Case Study 4

ON-GOING EVALUATION OF FRP PROJECT: "SUSTAINABLE MANAGEMENT OF MIOMBO WOODLAND BY LOCAL COMMUNITIES IN MALAWI" (R6709)

Neil Marsland[1], Simon Henderson[2] and Bob Burn[3]

A Case Study associated with outputs from the DFID-funded Natural Resources Systems Programme (Socio-Economic Methodologies Component) project R7033 titled *Methodological Framework Integrating Qualitative and Quantitative Approaches for Socio-Economic Survey Work*

Collaborative project between the

Social and Economic Development Department, Natural Resources Institute

and the

Statistical Services Centre, The University of Reading

[1] Natural Resource Institute
[2] Natural Resources Institute
[3] Statistical Services Centre, University of Reading

ON-GOING EVALUATION OF FRP PROJECT: "SUSTAINABLE MANAGEMENT OF MIOMBO WOODLAND BY LOCAL COMMUNITIES IN MALAWI" (R6709)

1. Background to study

The FRP project *Sustainable Management of Miombo Woodland by Local Communities in Malawi* (R6709), began in October 1996 and is due to finish in September 1999. It is relatively unusual within the RNRKS in that it is being implemented directly by the Forestry Research Institute of Malawi (FRIM) with no counterpart UK research institution. R6709 is an extension of a previous FRP project (R4599) implemented collaboratively by the University of Aberdeen and FRIM (1992-1995).

In summary, R6709 is applied, action-orientated, NFM research. Its Purpose is to produce "techniques for sustainable management of forest resources by local people". This is to be achieved through the development and promotion of "co-management" by local communities and government of indigenous *miombo* woodlands situated on forest reserves, estate and customary land.

In broad terms, the project's strategy is based on two main lines of investigation. First, research into social/economic aspects of woodland utilisation and management by local people has been undertaken to improve understanding about the range of products demanded by them and the arrangements necessary for successful community management. Second, silvicultural/biophysical research is attempting to determine the potential *sustainable* supply of these products from the woodland resource. The results of this twin track approach will be used to design management prescriptions that focus on the production of woodland products demanded by local people but that adhere to the requirement for sustainability.

The average annual decline in forest biomass in Malawi is currently estimated to be around 3.5% per year as a result of both clearance for agriculture and resource degradation through overexploitation. Official estimates (Forestry Department) indicate that wood consumption is increasing at a rate of 9.25% p.a. The bulk of this demand is for fuelwood. Wood is the main source of fuel for cooking and heating water in 98% of rural households and meets virtually all other energy using activities. Together, charcoal and firewood provide 94% of the total energy consumed in urban households (USAID 1997). The vast majority of rural households are dependent on natural forests for construction materials and for a variety of foodstuffs which supplement household diet. In addition, households with land shortages obtain some 30% of household income from activities based around forest resources on public land (USAID 1997).

Uncontrolled cutting of green wood on publicly-owned, protected areas (including forest reserves) is officially prohibited. Poles can be pre-bought and then cut under the supervision of Forest Guards or alternatively bought directly from the authorities while firewood (dead wood) can be collected on payment of a licence fee. In principle, non-timber forest products (NTFPs) can now be freely collected though some confusion persists, in part because certain products (e.g. grass thatch) attracted fees in the past and also because the status of NTFPs collected for commercial

purposes is somewhat unclear. Notably, the NEP recognises communities' rights to benefit from sustainable utilisation of natural resources on all public and customary land, though the implications for issues of access and charges have not yet been fully resolved.

To date, *Sustainable Management of Miombo Woodland by Local Communities in Malawi* has worked primarily in two forest reserves where co-management operations are being piloted with surrounding communities: Chimaliro forest reserve (Kasungu/Mzimba districts) located on the border between the central and northern regions; and Liwonde forest reserve (Machinga district) in the southern region. In addition, experiences from a community's own efforts to manage an area of woodland (38ha) on customary land (Mangwere Hill) are also being studied. Areas within both Chimaliro and Liwonde forest reserves have been selected on the basis of site conditions and taking into account the wider environmental functions of the woodlands. These have been demarcated into blocks for management purposes and assigned to groups of villages (see below).

