also Mwale, B., Ritchie, J. M., Chanika, C. S. M. and Barahona, C. (2000) Cultural management of the sweet potato weevil (*Cylas puncticollis*). pp. 48–59. In: *Integrated Crop Management Research in Malawi: Developing Technologies with Farmers. Proceedings of the Final Workshop of the Farming Systems Integrated Pest Management Project, Club Makokola, Mangochi, Malawi, 29 November–3 December.* Chatham, UK: Natural Resources Institute.

Box 7 Creating a 'Learning Project'
Orr, A. and Jere, P. (1997) What Have We Learnt? 1996/97 In Review. Bvumbwe Agricultural Research Station, Malawi: FSIPM Project (unpublished).

Box 8. The Rise and Fall of 'Adaptive Research' in Malawi: A Cautionary Tale
Since this subject has not been covered by previous research, we have provided full references. An account of early farming systems research in Malawi may be found in Hansen, A. (1986) Farming systems research in Phalombe, Malawi: the limited utility of high yielding varieties. pp. 145–169. In: *Social Sciences and Farming Systems Research: Methodological Perspectives on Agricultural Development.* Jones, J. R. and Wallace, B. J. (eds). *Westview Special Studies on Agriculture, Science and Policy.* Westview Press. For DARTS' reaction to the results of farming systems research in Phalombe, see USAID (1983) Evaluation Report for Malawi Agricultural Research Project, February (unpublished).

The importance of intercropping is stressed in Hansen, A. (ed.) (1983) Proceedings and Materials from the Conference on Intercropping Research in Malawi, 20 October 1981. Chitedze Agricultural Research Station (unpublished). The diagnostic survey for Chiradzulu is reported in Kawonga, W. T. and Ndengu, J. D. (1986) Farming systems diagnosis: a case-study of the Chiradzulu Rural Development Project of the Blantyre Agricultural Development Division. pp. 138–142. In: *Research Highlights and Constraints to Crop Production. Proceedings of the 1986 Research and Extension Workshop.* Maida, J. H. A. (ed.). Lilongwe: Department of Agricultural Research. Descriptions of the on-farm trials made in the Shire Highlands may be found in Kawonga, W. T. and Jere, O. A. (1990). Review of Adaptive Research Trial Results for Blantyre ADD 1985–1990 Period. November. Blantyre: Adaptive Research Section, BLADD (unpublished).

For a critique of adaptive research from the perspective of the Commodity Teams, see Jones, R. B. (1993). The development of technologies for farmers by traditional commodity research teams: the Malawi experience. pp. 82–87. In: *Impacts of On-Farm Research: Proceedings of a Workshop on Impacts of On-Farm Research in Eastern and Southern Africa, 23–26 June, Harare, Zimbabwe.* Heisey, P. and Waddington, S. (eds) CIMMYT Eastern and Southern Africa On-Farm Research Network. For the *coup de grace*, see Coffman, W. T. (Team Leader) (1992) Malawi National Agricultural Research Project. Second Triennial Review (unpublished).

For Hansen's institutional vision, see Hansen, A. (1981) Farming Systems Research: Theory and Practice in Malawi. Paper presented at Chitedze Research Station, 25 September (unpublished). For a general review, see Anandajayasekeram, P. and Stilwell, T. (1998). Institutionalization of farming systems approach: lessons from East and Southern Africa. pp. 3–26. In: *Institutionalization of Farming Systems Approach in Eastern and Southern Africa.* Anandajayasekeram, P. and Stillwell, T. (eds). Mbabane: Southern African Association for Farming Systems Research- Extension.