Poverty Mapping and Analysis:
An RNRRS Synthesis

This synthesis paper is one of a series that has been developed to assist research managers use the key lessons learnt between 1995 and 2005 from natural resource research and implementation under the Renewable Natural Resource Research Strategy (RNRRS), funded by the UK Department for International Development (DFID). The aim of these papers is to provide practical guidance to enable institutions and research projects incorporate these lessons into their current and future programmes.

In the absence of other indications, the main audience for these RNRRS syntheses are assumed to be:

- *Donor organisations;*
- *ASARECA, CORAF/WECARD and SADC/FANR under the umbrella of the Forum for Agricultural Research in Africa (FARA) and allied to the Comprehensive Programme for African Agricultural Development (CPAAD) of the AU/NEPAD;*
- *Asia-Pacific Association of Agricultural Research Institutions (APAARI);*
- *The equivalent regional networks for forestry/agroforestry research – AFORNET and FORNESSA in Africa, APAAFRI in Asia and RIFALC in Latin America;*
- *The equivalent regional networks for fisheries and wildlife and other forms of research for the improved management of renewable natural resources.*

SECTION I: OVERVIEW

Major Lessons Learnt

- In order to be effective, poverty measurement, analysis and mapping must be conducted using a coordinated approach by governments, civil societies, the R&D community and investors.
- Due to the amorphous and diverse nature of poverty alleviation, and the scarcity of resources, priorities are needed to ensure that research interventions are appropriate and focused.
- It is essential that a multidisciplinary approach be used as well as adopting an integrated methodology (such as the consideration of watersheds as an overall spatial framework).
- Causal Diagrams are a useful and reasonably rapid tool to display connections between the problems which collectively cause poverty, and to focus attention on root causes.
- Poverty Mapping can be used as a valuable decision support tool to help identify and evaluate investment choices, as well as for policy and project design.
- Scenario Building and the generation of likely progressions enable researchers to evaluate long-term developments.

This paper does not attempt to describe or analyse the many different ways in which the IARCs of the CGIAR conduct poverty mapping and analysis. However, RNRRS programmes and IARCs often have worked together and some procedures are the same or similar. Where RNRRS programmes have explicitly derived techniques from IARCs, this is acknowledged.

The aim of this synthesis is to show how poverty analysis and mapping has been dealt with in the RNRRS programmes and how this experience can be applied to develop poverty analyses for the rural economy and beyond. Three case study clusters have been selected to highlight the poverty issues discussed throughout the paper. Experience of research projects from DFID's Aquaculture and Fish Genetics Research Programme (AFGRP), the Forestry Research Programme (FRP), the Animal Health Programme (AHP), and the Livestock Production Programme (LPP) are drawn upon. The International Livestock Research Institute (ILRI) worked on a series of projects with AHP and LPP, which forms the AHP/LPP cluster case study. These research clusters were selected as examples of successful or significant utilisation of poverty analysis. Reasons for success are analysed and areas for improvement highlighted. (Further information on all projects can be found on the programme websites listed in the case studies and the DFID research portal www.research4development.org).

What is poverty? There is no agreed international definition of poverty. The World Bank states that poverty is hunger. Poverty is also lack of shelter. Poverty is being sick and not being able to see a doctor. Poverty is not having access to school and not knowing how to read. Poverty is not having a job, is fear for the future, living one day at a time. Poverty is losing a child to illness brought about by unclean water. Poverty is powerlessness, lack of representation and freedom.

The RNRRS research programmes were not originally designed in 1994 to carry out their own poverty analysis. The expectation was that other institutions and organisations had a more direct mandate to carry out this type of work and had a comparative advantage in doing so. Generally the RNRRS programmes were expected to utilise the tools and results generated by others. This is particularly the case with regard to poverty measurement.

One major information source on the measurement of poverty is the World Banks 'Data and Tools' section of PovertyNet.[1] A substantial amount of information is available on recent trends in poverty indicators and links to sources of data on poverty.

The structure of this synthesis follows the World Bank's approach to poverty analysis[2], which has been used to help users formulate poverty reduction strategies:

- Measuring Poverty (section II)
- Analysing Poverty (section III)
- Mapping Poverty (section IV)

An additional section (section V) has been added to encompass overarching issues.

Research outcomes identified by any RNRRS project or programme need to be considered within a broader financial and socio-political context. The ultimate impact of such outcomes will depend on developing enabling circumstances in which they can succeed; in other words, policy change and its implementation. That may involve *inter alia* new or revised laws or regulations, change in tax

[1] World Bank Data and Tools information can be found using this link: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20205985~menuPK:435761~pagePK:148956~piPK:216618~theSitePK:430367,00.html

[2] The World Bank Poverty Analysis website can be found using this link: HTTP://WEB.WORLDBANK.ORG/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,MENUPK:430373~PAGEPK:149018~PIPK:149093~THESITEPK:430367,00.HTML

or subsidy regimes, a balancing of developmental effort between rural and urban demands, removal of market barriers, freer flow of market information, or the removal of social inequities. This reality demands a coordinated approach by governments, civil societies, the R&D community and investors. The eventual benefits for the poor rely on the coordinated and focused action by many.

All of the methodologies discussed in this paper could be used in any area of research on renewable natural resources and development.

SECTION II: MEASURING POVERTY

1. Prioritisation

The first Millennium Development Goal calls for halving the proportion of people living in extreme poverty – and those suffering from hunger – between 1990 and 2015.