	Block size (ha)	Villages per block (No.)	PSPs per block (No.)
Chimaliro (152 km^2)			
Block I	18	3	14
Block II	118	3	13
Block III	74	3	12
Liwonde (274 km^2)			
Block I	416	3	10
Block II	288	4	10
Block III	468	2	10

These blocks represent the focus of co-management activities, where silvicultural interventions will take place (according to agreed management plans) in order to generate poles, firewood and other wood products for use by the participating communities. In return, the communities must provide labour for forest management (e.g. boundary marking, firebreak maintenance, controlled early burning, supervised harvesting and patrolling). Co-management is also expected to legitimise communities' rights of access to the reserves more generally, for the collection of non-timber forest products (NTFPs) and dead wood products. The regulatory framework is provided by the co-management constitutions, drawn up with each community involved, while detailed operations will be guided by block management plans.

2. The evaluation challenge

A number of considerations guided the development of the evaluation approach. The first and most important point to make is that there were two objectives behind the evaluation. The main objective was to field test an on-going evaluation methodology *which could be used in whole or in part across all FRP projects*. The second - *and very much secondary* - objective was to provide an acceptable on-going evaluation of R6709 itself. All of the remaining points in this section reflect the need to devise an approach that fulfilled these two objectives.

First, to be of maximum value, the approach needed to provide information that was both useful for internal research management purposes and meaningful to external audiences. In order to meet these twin objectives, the approach needed to report on *actual* events, situating these within an impact-orientated framework rather than the activity-focused framework conventionally addressed by monitoring. Given that R6709 is long-term in nature yet both internal and external audiences require timely results, *on-going evaluation* (i.e. monitoring progress towards impact) offered the most feasible solution.

Second, for the approach to form the basis of an evaluation *strategy*, it needed to be applicable across different projects and facilitate at least qualitative comparison of performance. However, different projects, undertaking different types of research under different conditions will inevitably require different assessment methods. The approach, therefore, must select evaluation criteria that are widely applicable and can be applied consistently but also permit methodological flexibility within the overall framework provided by the criteria.

Third, given the long-term nature of much NFM research, the approach to on-going evaluation necessarily relies on leading, intermediate indicators of progress towards impact. These indicators, however, do not measure "impact" in an absolute sense but rather are relative measures that identify change over time. On-going evaluation, therefore, must be undertaken periodically. This need for repeat assessment implies that the approach needed to be relatively inexpensive, but also that the depth of analysis possible might be constrained by available resources.

Finally, the usual uncertainty surrounding the outcome of RNR research in general is compounded for natural forest management research by data shortages, social and institutional issues and long research lags. For the results of an on-going evaluation exercise to be credible, therefore, the key factors that affect the likelihood of achieving impact must be identified and their "riskiness" explicitly incorporated into the assessment process.

3. The evaluation approach

In the light of these considerations, the study attempted to develop an alternative approach to evaluation, based loosely on the principles of the "Balanced Scorecard", an approach used widely in industry in developed countries. Similar to the Balanced Scorecard, the proposed approach comprised four components:

(1) *Internal perspective*
(2) *Client perspective*[4]
(3) *Test of research effects*
(4) *Uptake network*

The inclusion of components (1), (2) and (4) explicitly recognises that all FRP projects share three key characteristics: they have internally established targets (i.e. Outputs), they have clients who are expected to make use of results, and they rely on the actions of external actors for the results of research to be applied more widely. Furthermore, adequate performance against Outputs, satisfaction on the part of the clients and wider application of research recommendations, (whether directly in a productive process or indirectly by informing decisions that influence subsequent actions) are considered to represent the "lowest common denominator" of successful research[5]. While they are necessary rather than sufficient conditions for impact to be realised, the advantage of these criteria is that they are shared by all projects, even the most problematic for evaluation.

