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IMPACT ASSESSMENT USING PARTICIPATORY APPROACHES: 'STARTER PACK' AND SUSTAINABLE AGRICULTURE IN MALAWI

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Abstract

This paper is based on a study undertaken as part of the Malawi Starter Pack Evaluation Programme (1999–2000). Focusing on the concept of 'sustainable agriculture', it describes how participatory approaches can be used for impact assessment and the kind of information that emerges from such an approach. The study explored how farmers themselves perceive the concept of sustainable agriculture and how this relates to their livelihoods. Detailed information was collected from 30 villages and was used to determine variations in sustainability across regions, between different households, and trends over the last 30 years. The types of inputs required for increased agricultural sustainability were also ascertained.

Research findings

- *The use of participatory approaches revealed that farmers' perceptions on sustainable agriculture were closely related to their concerns for immediate family food security. Cropping practices and the availability of seed to support these were regarded by farmers as the most important indicators of sustainable agriculture.*
- *Malawi's experience does not appear to fall within the commonly assumed paradigm of highly biodiverse small farm agriculture at risk from the interventions of the formal seed sector. Rather, small farmers appear to be short of crops and varieties and are keenly seeking new sources.*
- *Starter Pack beneficiaries indicated a desire to see the quality of the packs improved, both in terms of content and delivery systems.*

Policy implications

- *Current professional recommendations for sustainable agriculture that promote agroforestry, fallowing and low chemical application may not be feasible in Malawi, given farmers' present natural and human capital base.*
- *Donor agencies contributing to the design and implementation of sustainable agriculture programmes have a responsibility to ensure that such programmes contribute positively to institutional structures and processes, including research and extension institutions.*
- *Participatory impact assessment approaches can be used to capture trends and variations at national level and also gather detailed information at village level.*

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Acronyms

ADMARC	Agricultural Development and Marketing Corporation
FPG	Farming Practice Group
SI	Sustainability Indicator
SPEP	Starter Pack Evaluation Programme
SPS	Starter Pack Scheme
SWC	Soil and Water Conservation

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1 INTRODUCTION

Malawi has one of the highest population densities in the world for a country dependent on a single cropping season per year (approximately 60 people/km^2). Some 85 per cent of the population remain in the rural areas, but an estimated 70 per cent of rural families have less than one hectare of land, the minimum necessary to achieve family food security. Soils are poor over much of the country. At the same time, the Malawi population is increasing at over 3 per cent a year, so – with little unallocated land in the smallholder sector – farm families' access to land is declining markedly.

Up until the mid-1980s, national food security was achieved most years through an extensive system of agricultural input and marketing subsidies, which made the promoted agricultural intensification package of hybrid maize seed and chemical fertiliser economic for most farmers.

From the late 1980s, Malawi went through a period of substantial economic and political reform. Fertiliser subsidies were dramatically reduced and have since been removed completely; the government agricultural credit system ended; ADMARC, the agricultural marketing parastatal, underwent substantial downsizing and retrenchment; and consumer maize prices were liberalised. Successive devaluations as part of the wider macro-economic reform programme caused a dramatic increase in fertiliser prices.

All this served to increase the pressures on smallholder agricultural land, at the same time as reducing the economic rationale for farm families to use the hybrid maize/chemical fertiliser technology package that had been the lynchpin of Malawi's agricultural development strategy for the last twenty or more years. The use of hybrid maize seed and chemical fertiliser fell dramatically in the smallholder sector and, in any case, research data cast doubt on the value of varietal improvement and the use of chemical fertiliser, given prevailing soil organic matter levels and farmer management practices. Accordingly, a structural food deficit of several hundred thousand tonnes per year emerged. By the mid 1990s, the environmental and economic sustainability of Malawi smallholder agriculture was seriously in doubt in the immediate short term.

The national agricultural research system responded to concerns about the environmental and economic sustainability of smallholder agriculture by identifying a 'best-bet technology' package as a short-term solution to ameliorating soil fertility in the smallholder sector (Rockefeller Foundation, 1998). This had two components: (i) increasing access to improved maize seed and chemical fertiliser inputs and the extension advice to go with it; and (ii) diversifying the cropping system using grain legume rotations. It was to supply this package that the 'Starter Pack Scheme' (SPS) was implemented in 1998–9 and 1999–2000. SPS aimed to supply improved maize seed to cover 0.1 hectare (20 kg), together with grain legume seed and chemical fertiliser to all rural households with land in Malawi. The objectives of the Starter Pack Scheme were to:

- increase household food security;
- act as a fore-runner to a wider social safety net programme;
- examine 'best-bet' agricultural technologies for smallholder farmers in Malawi; and
- introduce more sustainable agricultural practices.

In both years, some 2.86 million packs containing seed and fertiliser were distributed by government with NGO assistance. A reduced scheme – the Targeted Inputs Programme – has been planned to supply similar inputs to 1.5 million farm families in 2000–1. In SPS1 (1998–9), at least eight different kinds of pack were distributed (i.e. containing seed of different crops and varieties), with the intention of being tailored to the needs of different areas. In SPS2 (1999–2000), the composition of the packs was determined largely by supply constraints and was not tailored to agro-ecological conditions. In the Targeted Inputs Programme planned for 2000–1, efforts are being made to procure and distribute seed of open pollinated varieties of maize.