"A common method used to measure poverty is based on incomes or consumption levels. A person is considered poor if his or her consumption or income level falls below some minimum level necessary to meet basic needs. This minimum level is usually called the "poverty line". What is necessary to satisfy basic needs varies across time and societies. Therefore, poverty lines vary in time and place, and each country uses lines, which are appropriate to its level of development, societal norms and values."

World Bank
(http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20153855~menuPK:435040~pagePK:148956~piPK:216618~theSitePK:430367,00.html)

It is primarily the scarcity of resources for poverty eradication that necessitates some form of prioritisation of research effort. This prioritisation has been undertaken throughout the RNRRS programmes and can occur at five different levels:

1) Regions – which countries, regions or group should receive investment?
2) Sectors – which sectors within a region should receive investment e.g. credit systems, infrastructure, education, institutional capacity building, or natural resources?
3) Programmes – which programmes within a sector should receive investment e.g. baseline-surveys, administration, development, research, or dissemination?
4) Clusters – which clusters within a programme should receive investment e.g. generic issues/tools, decision making support, institutional change/reform, livelihood/income, comparative advantage, or generating technologies?
5) Projects – which projects within a cluster should receive investment?

FRP management (ZF0100) developed a matrix that summarises existing prioritisation tools for research investment (see Annex A, pages 36-38). This matrix analyses nine different prioritisation tools in terms of the advantages and disadvantages of using each tool. This analysis enables the researcher to review the best prioritisation tool(s) to use depending on the individual situation or context to be analysed.

2. Stakeholder Analysis

Stakeholder analysis is a multi-perspective participatory approach, which can be used to investigate the potential interactions, conflicts and trade-offs associated with a particular course of action. AFGRP found that stakeholder analysis is also an important step in developing a shared idea of the work to be done and how to go about it, so as to improve the way research is designed and carried out.

The AHP projects show one approach to describe and quantify the distribution and extent of poverty in target regions. In order to develop an accurate computerised model it proved essential that poverty criteria and indicators be well measured. Since, if the baseline data is incorrect, then it follows that any analysis and predictors will consequently be too inaccurate to prove useful.

ILRI put together disease impacts with research opportunities. When poverty alleviation outcomes were combined with the R&D opportunity categories in a matrix, it became evident that differing priority investment opportunities suit different approaches to poverty alleviation that depend on the donors goals and vision.

Stakeholder workshops have been used throughout the RNRRS to gather and assess, using such criteria and indicators. ILRI also used stakeholder workshops to identify and quantify disease impacts on livestock. The more quantitative elements of the ILRI study were used to identify research opportunities and in the development of 'best bet' options for poverty alleviation.

3. Classification

Several RNRRS programmes have used some form of classification or dis-aggregation to help assess poverty and to quantify the recommendations domains. These domains are the spatial areas or target groups affected by the researchable constraint, and to which logically the positive research results should be applicable. Also logically, domains will be problem-specific. For problems in commercial agriculture, the location and size of the membership of the relevant crop / livestock producer association are key aspects of recommendation domains.

For the very poor, outside the scope of commercial agriculture and having composite livelihoods from involvement in a variety of subsistence and borderline commercial activities, membership of crop producer associations is unlikely and domains may be difficult to define.

AFGRP found that in Sri Lanka the integration of fish production into agricultural systems addressed the following needs of resource poor farmers in marginal areas:

- *Food security*: production of a cheap high quality source of protein.
- *Livelihood diversification:* through aquatic production as an income generating activity.
- *Infrastructure maintenance*: use of fish production derived revenue for improved maintenance of communally managed irrigation structures, providing indirect benefits to agricultural production.
- *Improved efficiency of water use*: Aquaculture may consume only low levels of water. Integration within irrigation systems provides a means of increasing the productivity of scarce water resources in a sustainable manner.
- *Social cohesion:* enhancement through community participation in aquaculture activities. Equally, potential for conflict exists where the diverse requirements of

different water users and uses are not recognised or where existing social and economic hierarchies are threatened.

The AFGRP example here is just one illustration of how classification can work

ILRI used definitions based on agroclimatology and human population density for classifying the global livestock production system, following the CGIAR/TAC approach used more or less by all IARCs during the 1980s/1990s.

FRP adopted as focus groups in its revised strategy (2000) some of the CGIAR/CIFOR classes of the forest-dependent poor: resource-poor farmers, artisans, the landless and the peri-urban poor; although two years later FRP abandoned these focus groups because the composite livelihoods of the forest-dependent poor meant that people shifted between the groups according to the nature of the problem.

LPP (in R7823) developed a subjective description of poverty, using up to 4 categories for how poor people move up and out of different poverty sub-classifications.

4. Quantitative Measurement

As mentioned at the start of this synthesis, the overall expectation of RNRRS programmes was that they would be the users of quantitative poverty measurements developed by other organisations and institutions. In practice however, the RNRRS programmes found that these quantitative data were not necessarily appropriate for their needs.

This was borne out by FRP's ZF0132 project, which found there were no reliable regional or global sources of data on forest-dependent poor people, as indeed Byron & Arnold (1997) had pointed out earlier to CIFOR. The study offered ways of obtaining this crucial information, although it acknowledged the inherent vagueness of most easy-to-access sources. Previously published estimates differed by an order of magnitude. Recommendation domains for FRP were assessed by a consortium of the Statistical Services Centre at Reading with Calibre Consulting. The reason for this difference is that national census data does not differentiate the FRP focus groups, so indirect methods were required. Regional quantification came partly through surveys carried out by FRP but local quantification of recommendation domains was expected to remain the responsibility of individual research projects, and this was built into FRP standing instructions to project leaders.