Component (1): Internal Perspective

The objective of the internal perspective is to assess current and likely future performance of research against stated Outputs, based on the OVIs identified the log-frame.

Component (2): Client Perspective

The objectives of this component are to (a) assess whether significant levels of dissatisfaction exist with the research process to date; and (b) assess the degree of commitment to the future implementation of research.

Component (3): Test of research effects

This component of the evaluation seeks to:

(a) determine whether there is evidence of positive change among beneficiaries resulting from research;
(b) qualitatively assess the significance of any changes;
(c) assess local perspectives regarding the costs and benefits of participation in the research;
(d) determine whether there is evidence to suggest that particular groups are performing significantly better than others (according to gender, wealth and education).

[4] The term "clients" is used to describe the target audience for the results of research, in the context of its developmental objectives, and does not refer to the Programme or donor. In the case of applied, participatory research (such as R6709), the primary clients are considered also to be the intended beneficiaries.
[5] Research "success" unless otherwise specified refers to achievement of the developmental aims of the project/Programme and not to narrower "scientific" definitions that, for example, may be limited to the testing of hypotheses.

Component (4): Uptake network

FRP's interest in wider impact, coupled with the growing awareness that such impact is dependent on factors *external* and *subsequent* to research, suggests the need for more systematic assessment of future prospects. This need is considered all the greater for NFM research. In the majority of cases, predicted efficiency gains indicate *a priori* the need for *widespread* adoption in order for research to "pay-off". In addition, the long-term nature of NFM research means that FRP must consider prospects beyond the typical project funding window (three years) in order to allocate research funds effectively.

The evaluation sought to predict up-take by making use of a Bayesian belief network approach using the Netica™ software developed by Norsys Software Corporation. Bayesian techniques are more normally associated with decision-making problems under uncertainty or identification of causes of an event that has already occurred (e.g. in medical diagnosis). Use of belief networks for the purposes of on-going evaluation is believed to be relatively novel. However, in the time available, the study could not fully assess current applications of these techniques, most noticeably at ICRAF[6]. Readers interested in finding out more about Bayesian belief networks are referred to the theme paper entitled "Quantifying and Combining Causal Diagrams".

3. Data collection and analysis

A formal household questionnaire survey was conducted within project villages at both Chimaliro and Liwonde sites (150 households included in each site). In addition, four control villages (i.e. not participating in the project) were selected at both Chimaliro and Liwonde from areas *adjacent* to the project areas. 25 households were interviewed in each of the control villages (i.e. total of 100 households at both sites). The major difference between project and control questionnaires was that the latter omitted questions that referred directly to "co-management" or the research.

[6] ICRAF is using belief networks in a range of land use assessments. Examples include estimating deforestation risk, adoption potential of agroforestry technologies, desegregating population and other census data to match with remote sensing data and (work in progress) using hyperspectral data for soil analysis.

Table 1: Overview of data sources by component

Evaluation component	Indicators	Formal Q'nnaire Survey	Informal RRA Exercises	Key Informant Interviews	Baseline/ 2ndary Data
I. Internal perspective	Progress to date against Outputs			✓✓	✓✓
	Prospect for achievement of Outputs			✓✓✓✓	
II. Client perspective	Awareness/participation among communities	✓✓✓✓			
	Information/explanation	✓✓✓✓			
	Implementation arrangements	✓✓✓✓			
	Advantages/ disadvantages	✓✓✓✓			
	Willingness to continue	✓✓✓✓			
III. Test of research effects	Change in availability of forest products	✓✓	✓✓		✓
	Influence of research	✓✓	✓✓		✓
	Perception of Cs & Bs of participation in research	✓✓✓✓			
	Distribution of benefits	✓✓✓✓			
	Indirect & non use goods and services		✓✓✓✓		
	Acceptability of restrictions on use		✓✓✓✓		
	Expectation of future benefits	✓✓	✓✓		
	Opportunity cost of forest land	✓✓✓✓			
	Financial capital		✓✓✓✓		
	Social/human capital		✓✓✓✓		
	Transforming processes		✓✓✓✓		
IV. Uptake network	Research timeframe			✓✓✓✓	
	Technical success			✓✓✓✓	
	Meet client expectations			✓✓✓✓	
	Wider applicability			✓✓	✓✓