Evaluations of both SPS1 and SPS2 have been conducted (Longley et al., 1999; SPEP, 2000). The evaluation of SPS2 was carried out between January and August 2000, and consisted of five modules investigating: (1) agronomic impact; (2) micro-economic impact and willingness to pay; (3) gender and intra-household distribution; (4) impact on sustainable agriculture; and (5) household registrations for Starter Pack as compared to 1998 national census data[1]. This paper reports on Module 4 of the SPS2 evaluation.

The impact assessment study conducted under Module 4 was implemented using participatory approaches and provided useful lessons relating to two issues that are of current interest to development practitioners:

- how farmers perceive the concept of 'sustainable agriculture', and how this relates to their livelihoods. There has been much debate amongst development practitioners about what sustainability means and its micro-, meso- and macro-dimensions, but to date there is comparatively little information on what farmers themselves think.
- how participatory approaches can be used for impact assessment, and the kind of information that emerges

using these approaches compared to formal questionnaires and other conventional evaluation methods;

This paper discusses the lessons from SPS2 evaluation Module 4 for both these issues.

2 ISSUES IN SUSTAINABLE AGRICULTURE

'Sustainability' means different things over different time-frames and to different stakeholders (see, for example, Bell and Morse, 1999). In the short term, over say one or two seasons, making agriculture more sustainable could be defined as increasing production without any negative effects on farm families' social, human, physical, financial and natural asset base. In the longer term, say over four or five seasons, making agriculture more sustainable could be defined as increasing production *and* improving the quantity and quality of farm families' asset base, thus improving their livelihood options.

There is now a considerable literature detailing potential win–win interventions for achieving more sustainable agriculture over the longer-term (e.g. Whiteside, 1998). What is clear is that this involves a wider set of questions beyond how to reduce the length of the hungry period faced by farm families and ameliorate soil fertility problems.

The promotion of sustainable agriculture requires that *on-farm technical questions* are addressed. In Malawi these include:

- the real feasibility and potential scale of application of non-chemical options for improving soil fertility, particularly grain legumes;
- the options for biological, cultural and mechanical pest and disease control, particularly in locally important susceptible crops such as beans;
- the options for adapting local farming systems to cope with the predicted impact of HIV/AIDS, in farm families that are already predominantly short of labour.

But there are also important questions to answer relating to the *wider economic and environmental impact of current agricultural practices*. In Malawi, the questions to consider here include whether there are better and feasible alternatives to the prevailing maize monoculture for:

- human nutrition – providing a greater quantity and quality of preferred foods, including micro-nutrients and access to wild foods;
- other aspects of farm families' livelihoods in terms of cash income, building/fencing materials, animal fodder, medicinal and amenity needs;
- ecosystem functions, including water cycle and quality, micro- and macro-climate and sustainable use of biodiversity.

In the longer term, sustainability relates not only to the economic and environmental impact of technologies and practices, but also *to institutional structures and processes:* 'Sustainable agriculture… must become a process for learning' (Pretty, 1995). Any impact assessment must therefore consider the extent that sustainable agriculture programmes can be built upon to achieve this transformation of structures and processes. For example:

- the agricultural research and extension system – how can it better learn from farmers and other stakeholders?
- national institutions and policies – how can they (particularly input and output marketing) better support sustainable agriculture?
- local groups and institutions – how can they better be encouraged to manage natural resources effectively?

In this respect, the donor agencies contributing to the design and implementation of sustainable agriculture programmes have a responsibility to ensure that their institutional format contributes positively to this.

Absolute definitions of sustainable agriculture at global level and over time are not feasible. Individual farm families or communities can define criteria at local level at a moment in time, but definitions at the district, regional, national and global level will be different according to the perspective and context of stakeholders. Therefore, it may be helpful to focus on one group of stakeholders and use participatory approaches to develop an understanding of their own particular perspectives and definitions. This is the approach taken in the SPS2 Module 4 study, which focused on smallholder farmers.

Box 1 lists the aspects of agricultural sustainability that were explored by the SPS2 Module 4 study, amongst other issues specific to the Starter Pack Scheme. Results are discussed in Section 4 below.

3 METHOD

Amongst development practitioners world-wide, there is now a growing realisation that an understanding of local needs and capabilities is central to any assessment of the options and potential for longer-term sustainability. Therefore impact assessments based on participatory approaches are useful contributions to the on-going debate. In particular, participatory approaches can help to reveal the *diversity* of local needs and capabilities among different socio-economic categories of families and also within families according to gender, age, etc.

Box 1 Dimensions of agricultural sustainability explored by the study

- the indicators farmers use to assess the sustainability of the agriculture they see practised around them;
- whether sustainability (as defined by farmers) varies significantly between regions and types of households;
- farmers' assessment of trends in sustainable agriculture over the last 30 years;
- farmers' 'Dream Packs' – the type of inputs and extension package that would most help them increase the sustainability of their agriculture.

Box 2 Key features of participatory approaches for impact assessment

- identifying which stakeholders want to be involved;
- establishing their expectations of the study;
- identifying their priority evaluation criteria;
- identifying indicators to provide the information needed for the evaluation;
- agreeing amongst stakeholders on the methods to be used;
- collecting and analysing information collaboratively with stakeholders.

There is a wide and growing literature on how participatory approaches can be used for impact assessment[2]. Key features of participatory approaches for impact assessment are listed in Box 2.