5. Impact

Assessing a poverty or livelihoods impact is complex, time consuming and expensive and is rarely included in research projects. Most UK Government Departments use separate budgets for promotion/dissemination of research outputs and for impact assessment. DFID is unusual in using its research budgets for activities not considered as research elsewhere, thereby distorting central government statistics of the spend on research.

It has often been considered near impossible to produce precise and 'proven' (quantitative) assessments of the impact of research except in very specific situations. This is because there is rarely an attributable direct chain of cause and effect between the research and the developmental benefit of applying the research outputs. Progressive improvement of the management of renewable natural resources for the benefit of the very poor is usually incremental and involves multiple projects and funding agencies and local actors.

If poverty is defined in terms of the SL (Sustainable Livelihoods) approach developed for DFID by the Institute of Development Studies at the University of Sussex, then research will tend to have a 'softer' focus. This requires a more sensitive and interpretative approach (qualitative) where judgement rather than proof, is central. Straightforward 'participatory' impact assessments will be of limited use by themselves, as such methods often fail to address central issues of power, hierarchy and social exclusion. In planning future research projects the argument that any 'technical' research project should be preceded by what amounts to an SL research project was raised by AFGRP. This would identify whether the preconditions for the successful dissemination and uptake of the research outputs exist, and whether the outputs of the research project will address real rather than perceived needs.

In 2004, the CGIAR System Wide Livestock Programme provided funds for the development of a framework to assess the impacts of feed resource interventions on crop–livestock systems. This work was designed to provide answers to three basic questions:

- Which data are required for impact assessments?
- How do we collect the data?
- How can the data be integrated to assess different impacts of feed resources?

An international workshop was organised to discuss and develop a generic framework that could be used to assess the potential impact of all feed resource work. It is, as yet, too early to assess the effectiveness of this approach.

Moreover, the nature of the impact assessment questions depends on where the research activities are positioned along the research-development-application continuum. Until 1992, ODA centrally-funded RNR research was explicitly intended to be multi-country, upstream and strategic in nature. From 1992 a small proportion of funds in each programme were to be used for more downstream applied and adaptive research.

DFID later abandoned the well-known categories of basic / strategic / applied / adaptive research and replaced them by its own “enabling / inclusive / focussed” categories, properly reflecting the understanding that most obstacles to development are of a policy and institutional nature and need a high level and often political response in the enabling environment. Major obstacles to international development are only rarely of a purely technological nature. It seems that this understanding which was common currency in DFID in the late 1990s had been forgotten when the post-RNRRS SRSA component Research-into-Use Programme 2006-2011 was focussed on promotion of about 30 technologies.

SECTION III: ANALYSING POVERTY

One of the difficulties in synthesising RNRRS poverty analysis and lesson learning is that poverty is a not concretely definable concept and crosses many spatial, cultural and disciplinary boundaries. A range of governments, organisations and individuals work on poverty-related issues at the same time. The complexity of this landscape means that it is difficult to attribute overarching achievements or overall improvements in people’s well-being to specific organisations.

1. Applying Poverty Measurement

One application of the conceptual framework matrix resulting from measuring poverty in the AHP/LPP cluster was to allow the selection of different categories of sponsor/donor for each of the different cells of the matrix. Research opportunities were presented according to the type of research and the likely impact that the research product would have on different processes of poverty alleviation. This provided a framework for evaluating any animal health research proposal. It also provided a 'basket' of opportunities for donors to select from. However, what it did not do was to rank the opportunities within any one basket in terms of potential developmental impact.

Priority Country Poverty Mapping (Project ZC0216)
"Opportunities over a 15-year future predictive period were identified for improving the control of high-priority diseases within the overall goal of alleviating poverty through enhancing benefits from livestock. In many cases, little was known about the incidence and impact of livestock diseases on the poor, particularly for non-cattle livestock species, for diseases that are difficult to diagnose and for populations in more remote areas. However, even less was known about the expected benefit to the poor of specific interventions using the products of the proposed research. This study emphasised the impacts that research in animal health can have on poverty alleviation rather than purely on national agricultural development."

2. Participatory Situation Analysis

Participatory situation analysis were successfully used in the AFGRP cluster as the first step to investigating the social, economic and technical feasibility of aquaculture options in small-scale farmer-managed irrigation systems in the lowland dry zone of Sri Lanka. The aim was to determine the most relevant initiatives that would benefit the poor. The process progressed from regional to local level, using secondary information and key informant interviews before undertaking Participatory Rural Appraisals. The framework included the following components:

- Screening process used to select field work areas
- Participatory data gathering methodology used in study villages
- Use of Data Validation Techniques (detailed in the case study)

This participatory situation analysis (under R7064) enabled the AFGRP work to progress to the other analysis and interventions discussed in this paper such as stakeholder workshops, classification, watershed management and development.

3. Causal Diagrams and Problem Surveys

A lot of attention has been paid to developing methodologies for eliciting information, primarily through participatory approaches. Less attention has been paid to the display of that information. This is in partly because of the sheer volume and complexity of information that arises from poverty surveys of whatever type. The display of such information by causal diagrams has been used by FRP to assess research priorities and to focus inputs.