4. Relationships between qualitative and quantitative components of the evaluation

Combining ideas and methods based on probability theory and statistical inference with those rooted in informal, participatory enquiry can give benefits in terms of trustworthiness of data. Table 2 illustrates this.

Table 2: Relationship between: stages in research exercise, type of formal-informal combination, and improvements in trustworthiness.

(i) Design of study

Type	Explanation/Example	Function
Swapping	• Formal sampling procedures for informal work	• Reduced sampling error: better external validity for informal work
	• Use of social mapping for formal work	• Reduced time and cost for household listing and sampling.
Concurrent	• Correct use of different instruments for different variables within the same survey/ experiment	• Better internal validity for "qualitative" variables - belief, motivations etc. alongside better external validity for quantitative variables - rates, proportions etc. • "Enriching": Using informal work to identify issues or obtain information on variables not obtained by quantitative surveys.

(ii) Analysis

Type	Explanation/Example	Function
Sequential	• Analysis of formal outputs with informal approaches. e.g. testing null hypotheses; investigating unexpected outcomes.	"Refuting" or "Confirming": Verification of formal results through informal methods. • "Explaining": Using informal work to explain unanticipated results from formal survey work
Swapping	• Applying statistics to categorical and unbalanced data sets.	• Improved credibility of analytical conclusions from informal work.
	• Coding responses from informal work	• Enhances possibilities for aggregation, thus facilitating generalisation. • Enhances possibilities for stratification of sample for subsequent sample survey
Merging	• Blending the analytical outputs from informal and formal work into one set of policy recommendations. The outputs may be from Type A, B or C combinations.	• Higher quality policy recommendations

4.1 Design of study

(i) Informal to formal: Use of village mapping to generate sample frame

The sample design for project households was based on a single-stage cluster sample within each of the stratified substrata, with villages as clusters. Project villages were stratified first by association with particular the co-management blocks in each reserve and then by proximity to the reserve (i.e. near and far). Because of time and resource constraints, a systematic sampling method was used to select households within the selected villages. The sample frame was generated through a process of village mapping, with villagers marking out the number and location of each dwelling unit in the village, together with the name and sex of the household head. All the names and numbers were recorded by the RRA field teams and a systematic sample was taken. This process was found to be useful for three main reasons. First, it served as an initial ice- breaker, allowing the RRA team to interact with members of the village. Second, and more importantly perhaps, it provided a very rapid and accurate way of generating a comprehensive sampling frame for selected villages. Characteristically, the whole process would take between 1 and 2 hours for Chimaliro and 1 to 3 hours for Liwonde. The process was lightly longer in Liwonde than in Chimaliro owing to the larger village sizes in Liwonde. Finally, the existence of an accurate village map helped greatly in planning the actual enumeration and dividing tasks up between enumerators.