Some of the lessons emerging about the practicalities of this approach are that decisions have to be made in advance about the range of stakeholders to be involved and the extent of their participation. The extent of stakeholders' participation ranges from their control over identification of evaluation criteria and data analysis, to a less extensive involvement focusing on participatory indicator identification and participation in information gathering. It is also important to note that participatory approaches do not necessarily generate *all* the information needed to identify options and potentials; rather they focus on eliciting the views and understanding of selected stakeholders. This study focused on smallholder farmers, as their views on sustainable agriculture had not been sought systematically in Malawi before, and it involved them primarily in indicator identification and data gathering.

The basic framework of analysis chosen for this study was to adapt the approach and techniques of participatory well-being ranking to measure farm families' sense of agricultural sustainability instead of well-being. Participatory well-being ranking has been used successfully by, for example, CARE in Zambia (Drinkwater and Rusinow, 1999) and by the HIMA-Njombe project in Tanzania (see Temu and Due, 2000). In our version we aimed in collaboration with farm families to develop sustainability categories, which we called 'Farming Practice Groups', which could be used to map actual short-term changes and potential long-term changes in sustainability. In each case study village, key informants ascribed farm families to a particular Farming Practice Group and this formed the basis for focus group discussion about movement between sustainability categories over time and reasons for this movement.

Because participatory approaches had not been used to explore sustainable agriculture issues in Malawi before, and yet time for fieldwork was relatively short, it was realised that preliminary participatory fieldwork would be needed to:

- identify which variables farmers themselves use to assess agricultural sustainability, i.e. to generate a set of sustainability indicators which could be used as a starting point for village-level discussions;
- assess which particular participatory tools and techniques would be most appropriate for facilitating discussions at community level.

Accordingly, an in-depth preliminary field study was carried out at three sites. The sites were chosen to represent the variability in one of the main factors that determines farming practices in Malawi, namely altitude. Within each site, the individual village was chosen to be of medium wealth and accessibility, to avoid extremes in these two variables unduly influencing results.

The study team spent six or seven days in each village, starting with an open meeting to discuss farming activities (problem-objective tree) and moving on to identifying different farming practices within the village with key informants (transect walk) and discussing their sustainability (phrased as *ulimi okhazikika* – literally 'stable agriculture'). From the transect walk and discussion, the team was able to generate for each village a list of farming practices considered to be indicators of sustainable agriculture, with descriptions of how to distinguish 'high', 'medium' and 'low' sustainability for each practice (which we called Farming Practice Group 3, 2 and 1 respectively). The team then spent time experimenting with different participatory exercises (institutional mappings, history timelines, pair-wise rankings, trend analyses, dream-nightmare visions, etc.) in different formats (open meetings, key informants, focus group discussions, etc.), to assess approaches which would be most appropriate for the main study for generating the information needed within the limited time available. The preliminary fieldwork in each village concluded with a feedback meeting for the whole village, at which the team presented the results and incorporated comments from village members.

Using the results of the preliminary field study, the team got a clear vision of how the information needed for the study could best be obtained in the main study using participatory approaches. This was written up as a field facilitators' manual, which guided the main study fieldwork.

The team was able to identify 15 sustainability indicators which were mentioned consistently across villages (Table 1). These were used as a set of standard indicators for which information was sought in each village during the main study.

The main study was carried out in 30 villages, with teams of four field facilitators spending three days in each village. Study sites were selected by proportional representation, based on a vulnerability assessment mapping exercise conducted in 1996 by the Famine Early Warning Unit (Moriniere et al., 1996). Within each study site, specific villages were randomly selected from the Starter Pack Logistical Unit national database of villages, excluding those villages with less than 30 or more than 300 households registered to receive Starter Pack. The fieldwork within each study village consisted of:

- introductions;
- background information: resource, social and institutional mapping, transect walk;
- pair-wise ranking of relative importance of Sustainability Indicators;
- categorisation of households into 'high', 'medium' and 'low' sustainability Farming Practice Groups, using the list of sustainability indicators;
- focus group discussions with each Farming Practice Group about:
- the relative importance of different Sustainability Indicators;
- trend analysis of factors influencing the sustainability of their farming over time;
- impact (positive, negative, zero) of Starter Pack on their farming; and
- ideal contents of a 'Dream Pack' of inputs and extension advice for the future.

For the household categorisation, two groups of key informants (one male, one female) took the household cards generated during the earlier social mapping exercise and placed each in turn in the box that best described