Causal diagrams are perhaps the easiest visual tool for representing the results of poverty surveys. This type of diagram is essentially a pictorial device that displays the linkages between a problem and its underlying causes. However, the terms 'problem' and 'cause' are often interchangeable

(i.e. a problem may be the cause of another problem, and a cause may itself be a problem with other causes). The problems identified by the poor themselves differ considerably from intuitive considerations of financial income, and may vary between different groups of poor people. Because of this, FRP considered that the underlying causes of poverty were best investigated through some form of broadly based participatory survey.

Causal diagrams in practice: problem surveys in Nepal (ZF0172 & ZF0172E):

This approach was used twice in Nepal.

1) In 2002-2003, FRP identified the causes of poverty in Nepal and helped to prioritise the issues. The main areas were identified as finance (lack of access to credit), society/culture (caste and large families) and governance (corrupt officials). This led to the development of a list of prioritised issues for different focus groups under different themes.
2) In 2005, problem surveys were used to update the first survey and sought to focus on understanding how the escalating violent conflict in Nepal had affected livelihoods and changed the structure of livelihood problems. The main issues identified were insecurity, declining basic healthcare and lack of employment opportunities. Traditional rural livelihood opportunities, such as the collection and marketing of non-timber forest products, had been severely disrupted.

As with most analytical tools, the accuracy and scope of the information displayed depends on the quality and focus of the poverty survey. The causal diagram technique goes further than merely displaying data and provides a tool to prioritise researchable constraints. The way causal diagrams have been used by FRP is described in detail in the FRP cluster case study. Prioritisation is achieved by weighting the 'branches' of the diagram, often through some form of participatory ranking exercise where a score is given to each researchable constraint. The methodology allows for the differentiation of problems for different categories of poor people.

SECTION IV: MAPPING POVERTY

1. Mapping Poverty as a Decision Making Tool

Decision support tools help identify and evaluate alternative interventions to inform investment choices as well as policy and project design at the micro, meso and macro levels. Broad-brush analyses help target priority research areas and geographical regions where to invest and implement projects, while meso and household-level analyses identify system niches for implementing feasible technologies or policies for poverty reduction. Within AHP/LPP, a range of spatial analyses have been carried out, overlaying a range of poverty indicators with livestock systems, agronomic potential, population and market access data for informing the selection of sites for implementing projects by diverse clients ranging from the donor community to sub-regional organisations and NARS.

The poverty-mapping product developed by ILRI and LPP is a decision tool (through utilisation of different series of overlays) to enable policy makers, researchers and service providers to make appropriate judgements. The tool is called PRIMAS (Poverty Reduction Intervention Mapping in Agricultural Systems) and is a filtering tool that matches the characteristics of particular technological options with the spatial characteristics of particular target groups in the landscape. A

second tool called EXTRAPOLATE (*EX-ante* Tool for RAnking POLicy AlTErnatives) assesses the impact of policy measures on different target groups. The mapping architecture was designed to enable details of the individual poverty groups to be 'fully-screened' at the 'touch of a button'. The updated maps include the location and numbers of smallholder milk producers, crop/livestock farmers, smallstock keepers, landless livestock keepers, pastoralists and transhumant groups.

The analytical tools and techniques of poverty analysis, such as poverty mapping and spatial overlays with markets and other key drivers of livestock systems changes, are beginning to attract interests from other sectors, such as health, that are interested in customising the tools for their specific institutions.

ILRI has started discussions with a number of development partners to determine how the analytical tools and methods from the Targeting Project can be used in the design of pro-poor policies and projects in other sectors. This achievement highlights the fact that poverty analysis and mapping methodologies are not specific to a particular discipline and can have a much wider livelihoods application.

2. Using Mapping Poverty for Scenario Analysis

ILRI undertook concurrent poverty mapping studies in 12 different countries in South Asia, sub-Saharan Africa and Latin America. This study was undertaken to develop a better understanding of how livestock could contribute to poor people's livelihoods and to identify specific groups of livestock keepers that donors could target. A range of maps and tables were produced that located significant populations of poor livestock keepers and produced scenarios to assess how poor livestock keeping populations were likely to change over the next three to five decades.

Priority Country Poverty Mapping (Project ZC0216)
In future decades: Livestock production systems, and the households that operate them, face major changes. The spatial projections of human population growth, particularly in SSA (Sub-Saharan Africa), are quite startling. Equally startling are the predicted changes in length of growing period for SSA. Add these projections to the increases in demand for livestock products forecast globally, in SSA as well as in Asia and South America, and the outlook is extremely dynamic. In terms of the numbers of poor and the numbers of poor livestock keepers, the critical regions are SA (South America) and SSA. This ILRI study suggested that there are at least 550 million poor livestock keepers globally.

The modelling of Country Poverty Mapping has interesting applications when the results are extrapolated internationally. One use is as a first step to identify rapid change hotspots and as a second step to zoom-in to these areas for more detail. At a global level, and even with relatively coarse data sets, hot spots can be identified where system changes are likely to be substantial over the next 3-5 decades, as a result of population growth and climate change. The magnitude of these system changes, particularly in Sub-Saharan Africa, may be so large as to be potentially overwhelming.

As a result of these studies, ILRI believes that:

> **"Poverty mapping information is key to any convincing framework for livestock-related research and development priority setting."**

FRP used a different methodology, but reached a similar conclusion for forestry-related research and development priority setting as explained in their causal diagrams and problem study approach.