(ii) Formal to informal: "Tagging" RRA respondents to random sample

In the case of the RRA exercise, three groups were selected in each of the six villages. Originally, intention had been to directly link the RRA results with the questionnaire results by ensuring that the RRA respondents were a sub group of the questionnaire respondents. This was to be achieved through rapid socio-economic analysis of questionnaire responses by field teams immediately after coming back from the questionnaire interviewing. Field teams had been trained to analyse responses and group respondents into three wealth groups on the basis of predetermined criteria. Through being able to identify members of wealth groups and cross-referencing to questionnaire data, it was hoped that the strength of triangulation between the RRA and the questionnaire responses could be strengthened. In addition it was hoped that the "tagging" of RRA to questionnaire data would generate interesting and potentially important combinations of depth and generalisability. However, due to non-availability of large number of questionnaire respondents during the RRA exercise, FRIM field staff effectively abandoned this approach and just relied on a combination of opportunity sampling (simply asking villagers at random whether they would be prepared to be involved in the exercise, and then classifying according to the predetermined criteria) and by selection through the chief - i.e. asking the chief to select groups of poor, medium and wealthy on the basis of the predetermined criteria. While this is viewed as a major disappointment from the point of view of the evaluation methodology, it is not felt to negate the results, just temper the strength of conclusions that may be drawn.

(iii) Informal to formal: Use of key informants to generate initial values in Uptake Pathway Network (Beyesian network)

The views of key informants were used directly in the assessments made under components (1) (internal perspective) and (4) (uptake network). In the case of the former, the lead researcher on R6709 provided the necessary information while in the latter, informants comprised FD HQ staff members familiar with the research and who have detailed knowledge of the forest reserves in Malawi, the lead researcher on R6709 and R6709's UK liaison consultant who has wide experience of forestry in Malawi. In component (1), secondary data (essentially project reports) were used to inform the discussions and subsequent assessment. In component (4), secondary data were combined more explicitly with the subjective assessments of key informants to project potential adoption of research.

Key informant interviews were used to inform assessment of the potential adoption ceiling. Opinions were obtained from two FD HQ staff members familiar with the research and who have detailed knowledge of the reserves, the lead researcher on R6709 and R6709's UK liaison consultant who has wide experience of forestry in Malawi. Each informant was (separately) asked to assign a score to each reserve as follows:

1 = "high chance that co-management can be successfully implemented";
2 = "good chance that co-management can be successfully implemented";
3 = "less confident that co-management can work";
4 = "little chance of co-management working".

Informants' scores were then averaged and the results regrouped as follows:
"High" = average score 1 - 1.75
"High-Medium" = average score 1.76 - 2.5
"Medium-Low" = average score 2.6 - 3.25
"Low" = average score 3.26 – 4.0

4.2 Analysis

(i) Sequential: "confirming"

In order facilitate understanding of potential impact on "natural capital", it is necessary to compare the most important forest products identified by respondents with those most likely to be influenced by research. The questionnaire survey asked respondents to identify the most important forest products (unprompted) and frequencies of response were used to rank the products. In the RRA exercise with project villages in Chimaliro, participants were again asked to identify the most important products and assign a score to each (with 10 being the most important). Table 4 shows that the results of the RRA confirmed those of the questionnaire.

Table 4: Comparison of responses from questionnaire with RRA exercise: Importance of different forest products