Table 1 Sustainability indicators of Farming Practice Groups

	Farming Practice Group 3 (High sustainability)	Farming Practice Group 2 (Medium sustainability)	Farming Practice Group 1 (Low sustainability)
1. Tilling or weeding by retaining weeds and crop residues in soil	Farmers retain maize leaves and stalks, and bury weeds while weeding (*vundira* or *kugaula*, *kuojeka*). Residues are burried immediately after piling maize for harvesting. If done by hand ridging is carried out at this time; if using cattle tilling is undertaken during this time, usually between June and July.	Farmers in this group mostly do the same as FPG 1 but the tasks are performed a bit later, usually in August or September. This, it was said, does not give enough time for the residues to decompose. In other areas late retention means trouble with termites and poor germination rate.	Farmers usually gather stalks and weeds in piles and burn them (*kusosa*), or set the garden on fire to clear it before ridging. Others in this category wait until the first rains when the soils are wet and then ridge immediately. Though residues are retained in soil there is no time for decomposition.
2. Application of organic manure (animal and compost)	Able to apply manure to whole fields and usually have means of transporting manure to their farmlands (*ngolo*). Most farmers also apply fertiliser because it is less laborious. This is done in good time, just before the rains in November.	Put manure on each plant station to economise. May not have enough to apply to all farm plots. Usually just apply to farm plots near homesteads for lack of transport to carry manure to distant farm plots and for limited access to animal manure.	Do not apply any manure because they usually do not own any animals and may not be able to purchase manure. FPG 1 farmers rely on Starter Pack as only source of improving on soil fertility.
3. Livestock farming	Keep a diverse type of livestock e.g. chickens, goats, pigs, and cattle. These help in production of animal manure; and animal power in terms of transport and farming; and as a source of income to buy fertiliser.	Keep some livestock, but only chickens, goats and pigs.	Keep only a few chickens.
4. Agroforestry trees	Plant agroforestry trees like rantana, pigeon peas (*nandolo*), with systematic spacing. Other trees mentioned include *msangu* and *tifonia.*	Scattered agroforestry trees in garden/ farm plots.	No agroforestry trees planted in farmland. Trees like *Gmelina* and *Eucalyptus* occur in farmland, which disturb crop growth.
5. Land husbandry practices	Use SWC measures including contour bunds, storm drains, and contour ridges where their gardens are sloping. Make ridges across slope following contours and also make box ridges. Ridges are well spaced, 90cm apart.	Have contour bunds where their gardens are sloping. Have ridges across some slopes but may not necessarily follow contours. No box ridges. Ridges may be too close or far apart.	No contour bunds even where garden is on slope. Ridging along slope. Improper spacing of ridges, too close together or too far apart.
6. Farm implements and tools	Have tools and implements such as ploughs, ridgers, oxcarts, plus hoes, sickles, axes.	Own a few suitable farm tools like axes, hoes, sickle, panga knives.	Own just some basic tools e.g. a few hoes and an axe. Farmers borrow most of the other tools from other people.
7. Access to seed	Save enough seed for all crops and can also buy seed. Able to follow recommended planting methods per plant station and spacing.	Save enough seed for 1 or 2 crops only. Plant following recommended methods per plant station and spacing.	Rarely save any seed and rely on *ganyu* labour or Starter Pack to access seed. Characterised by late planting because time is wasted in searching for seed. May not always follow recommended planting methods.

8. Farmland size	Enough land to plant all crops needed to feed family. Farmers able to lend some land to others.	Own land may be inadequate, but some farmers can afford to rent to expand their farm area.	Small land size, limiting cultivation area.
9. Application of fertiliser	Farmers are able to buy fertiliser to apply on all farmland, thus ensuring production and allowing them to buy more fertiliser in subsequent years. Do not have much trouble to repay fertiliser loans.	Only manage to buy some bags of fertiliser and may have some trouble repaying loans.	Cannot afford to buy any fertiliser. Rely on Starter Pack as a source of fertiliser.
10. Crop diversification	Grow a number of staple crops.	Grow 1–2 staple crops only.	Grow only one staple crop.
11. Mixed cropping (inter-cropping, relay cropping)	Intercropping usually involves maize and beans mixed with tree legume crops grown just around the edges of the field. Farmers tend not to mix more than two different crops but may divide plots within the garden for different mixtures.	Mix crops better by making sure that the crops grown in same garden relate well by mixing nitrogen fixing like beans and pigeon peas and maize. However you will also find some complementary crops in the garden like pumpkins, and different types of the beans mixed in the garden.	Improper mixing of crops. Like mixing cassava, pigeon peas, maize and beans in the same garden. Overloading the garden with many crops beyond capacity. just grow crops that they access at the planting time.
12. Fallowing	Farmers leave land fallow for three or more years with total control of animal grazing in the field. This ensures that the purpose of leaving land fallow is not defeated by overgrazing or hardening of the soil by hoof stamping of animals.	Farmers leave land fallow for a period of only 1–2 growing seasons, with some controlled grazing in the fallow fields.	Cannot willingly leave any land fallow. Fallowing only occurs when farmers cannot farm the land for some reason such as illness during farming season.
13. Application of chemicals	Apply recommended measures and types of chemicals to their fields, e.g. SMITHION mixed with SEVEN for termites, caterpillars and borers. Practise Integrated Pest Management.	Apply recommended measures and types of chemicals to their fields, as with FPG 3 farmers.	Apply detrimental chemicals to fields such as DUAL for weed control instead of keeping weeds as green manure. Farmers also use sulphate of ammonia fertilisers on their fields.
14. Crop rotation	Practise proper rotation: maize followed by groundnuts or tobacco. In another year tobacco follows maize or groundnuts, while groundnuts may follow where millet was previously planted.	There is much change: rotation between two crops such as maize and tobacco, with millet planted on fallow land.	Plant same types of crops on same pieces of land every year. If there are changes then the crops that follow each other are not appropriate, for example a maize plot followed by cassava or vice versa.
15. Institutions[1]	Farmers are members of farmers clubs for both cash and food crops and the family has access to a range of credit sources for the purchase of inputs. Farmers have access to and are able to act on good extension advice.	Farmers receive some credit, often from within the village, not outside institutions. They are members of some farmers clubs and receive some extension advice.	Farmers do not have access to extension services and advice. Farmers do not have access to any credit schemes for inputs, either for cash or food crops.