SECTION V: OVERARCHING POVERTY ANALYSIS AND MAPPING ISSUES

1. Disciplinary Integration

RNRRS Programmes have frequently identified that, in addressing poverty alleviation, research and development should not be kept within separate disciplines. For instance AFGRP found that the causes and impacts of poor land and water management are inextricably linked (see case study). Consequently, sustainable land and water management practices go hand in hand. The watershed is both a natural ecosystem and a logical unit that integrates the socio-economic and biophysical factors that lead to environmental degradation and food insecurity. Community-based water and land management at the watershed level can lead to increased options for on-farm natural resource management at the individual level.

A second type of integration that is important is the inclusion of social as well as scientific disciplines, particularly in terms of strategic implementation of project findings. In their eight watershed projects, FRP found that there was a need for strong integration between hydrology and socio-economic research inputs. The need for this type of interaction may partly explain the difference in uptake that can affect more qualitative methodologies compared to more quantitative techniques.

RNRRS programmes such as FRP have repeatedly recommended that thematic clusters be used by DFID to develop natural resources research for development after the RNRRS comes to an end in 2006.

2. Developing Option Portfolios

Several RNRRS programmes found that the most effective way to increase the uptake and application of results from research which was commissioned after poverty analysis and mapping was to provide varying options to the poor.

In Sri Lanka, AFGRP identified and tested an approach that benefits poorer people located in upper watershed areas through fish culture, in collaboration with CARE. Over an extended period of assessment, the risk of increasing conflicts through misguided promotion of community fish culture was established. Alternative approaches were piloted with communities in an adaptive process in which group learning was facilitated. Recommendations for enhancing livelihood outcomes for the poorest people were based on using simple local transfers of fish for stocking and modifications to a traditional practice that recognised social and technical constraints identified by the communities themselves. The research also assessed the value in combining low input enhancements with other micro-industrial uses of water holding structures (such as brick-making). This allowed the production of portfolios of options which were more attractive to landless and youth groups, thereby increasing the chance of their mobilisation.

3. Requirements for using poverty analysis and mapping as a research prioritisation tool

As part of the development of the causal diagram techniques, FRP realised that the following aspects must be included if such methodologies are to be used as a research prioritisation tool. However, this framework can be applied to any of the analysis or mapping poverty approaches discussed in this paper.

Holistic scope: The participatory process that informs the production of a causal diagram must be truly multi-disciplinary. This will allow the real concerns of poor people to be portrayed without distortion through a single disciplinary lens. Single discipline specialists are unlikely to be able to identify and prioritise the most appropriate poverty eradication interventions. Because participative multi-disciplinary surveys are expensive, this will require either central developmental support, or greater co-ordination of cross-sectoral priority setting.

Sharp people focus: such analysis will be of most use if the participative consultation process on which it is based differentiates between groups of poor people that have different "vulnerability contexts" (e.g. within each group there must be sufficient commonality of problems to allow an accurate portrayal of the cause and effect linkages of poverty). This will require a locally-agreed grouping of poor people, based upon their vulnerability context.

Co-ordinated action: It is clear from the causal diagrams in the FRP problem analysis cluster that in order to resolve certain causes of poverty, many different activities must occur in a co-ordinated fashion. For example, if we wish to resolve marginal productivity, a broad range of interventions must address not only research and development in natural capital, but also constraints relating to low financial, social, human and physical capitals. It is pointless to solve one particular researchable constraint if the financial, social, human or physical capacity does not exist to implement results. Interventions must be strategically co-ordinated to match technical solutions with an enabling environment. Research must be matched with capacity building in its broadest sense.

Enabling structure: In order to achieve the above, there must be some co-ordination in the way that research and developmental activities are identified, prioritised, implemented and assessed. If project cycles or overarching strategies are asynchronous, it is unlikely that the basal causes of poverty will be addressed in a co-ordinated way.

Dynamic flexibility: Since the vulnerability contexts of poor people change rapidly with time, participative consultation must be an iterative process, allowing new priorities to emerge. Fossilisation of research priorities within long-term strategies is unlikely to best serve poor people. A dynamic research and development structure is needed.

Comprehensive outputs: Too often, the outputs from research and development projects are restricted to a single discipline. The co-ordinated approach espoused above could potentially facilitate more comprehensive joint outputs geared towards the multiple livelihood needs of a particular group of poor people. This would require some process of knowledge synthesis across sectors. Moreover, uptake into policy analysis and development will almost always require a multi-disciplinary if not multi-sectoral knowledge base on which the analysts can draw.

Fair impact assessment: Since researchable or developmental priorities should be prioritised on the basis of a broad understanding of poverty, not solely on financial measures, it is only sensible that impact assessment methodologies keep pace with these developments. Indicators of social,

human, physical and natural capital are urgently needed within a framework that does not always bow to the simplicity of cost-benefit analysis. UNCED'92 (The Earth Summit in Rio de Janeiro) gave rise to a plethora of national and international developments in criteria for sustainable development and associated indicators and means of verification. It should not be necessary to re-invent yet more indicators. Which indicators are appropriate depends, as noted above, on where the research is positioned along the research-development-application continuum.

Healthy realism: Because the poverty trap is complex, many independent changes may be needed simultaneously for real progress. Supporting appropriate knowledge generation with poverty eradication will not be served by such detailed analysis of its different facets that action is postponed ("paralysis by analysis"). Nor will it be served by simplistic attempts which focus only on financial benefits dressed up with Sustainable Livelihoods vocabulary (lip-service). Instead, poverty eradication will be served by careful priority setting and co-ordinated action.