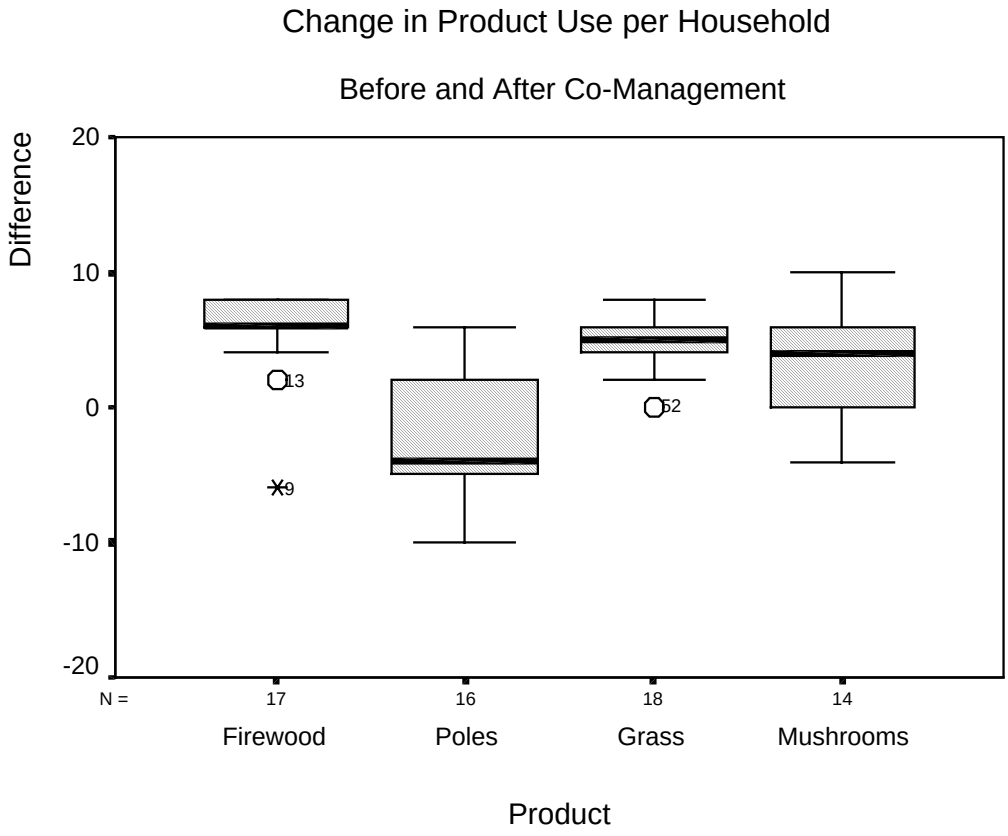
Product	Questionnaire survey		RRA exercise
	%	Rank	Rank
Firewood	94	1	1
Grass/thatch	84	2	2
Mushroom	70	3	3
Poles/timber	58	4	4
Rope fibres	28	5	5
Medicine/herbals	24	6	6
Fruits	22	7	7

(ii) Swapping: Use of statistical packages and statistics to analyse RRA data

RRA data was entered into excel spreadsheets and analysed using SPSS and simple excel tools. Box and whisker plots were used to identify more clearly a number of relationships including: changes in product use; changes in sources of forest products; changes in importance of products gathered from reserve as perceived by respondents; balance between domestic consumption and cash uses of woodland products, and; differences in consumption of products across wealth groups. Some simple statistical testing was done (f-test; Duncan's multiple range test) to explore differences in scores. An example of the type of analysis done is given in the text Box (next page)

Change in consumption of forest products

Taking all villages together, it appears that very large majorities in the sample survey felt that access to all products apart from poles had improved under co-management. This pattern is repeated in findings from the RRA. Here, groups were asked to estimate the magnitude of the change in forest product use before and after co-management.



ANOVA
Difference

	Sum of Squares	df	Mean Square	F	Sig.
Between products	606.538	3	202.179	16.350	.000
Within products	754.324	61	12.366		
Total	1360.862	64			

Difference
Duncan's multiple range test

	N	Subset for alpha = .05	
Product		1	2
Poles	16	-2.25	
Mushrooms	14		3.43
Grass	18		4.89
Firewood	17		5.41
Sig.		1.000	.136

F test results confirm that there are significant differences between the means of the products, and a Duncan's multiple range test confirms that the F test result is accounted for by the difference between the mean of the response for poles and all the other means.

5. Design Objectives and Operational Parameters / Constraints

5.1 Introduction

At each site, the study was designed to evaluate with-project effects vs. without project effects as well as before vs. after project comparisons. The key instruments were the RRA (Chimaliro only) and the sample survey (both sites). On one level, the design of the study was shaped by a 2 x 2 matrix:

	With (project villages)	Without (non-project villages)
Before	Baseline data	Baseline data
After	Sample survey (plus RRA in Chimaliro only)	Sample survey

The "before" information came from baseline studies done in Chimaliro. The study sought to cover the with - without comparison by surveying both project and non-project villages at both sites. The decision not to include a RRA component for the Liwonde site was made on the assumption that the additional information gained through an RRA would not justify the extra cost involved owing to the fact that co-management was much more recently established in Liwonde than in Chimaliro.