1 Institutions is used here to refer to extension, credit and community organisations, NGO projects, seed supply, marketing, agricultural research.

Table 2 Total households in study villages, by region

Region	Total Number of Households		
	Male-headed	Female-headed	Total
Northern (4 villages)	257 (70.4%)	108 (29.6%)	365 (100%)
Central (14 villages)	998 (78.6%)	271 (21.4%)	1,269 (100%)
Southern (12 villages)	985 (76.4%)	305 (23.6%)	1,290 (100%)
All regions (30 villages)	2240 (76.6%)	684 (23.4%)	2,924 (100%)

that household's farming practices (high, medium or low sustainability) for each sustainability indicator. Throughout these exercises, symbols selected by the community were used to represent the sustainability indicators.

The mixed gender focus groups from each Farming Practice Group were composed of those households consistently placed within the same Group by both male and female key informants *and* who had received Starter Packs.

Each focus group in turn pair-wise ranked the 15 sustainability indicators according to their relative importance to the particular focus group (not the village as a whole). Each focus group then made line drawings of trends in the sustainability of their farming over the last 30 years, and highlighted the key influential factors in each decade.

When proposing the 'Dream Pack', focus groups could introduce new items or varieties (as long as this did not increase the weight of the Pack beyond the 20 kg of the Starter Pack) and could also suggest changes in distribution logistics and extension methods. They ranked the proposed changes through pair-wise rankings.

The types of households within the 30 villages selected for the main study fieldwork are given in Table 2.

There was a high incidence of female-headed households in Northern Region because husbands had migrated from the villages for work, leaving their wives behind. Because only four of the 30 randomly selected villages were in Northern Region, results from Northern Region are possibly less reliable than those from Central and Southern Regions.

Throughout the main study, the emphasis was on collecting information that could be used to make comparisons between sites as well as generalisations across sites. Thus, for example, scores were used in preference to relative rankings wherever feasible (e.g. see Table 3). Where ranks were used the ranking was always done considering the same set of ranked items.

For each village, results were recorded in a debriefing document. One copy of the debriefing document was left in the village and the study team kept one copy. The information in the debriefing documents was then summarised in various simple Excel tables and charts. These were used for analysis, with the emphasis being on exploring regional variations (experience in North, Centre and South) and differences in the experience of Farming Practice Groups (high, medium, low sustainability), as well as national trends and patterns.

4 FARMERS' PERCEPTIONS OF SUSTAINABLE AGRICULTURE

Sustainability indicators

Out of 15 possible choices, farmers in the study villages across Farming Practice Groups (FPGs) and regions picked out the following (in descending order of importance) as

Table 3 Importance of sustainability indicators ranked by study villages

Sustainability indicator	Means of pair-wise ranking across villages			
	North	Centre	South	Total
Crop diversification	5.5	3.6^{h}	3.6^{h}	4.2^{h}
Access to seed	5.5	4.2^{h}	4.5^{h}	4.7^{h}
Farmland size	7.9	4.1^{h}	4.1^{h}	5.4^{h}
Tools and implements	5.1^{h}	5.5	5.8	5.5^{h}
Mixed cropping	7.1	7.9	3.1^{h}	6.0
Fertiliser application	9.0	5.8	6.3	7.0
Institutions	1.3^{h}	10.0	10.7	7.3
Crop rotation	8.8	3.2^{h}	12.2^{l}	8.1
Land husbandry	9.1	9.5	9.0	9.2
Livestock	10.1	8.8	9.6	9.5
Tilling or weeding	11.1	10.4	8.0	9.8
Manure application	10.6	10.0	13.1	11.2
Chemical application	9.6	12.1^{l}	12.2^{l}	11.3^{l}
Agroforestry	11.6^{l}	13.1^{l}	10.9	11.9^{l}
Fallow	8.9	14.3^{l}	13.5^{l}	12.2^{l}

Sustainability indicators were classified as follows: high (^{h} = mean – standard deviation); medium (no superscript); and low (^{l} = mean + standard deviation). Low figures imply that an indicator was highly ranked.

Note: The sustainability indicators were weighted using pair-wise ranking. The top-ranking indicator was assigned one point and the lowest ranking was given 15 points. An indicator was considered to be highly important if its rank was below the mean minus its standard deviation and it was considered of low importance if its ranking was above the mean plus its standard deviation.

the five most important indicators of sustainable agriculture in Malawi:

i. Crop diversification – growing a range of staple crops
ii. Access to seed – enough seed for timely planting at recommended spacing for all crops
iii. Farmland size – enough land to feed family
iv. Tools and implements – owning all the necessary farm tools and implements
v. Mixed cropping – optimal mix of crops for in-field soil fertility management through inter-cropping and relay planting

Tables 4a and 4b show that, overall, the sustainability indicators chosen were fairly consistent across Farming Practice Groups and between male- and female- headed households[3]. The two significant differences between male- and female-headed households were that the cropping patterns of male-headed households are seen as more diversified than those of female-headed households; and, whilst all households rely on seed from off-farm sources, a greater proportion of female-headed households do so.