4. Enterprise Development

Across several of the RNRRS programmes, notably FRP and CPHP (Crop Post Harvest Programme), developing markets, producer marketing and enterprise development capacity have been strongly identified as key elements in poverty alleviation strategies. This approach is validated by the identification by AFGRP that the market orientation of successful farmer-fishermen clearly differentiated them from the majority of less successful production orientated inhabitants who produced similar products. In addition, successful farmer-fishermen were able to identify and capitalise the geographical and time based market windows in terms of when and what to produce and where to sell. As well as good market orientation, managerial capability of the farmer-fishermen played a vital role in extracting the maximum value perceived in each opportunity.

5. Capacity Building

Much of the RNRRS poverty analysis and mapping work has included the development of improved strategies and recommendations for a range of organisations, both governmental and non-governmental.

The **AFGRP project (R7064)** focused on developing recommendations for an extensive but largely undocumented resource accessed by many of the most marginal groups, but which was largely ignored in government policy. Recommendations were made to agencies involved in water storage rehabilitation on how to optimise fish migration and refuge potentials to improve overall watershed productivity, especially during drought years.

The Yellow Brick of May 1994 made light of parallel capacity building because this was to have been handled primarily by the counterpart national research organisations and by bilateral donors including the DFID in-country programme offices. Consequently there were strictures against the RNRRS programmes and projects becoming involved in institution-wide capacity building. There was some relaxation of these strictures as the RNRRS period progressed but there was never enough capacity building to make the RNRRS as developmentally effective as it could have been under a more coordinated approach by ODA/DFID.

The unsatisfied need was strongly pointed out in the report of the Commission for Africa in March 2005, amongst others, and in the external review of the RNRRS during 2004/5. The post-RNRRS

SRSA fails to address this continuing problem, while the Research Funding Framework 2005-2007 offers two diametrically opposed views on capacity building.

6. Dissemination

Once findings have been tested and validated it is important that they are disseminated widely as recommendations. Dissemination must also be carried out appropriately so that research lessons can be integrated into national and international institutions as well as within government policies[3]. As the case study clusters demonstrate, the AHP/LPP and AFGRP poverty analysis and mapping tools have been taken up by a range of programme partners.

To promote the uptake of any RNRRS strategies produced, the promotional pathways to ensure uptake and application of the strategy should be integrated wherever possible and appropriate into existing national and international promotional pathways. The relatively short time span of UK-funded research projects is often incompatible with the slow and intermittent process of strategy and policy development overseas, so one-off project-specific promotional strategies are unlikely to have a long enough lifetime. Such incorporation should strengthen links with national processes and also provide a means of checking and validating some of the natural resources strategies already being used.

Promotion of poor quality natural resources poverty alleviation strategies could be more damaging than providing no strategy at all.

Therefore, a means of checking the use of each RNRRS strategy being disseminated should ideally be in place within dissemination and uptake monitoring. The responsibility for this work requires in-depth discussion and is not currently clear-cut. Within a structured network and improved communication, monitoring the impacts of the research activities may become easier. This is something that should be raised at a policy-level within each partner country.

The AFGRP Thai partners incorporated several of the findings from the project to the National Programme Strategy for Aquaculture. In general, all of the participating Asian Institutes supplied information on aquatic animal health and management strategies to end-users. In addition, the project raised the awareness of the weaknesses within each of the Institutes when targeting the poor.

[3] Please see the Policy Advocacy Synthesis Paper for more detail on this topic.

IMPLICATIONS ON RESEARCH DESIGN FOR DONOR AGENCIES AND NATIONAL RESEARCH SYSTEMS

Activity (or way of working)

- Prioritisation must be undertaken at each level (regions, sectors, programmes, clusters and projects).
- Participatory approaches including stakeholder analysis are vital to assess and understand poverty.
- Developmental impact must be measurable and assessable and at least some of the indicators should be locally chosen and relevant.
- Once poverty data has been collected, it must be put in a form which is easy to manipulate and offer clear decision making options (for example causal diagrams).
- Scenario Analysis is an excellent tool for long term poverty related projections.

Principles to Adopt

- Poverty research and development must be planned and implemented using a broad multi-organisational approach including governments, civil societies, the R&D community and investors.
- Natural resources projects must consider how much quantitative measurement should be done by themselves/partners and how much can be used from existing work by other agencies.
- Enterprise development should be incorporated as part of a poverty alleviating approach
- Poverty Research and Development must use an integrated approach and a multidisciplinary methodology.

CASE STUDY CLUSTER 1:

AFGRP: Aquaculture and Fish Genetics Research Programme

http://www.dfid.stir.ac.uk/

Project R7064: **Small-scale farmer managed aquaculture in engineered water systems: critical design and management approaches** (Sri Lanka/South India watershed). The purpose of the project was to identify the major social and bio-economic constraints to the introduction of aquaculture into farmer-managed irrigation systems and then to develop and promote effective approaches to aquaculture. The project focused on two areas of the Sub-Continent that suffer water stress and where aquaculture has little tradition in India and Sri Lanka. The project aimed to deliver an assessment of the potential for aquaculture within available farmer-managed irrigation systems through a series of situation assessment activities. This culminated in several physical systems (open wells and check dams) being identified for their potential in Raichur District, Karnataka and the small seasonal tanks that are numerous in the Dry Zone of Sri Lanka.

R8119 (Start 01-08-00, End 31-03-02): **The impact of Aquatic Animal Health Strategies on the Livelihoods of Poor People in Asia**. Information on aquatic disease outbreaks together with suggested control or management strategies had been produced from previous projects (**R7051 (Start 15-11-97, End 30-09-00) & R7463 (Start 01-08-00, End 31-03-02)**) and disseminated widely using a variety of formats. The purpose of this project was to produce, disseminate and evaluate recommendations to enhance the efficacy and uptake of aquatic animal health strategies that are beneficial to poor people within Asia.