5.2 Time

Both the sample survey and the RRA had relatively tight windows in terms of fieldwork. This limited the number of villages that could be sampled. Out of a total of 18 project villages, 12 were sampled. Time taken from design of survey and RRA tools to analysis of results was approximately 4 months (beginning of November 1998 to end of February 1999). Details are in Table 5 below

Table 5: Stages in the evaluation

Component	Responsibility	Timing
Initial visit by project leader to identify collaborators	Team leader	September 1998 (2 days)
Visit by UK team to design and pre-test evaluation components and train counterparts	Statistician, Team leader (Economist), Socio-economist	November – December 1998 (3 weeks)
Fieldwork for RRA	Chimaliro team	December 1998 2 weeks
Fieldwork for sample survey	Chimaliro and Liwonde tams	December 1998 – February 1999 4 weeks
Coding and entering data from sample survey and RRA	Reading university data entry staff	January – February 1999 3 weeks[7]
Analysis of results	UK team	February 1999 2 weeks
Report writing	UK team	March – April 1999 3 weeks

[7] Most of this work was not costed

5.3 Money

The total cost of the evaluation was just under £ 50,000. It should be noted that if this exercise were to be repeated, the actual costs would be considerably less, as large amounts of time were spent developing the methods. In crude terms, one could probably expect a reduction of the order of £15,000 to £25,000 if the evaluation was to be repeated on the Liwonde and Chimaliro sites in subsequent years.

6. Lessons Learned

The evaluation was successful in some ways and not – so – successful in others. A number of useful lessons were learned from both the successes and the failures.

6.1 Household mapping to create sample frame

The success of this exercise confirms that it is a simple and cost effective way of generating a sample frame whilst at the same time making actual planning of the enumeration process at the village level very easy. Details of how to go about doing village mapping to obtain a sampling frame will be included in the best-practice guidelines to accompany these case studies.

6.2 Supervision

The exercise highlighted the problems that can occur with inadequate supervision of rapidly trained field staff. The "tagging" problem noted under 4.1 (ii) above, probably would have been avoided if a member of the NRI / Reading team had been available to supervise the RRA. Due to time and money constraints, however, this was not possible. This highlights a thorny issue: how to achieve the optimal balance between supervised and non-supervised fieldwork given tight budgetary and time constraints. There is no easy answer to this. In retrospect, the tasks demanded of the RRA team was at the limit of their capabilities, given the amount of training that they had. The team did very well, but was unable to cope with some of the unforeseen circumstances. Given that constant supervision by a member of the NRI / Reading team was out of the question, problems could have been reduced if either the training period was longer; and / or field supervisors were more experienced and / or the tasks were simplified.

6.3 The elicitation process for Bayesian networks

It would appear that the development of a systematic approach to eliciting the views of institutions and those in them is much less well developed, or at least practised than the battery of techniques that exist for deriving the opinions of farmers. Having said this, there are some straightforward techniques of semi-structured interviewing, ranking and scoring that can be applied very easily. In retrospect, the elicitation of the opinions of key informants would have been improved if these tools had been applied more systematically. The elicitation process can be improved also by deriving some

more tailor-made techniques, perhaps borrowing from the well-established body of market research. In all of this it is important to bear in mind that the process of elicitation will obviously depend on the degree of participation by primary and secondary stakeholders. This in turn will be shaped by the objectives of the exercise and by time, money and expertise constraints.

6.4 Application of statistics to ranking data

Through entering the ranked data into SPSS, it was possible to strengthen the conclusions of the exercise by representing relationships in a clear and consistent descriptive form e.g. box and whisker plots, and by undertaking further analysis using statistical tests.