Data at the regional level (Table 3) show some minor differences among regions. Respondents in the north ranked institutional contact highly. Those in the centre and the south ranked farmland size highly, while respondents in the north did not – because the centre and the south are more densely populated than the north. Farmers in southern Malawi have had to adopt mixed cropping because of land scarcity, therefore mixed cropping was ranked highly in this region. Groups in central Malawi ranked crop rotation highly – because the centre has relatively more land, which enables farmers to practice crop rotation.

Despite our initial assumptions that sustainable farming among smallholders might be indicated by the practice of agroforestry, the availability of fallow land, and low chemical application, were ranked lowly across the country. Land shortage was one of the main reasons respondents gave for not maintaining fallow or practising agroforestry, and lack of knowledge or availability of inputs were also cited as reasons for the lack of use of crop chemicals and agroforestry. These findings suggest that experts' current recommendations for sustainable agriculture that include these practices may not be feasible given farmers' current natural and human capital base.

Trends over time

Table 5 shows that farmers in Farming Practice Group 3 perceive sustainability has declined more markedly than those in Farming Practice Group 1. Farmland size is perceived to have decreased across nearly all Farming Practice Groups.

Seed availability is also considered to have declined by between one third and one half of farmers in all Farming Practice Groups. But over one half of farmers in all Farming Practice Groups indicated there has been an *increase* in crop diversification. This may be due to the increasing impact of land pressure over time: many focus groups

Table 4a Distribution of study households between Farming Practice Groups (%) – perceptions of male key informants

Sustainability indicators	Male-headed households			Female-headed households		
	FPG1	FPG2	FPG3	FPG1	FPG2	FPG3
Crop diversification	40%	24%	36%	30%	24%	46%
Access to seed	23%	31%	47%	13%	27%	61%
Farmland size	34%	32%	34%	26%	32%	42%
Tools and implements	13%	57%	40%	1%	37%	62%
Mixed cropping	24%	28%	48%	18%	34%	48%
All 15 indicators	17%	34%	46%	8%	36%	56%

Cell contents = % of households in specified FPG in all villages divided by total (male and female) households in all villages.
All indicators = mode of all 15 indicators, as perceived by key informant group, not arithmetical mean.

Table 4b Distribution of study households between Farming Practice Groups (%) – perceptions of female key informants

Sustainability indicators	Male-headed households			Female-headed households		
	FPG1	FPG2	FPG3	FPG1	FPG2	FPG3
Crop diversification	45	33	22	33	35	32
Access to seed	31	26	44	19	28	52
Farmland size	40	37	24	46	31	23
Tools and implements	3	62	34	1	48	51
Mixed cropping	17	31	52	15	33	53
All 15 indicators	20	42	38	14	34	52

FPG1 = highly sustainable, FPG2 = medium sustainable, FPG3 = lowly sustainable

Cell contents = % of households in specified FPG in all villages divided by total (male and female) households in all villages.
All indicators = mode of all 15 indicators as perceived by key informant group, not arithmetical mean.

mentioned that growing a diverse range of crops was not necessary 30 years ago because there was sufficient fertile land to support monoculture of maize at that time. Crop diversification has also been promoted over a number of years by various NGOs and the Ministry of Agriculture and Irrigation.

Baseline crop and variety diversity in the Malawi smallholder sector over the last 30 years, as presented in the trend analyses, appears to have been relatively low. Many farmers in the study villages mentioned that Starter Pack was their first access to seed of some crops and varieties. Malawi's experience does not therefore appear to fall within the commonly-assumed paradigm of highly biodiverse small farm agriculture at risk from the interventions of the formal seed sector. In fact, it appears closer to the experience documented in, for example, Wood and Lenné (1993), of small farmers being *short* of crops and varieties and keenly seeking new sources.

Dream Packs

A majority of the groups indicated that Starter Pack had a positive impact on some sustainability indicators: crop diversity, seed availability, mixed cropping, fertiliser application, and farm size. These were mentioned because of the seed and fertiliser that Starter Pack provided (Figure 1). As regards farmland size, respondents said the availability of the seed enabled farmers to plant a relatively larger land area than normal. This suggests that the availability of seed remains a major constraint among smallholder farmers.

In some cases, some indicators that are not directly related to the Starter Pack Scheme were mentioned. For instance, while the Scheme did not provide any tools and implements, some groups indicated that it had a positive impact on the availability of these to farmers. They argued that after harvest, they sold some produce whose proceeds were used to buy tools and implements.

Some groups indicated that, through the provision of legume seed, the Scheme had a positive impact on crop rotation, mixed cropping, tilling and crop diversification and thus on soil fertility.

The process of registration and distribution of the Starter Pack enabled farmers to have access to various agricultural service institutions, sometimes for the first time, and that is why institutional contact was said to have been affected positively by the Scheme.