Measuring Poverty

Stakeholder Analysis:

As a concurrent component of the situation analysis a stakeholder workshop was held in Kandy during November 1998. In this project the stakeholder analysis was carried out to determine participants' priorities for the formulation of a research agenda, to clarify differences in contribution, expectations and priorities, and to negotiate acceptance of these. As it was impracticable to bring primary and secondary stakeholders together within a single forum, the participation workshop was restricted to the latter group; Governmental line agencies, development and research institutions working in the arenas of, irrigation/water management, aquaculture and socio-economics.

The opinion of primary stakeholders i.e. local communities, was canvassed during village PRA's. In addition farmers who wished to research aquaculture options on their farms, were invited to participate in a primary stakeholder workshop prior to the following rainy season after which they will be supported to monitor and evaluate such research.

The stakeholder forum was used to achieve the following outputs:

- Further elucidation of researchable constraints to identified aquaculture options.
- Design of a monitoring scheme to enable evaluation of the relative success of the approaches adopted by different groups of farmers, as measured by indicators identified by the farmers themselves.
- Knowledge about specific aquaculture options for the different water bodies and if necessary, credit assistance for interventions will be made available to informal associations formed by participating farmers.

Classification

The classification of irrigation systems and aquaculture potentials can be considered part of 'Measuring Policy'. The integration of fish production into agricultural systems is compatible with the needs of resource poor farmers in marginal area.

ANALYSING POVERTY

Impact

The first time an aquatic animal health review (AAH) of this type had been performed was during project R8119. The lack of tried and tested AAH strategies was surprising but funding for this type of work is relatively non-existent, as they are expensive for funding agencies and are time consuming for the commercial companies. However, this emphasises the need for assessment of the impact of AAH strategies. The importance of social complexities related to information access was highlighted through the use of social methods. Integration of structured sampling together with informal interviews provided a more robust data set with better extrapolation potential.

The impact assessment document raised the suggestion that impact could not be assessed. This was a rather surprising result and provoked a great deal of debate among the partners. Many of the Institutes already performed some kind of impact assessment exercises. Although the general principle that impact cannot be measured or assessed in a livelihood context it was agreed that micro-assessment exercises could be undertaken. These types of exercises still had some relevance and so impact could be assessed in a specific context.

Participatory Situation Analysis

7064: A range of research methods and tools were identified and tested for developing appropriate aquaculture interventions. These were based on participatory approaches that sought to understand the needs of, and resources accessible to, the poor. A series of activities with partner institutions were initiated to pilot potential ways for the poor to gain from integrating fish culture within their irrigation systems and to monitor the impact.

Participatory situation analyses.

Participatory situation analysis was used as the first step to investigating the social, economic and technical feasibility of aquaculture options in small-scale farmer managed irrigation systems in the Lowland Dry Zone (LDZ) of Sri Lanka, with the aim of determining relevant initiatives, which would benefit the poor. The process progresses from regional to local level, using secondary information and key informant interviews before undertaking Participatory Rural Appraisals (PRA in villages within two Seasonal Tank Cascade Systems of Puttalam and Kurunegala Districts of North West Province.

Major components of a situation analysis for aquaculture related development (adapted from Haylor, Lawrence and Meusch, 1997).

Regional and local Situation Analysis.

a) Institutional support:

- Process orientated: Aquacultural and agricultural information systems, research bodies and support schemes. Policymaking bodies.
- Action orientated: NGO's, international development organisations, fisheries departments, banking and credit.

b) Fisheries production (by sector, seasonal & historic), aquaculture development & seed production.

c) Fisheries marketing (consumer preferences, infrastructure, wholesale and retail systems)

d) Relevant political and economic situation (i.e. demography, social disintegration).

Local Situation Analysis (Based around Village level PRA and longer term monitoring).

e) The local economy (labour, sources of income, credit, cash flow).

f) Physical nature of the area (climate, soils, water bodies).

g) Patterns of ownership and access to land and water.

h) Social structure (caste, wealth) of the local community and main priorities of these.

i) Role of women in farming systems and (resource access and decision making powers)

j) Farming systems and the role of women in these systems (seasonal patterns, workloads)

k) Existing indigenous knowledge relevant to research.

OVERARCHING POVERTY ISSUES

Disciplinary Integration

Watershed management in project R7064 is an example of the type of theme that requires a multidisciplinary approach. The causes and impacts of poor land and water management are inextricably linked (see box) and consequently efficient and sustainable land and water management practices go hand in hand. The watershed is both a natural ecosystem and a logical unit that integrates the socio-economic and biophysical factors that lead to environmental degradation and food insecurity. Community-based water and land management at the watershed level can lead to increased options for on-farm water management at the individual level.

The project, working with an NGO partner actively involved in watershed development in the drier areas of Karnataka State, India identified most physical structures to have little potential for aquaculture. Demand for fish was identified with some of the poorest low caste and tribal people

but consumption rates were very low as supplies had poor penetration into marginal rural areas. Most outputs from both fisheries and culture in the region tended to be exported to distant urban markets. On farm trials were conducted to assess the potential for using open wells, accessible by individual households, and checked dams used by groups in the project area. Poor availability of nutrient inputs was a major constraint to increasing benefits from open wells. However, collaborating households appreciated the small amounts of fish for social and convenience reasons and at this level of integration there appeared to be few conflicts with other uses. Farmer participation and interest increased to the point where farmers purchased their own seed by the end of the project. A lack of knowledge and experience in aquaculture within the private and NGO sector was a major constraint to carrying out field research in the area.