The focus groups also gave various reasons for Starter Pack having a negative or zero impact. For example, for indicators such as tools and implements and chemical application, while not directly being negatively affected by the Scheme, respondents said they were not provided therefore the Scheme did not assist them. The other indicators were mentioned because the packs were distributed late, or the seed was rotten, or the seed was broken. In such cases, the farmers never used the pack and therefore never benefited through mixed cropping,

Table 5 Trends in sustainabilityindicators in study villages, 1970–2000

Northern Region	FPG1			FPG2 (Percent)			FPG3		
	Constant	Increase	Decrease	Constant	Increase	Decrease	Constant	Increase	Decrease
Farmland size	75%	0%	0%	25%	0%	25%	25%	0%	50%
Access to seed	0%	25%	0%	50%	0%	0%	0%	25%	50%
Mixed cropping	25%	25%	0%	0%	25%	0%	25%	50%	0%
Crop rotation	0%	50%	0%	0%	75%	0%	0%	50%	0%
Crop diversity	0%	75%	0%	0%	25%	0%	0%	50%	0%

Central Region	FPG1			FPG2 (Percent)			FPG3		
	Constant	Increase	Decrease	Constant	Increase	Decrease	Constant	Increase	Decrease
Farmland size	0%	7%	57%	0%	79%	0%	0%	0%	100%
Access to seed	7%	14%	36%	0%	14%	50%	14%	7%	50%
Mixed cropping	7%	29%	21%	0%	21%	7%	14%	36%	7%
Crop rotation	0%	7%	0%	0%	29%	0%	7%	7%	0%
Crop diversity	7%	64%	36%	14%	43%	14%	14%	57%	21%

Southern Region	FPG1			FPG2 (Percent)			FPG3		
	Constant	Increase	Decrease	Constant	Increase	Decrease	Constant	Increase	Decrease
Farmland size	17%	67%	0%	0%	0%	67%	0%	92%	8%
Access to seed	0%	17%	33%	0%	17%	67%	8%	8%	50%
Mixed cropping	17%	75%	0%	0%	58%	8%	8%	83%	0%
Crop rotation	8%	25%	0%	0%	0%	0%	0%	8%	0%
Crop diversity	0%	17%	8%	8%	17%	8%	8%	25%	0%

crop rotation, or crop diversification.

Box 3 summarises farmers' descriptions of their 'Dream Packs' (Figure 1). Responses were similar across regions.

Overall, alternative seed types came out clearly as the top-most priority for farmers, with improved logistics in second place. Changes to extension were much less important but focused on the desire for 'hands-on' demonstrations rather than written leaflets. (The main extension tool in the Starter Pack Scheme was leaflets detailing plant spacing, fertiliser application, etc. included in the Starter Packs. The many illiterate farmers could not read them and those who could said they found them confusing. Few farmers wanted any changes to fertiliser. The desired changes all indicate a desire to see the *quality* of the packs improved, both in terms of content and delivery systems.

Box 3 Dream Pack contents, ranked in order of importance to farmers in study villages

Maize: seed of flinty (hard) varieties (e.g. the hybrid variety MH18) rather than dent (soft) varieties, the former being more similar to local varieties in taste and poundability.
Legumes: groundnut and bean seed not soyabean seed, which is perceived as unsuitable to local agro-ecological conditions and without a local market.
Logistics: provide the Pack early, i.e. before the first rains.
Extension: introduce demonstration plots, and give face-to-face instructions, not just written leaflets.
Fertiliser: no change to basal fertiliser or top dressing for most FPGs.

5 CONCLUSIONS

Farmers' perceptions of sustainable agriculture

Time and again in the problem-objective tree exercise in the preliminary fieldwork, farmers emphasised that their main concern is immediate family food security, and that they will use whatever farming practices are most likely to achieve this. If monocropping of modern varieties with chemical fertiliser is accessible and is likely to achieve this in the coming season, farmers will use this package, even though they are aware that this may not be sustainable economically or environmentally over the longer term.

From the ranking of sustainability indicators, it is clear that farmers' overriding concern is with cropping practices (diversification, rotation, etc.) and the availability of seed to support these. Frequently during the ranking exercises, farmers explained the low priority given to other farming practices, such as agroforestry or manuring, that are often promoted by extension, in terms of lack of physical resources (e.g. cattle for manure) or knowledge (e.g. advice about the planting and care of agroforestry species).

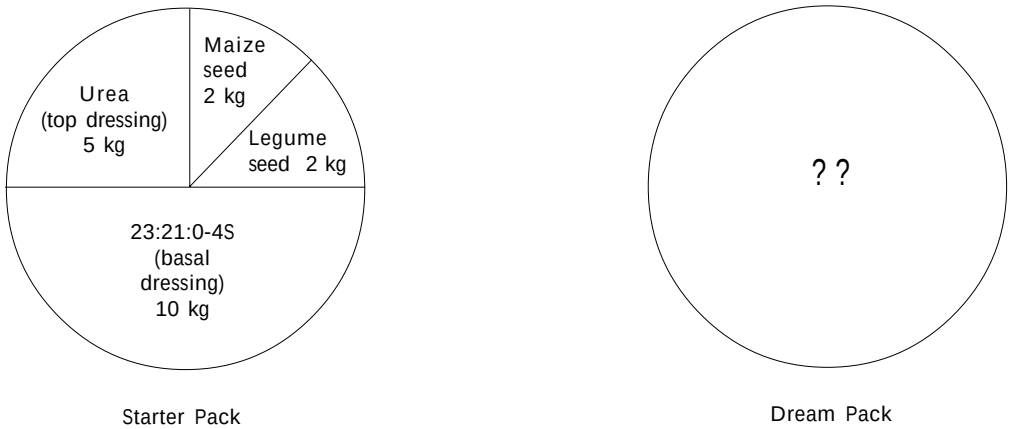
In farmer-led discussions, the longer-term economic and environmental impact of current farming practices – for example, the impact of land clearance on local ecosystem functioning – never arose. The participating farmers may well understand many of the relationships involved, but it is interesting to note that they did not include them in their framework of sustainable agriculture.

Many farmers were aware of the influence of institutions on their own farming practices, and expressed the desire for more and more relevant institutional contact (extension advice, credit institutions, etc.) but, not unexpectedly, they did not have a detailed understanding of the institutional structures and processes that influence agricultural sustainability. To fully understand the reasons for the current institutional situation and the options for change would require the participation of other stakeholders. This is necessary given that the Starter Pack Scheme was originally conceived as a means of helping to transform Malawi's agricultural research and extension institutions into real participatory mode – an essential component of longer-term sustainability. These other stakeholders include the donor agencies involved in the design and implementation of schemes such as Starter Pack.

Impact assessment using participatory approaches

The seven months of time available and the resource limitations (12 field facilitators, four part-time study team members, plus financial constraints) limited the extent that the study could embrace all the features of participatory approaches in a number of ways. This seems

Figure 1 Pie charts of Starter Pack contents



to be a common problem in implementing participatory approaches.

Referring back to Box 2, for reasons of time and resources the study managers had to decide on one group of stakeholders to involve, and identified smallholder farmers. Therefore the study does not include the equally relevant and possibly different views of other stakeholders, such as development agencies, national agricultural research scientists, and academics. Nonetheless, the focus on smallholder farmers was felt to be justified as the views of this group on sustainable agriculture had not been sought systematically before and many new insights were obtained.

Farmers' expectations of the study were sought at the micro-level, after the various fieldwork exercises had been explained in the introductory meeting. However, their overall views on what should be included in a study of sustainable agriculture were not sought. Indeed, it was felt that a certain degree of subterfuge had to be used in introducing the study. For example, the study team deliberately did not introduce the study as an impact assessment of the Starter Pack Scheme, as it was felt this would have biased farmers' responses (although questions about Starter Pack were included in later parts of the study). Neither was the study team's interest in the *sustainability* of agriculture emphasised at first, as it was felt it would have been divisive in key informant and focus group discussions to have highlighted which farmers practised 'more sustainable' and 'less sustainable' farming. It is for this reason that farmers were instead placed into the numbered Farming Practice Groups. The study was simply introduced as a study of farming practices to avoid these potential biases and divisiveness.

The institutions commissioning the impact assessment had specific questions they wished to see answered, so the criteria for the Module 4 study were pre-set: farmers had no input into deciding these.

However, it was farmers who identified appropriate indicators for assessing the pre-set evaluation criteria (the 15 sustainability indicators listed in Table 1). This was felt to be an extremely important aspect of the study, as many of the indicators selected – and the parameters dividing the three Farming Practice Groups – were not obvious to the study team and so, as we have seen earlier in this paper, they gave the team, and ultimately the commissioners of the study, several new insights into farmers' perceptions of sustainable agriculture.

Farmers were also involved in the selection of fieldwork exercises during the preliminary field study, and in the collecting of information. In fact, most exercises were organised so that key informants or focus group members led the discussions and study team staff acted only as facilitators and note-takers – for this reason, the study team field staff were called field facilitators, rather than enumerators. In this way, a number of important issues were raised that may not have arisen if the field facilitators had been more actively involved in directing the discussion, e.g. by using checklist approaches.

As regards the nature of the information obtained by using participatory approaches, a number of points emerged from the study.

First, there were the usual problems inherent in participatory work of needing a long time to explore issues adequately (and therefore some issues had to be missed out, for example differences *within* families). Also, of community leaders and dominant men leading discussions, although this could be dealt with to some extent by organising discussions in groups that were objectively selected (e.g. the focus groups were made up of members of each Farming Practice Group).

Second, as mentioned earlier in this paper, the sustainability indicators chosen by farmers relate closely to farmers' goals of meeting immediate livelihood needs, with no reference being made to longer-term horizons nor to wider ecosystem functions. A number (not all) are also closely related to prevailing notions of best farming practices. By definition, none relate to the overall institutional sustainability of the Starter Pack programme, an unavoidable but important omission.

Related to this, farmers had very little (remarkably little) knowledge or understanding of *upstream* linkages and causal factors relating to the organisation of research and extension and other institutions, so analysis of these was based instead on extrapolation by the study team.

In conclusion, by using participatory approaches to assess the impact of Starter Pack on sustainable agriculture in Malawi, the Module 4 study reported here was able to collect detailed information at both national and more local levels: by working in a relatively large number of sites, the study team could be confident of capturing the main trends and variations across the country; and by using participatory approaches, we obtained a much clearer understanding of the underlying relationships involved in sustainable agriculture in the smallholder sector in Malawi than if we had relied solely on quantitative survey data. In sum, the participatory impact assessment approach used in this study was able to get the best of both worlds.

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ENDNOTES

1 The full results of the 1999–2000 Starter Pack Evaluation Programme are available on CD-ROM from the DFID office in Lilongwe, Malawi or from: Statistical Services Centre, University of Reading, P.O. Box 240, Reading, RG6 6FN, UK. Email: c.e.barahona@reading.ac.uk

2 See, for example, Guijt (1998), Abbot and Guijt (1998), Guijt and Gaventa (1998), Harnmeijer (1999).

3 Though data were collected for all 15 sustainability indicators, only the five most important are listed in Tables 4a and 4b. The complete tables can be found in the full report (Cromwell et al., 2000)

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