Major issues associated with poor land and water management in the dry zone of Sri Lanka and India (after Gamage 1997, Nigam et al 1998).

- Resettlement of landless farmer in already degraded or degradation prone land.
- Uncontrolled land alienation (in Sri Lanka), legislative support and enforcement, unfavourable tenancy conditions and poor land use planning.
- Encroachment of stream banks, reservoir reservations and catchment areas, coupled with poor land management practices resulting in accelerated soil degradation, loss of reservoir capacity through siltation and agricultural productivity.
- Pollution of fresh water resources following the shift to high input agriculture and increased reliance on agro-chemicals.
- Denial of control of water to local communities.
- Unrestricted access of individual landowner to groundwater under common law resulting in lowering of water tables following increased access to pumping technology.
- Inadequate incentives and resources for soil and water conservation, groundwater recharge, efficient and sustainable use of water resources
- Low agricultural productivity and unavailability of marketing facilities for produce.

References:

Gamage, H. 1997. *State of art and status of watershed management in Sri Lanka.*UNDP /FAO, Rome.
Nigam, A., Gujja, B., Bandyopadhyay, J., and Talbot, R. 1998. *Fresh Water for India's Children and Nature. Learning from Local-level Approaches*. UNICEF & WWF. Delhi.

In Northwest province Sri Lanka, the project identified and tested an approach that benefited poorer people located in upper watershed areas through fish culture in collaboration with CARE, who financially supported the work over a further season. Over an extended period of assessment the risk of increasing conflicts through misguided promotion of community fish culture were established and alternative approaches developed. These were then piloted with communities over a two-year period in an adaptive process in which learning by the group was facilitated. Recommendations for enhancing livelihood outcomes for the poorest people were developed subsequently utilised by CARE. They were based on using simple local transfer of fish for stocking and modifications to traditional practice that recognise social and technical constraints identified by the communities themselves. The research also assessed the value in combining low input enhancements with other micro-industrial uses of tanks (such as brick-making). This allowed the production of portfolios of options which are more attractive to landless and youth groups, thereby increasing the chance of their mobilisation.

The second type of (multidisciplinary) integration was demonstrated in project R8119. The withdrawal of the social science partners prevented the extension of the collaboration between the social and scientific disciplines into the second phase, which made it impossible to implement planned strategic activities. However, the information produced from the first phase had a great deal of potential and has been discussed at Government level in the participating countries. The task remains to identify pathways by which this information can further influence future policy. The use of social methods to help evaluate potential problems with AAH information dissemination was provided through the situation appraisals.

The opinion-based methods used during the anthropological studies raised concern with the scientific partners, who were more familiar and comfortable with generating fact-based knowledge. The anthropologists were often unable or reluctant to describe their methods and so a great deal of discussion was required to reach some level of understanding by all partners. This disadvantaged some of the studies, as more time was required to discuss the benefits of the various methods used. Introduction of the social methods was new for many of the partners and again, limited information was provided for the initial introduction of such methods. This lack of detail affected the selection of the situation appraisals, particularly in Thailand.

Enterprise Development

Less opportunities and high levels of constraints characterize the environment in which the fishermen operate. Farming and fishing are found to be the most prominent sectors in the given environment. Findings revealed that the risk associated with fishing is relatively lower than that of farming. The main reasons for low risk in the fisheries sector were stability in production (fish catches) compared to agricultural outputs and the existence of an open equitable market. Findings also revealed that successful farmer-fishermen were both entrepreneurial and managerial in their endeavours. They are found to be entrepreneurial in creatively perceiving opportunities and capitalizing them through overcoming resource and other constraints by means of social networks. The entrepreneurial ability of these farmer-fishermen has enabled them to maintain a combination of both low and high-risk activities. The processes of value extraction adopted by each farmer-fisherman were found to be unique and different from each others leading to different combinations of resources and opportunities adopted by each individual. In contrast, the majority of the less successful farmer-fishermen were highly dependent on primary agricultural income

sources (paddy cultivation and fishing), which are highly susceptible to unfavourable environmental conditions.

Managerial capability of the farmer-fisherman played a vital role in extracting the maximum value perceived in each opportunity. For example the ability to delegate responsibilities to the right people at right times enabled the entrepreneur to avoid resource conflicts among different enterprises. This has enabled them to retain funds (which would otherwise have spent on hired labour) within the household and to re-invest them in the business. Time orientation is also found to be an important aspect in the particular context, since most of the available opportunities and emerging constraints are seasonal in nature.

> Market orientation of the successful farmer-fishermen clearly differentiated them from the majority of less successful production oriented inhabitants who produced similar products overtime.

This was further demonstrated by the successful farmer-fishermen's ability to identify and capitalize the geographical and time based market windows in terms of what to produce, in what forms to produce, where and when to sell etc.

Capacity Building

The project (R7064) identified that demand for freshwater fish was a critical driver of aquaculture development based on studies of marketing in both locations. Linking this with an assessment of current status led to an improved understanding of the potential role and benefits of fisheries and aquaculture production to the poor. The relationship between aquaculture development in areas of combined seasonal and perennial water availability has also been clarified. This has critical importance for determining the likely trajectory of aquaculture development and for informing change agents to more efficient and poverty-focused approaches to interventions.

A follow up project (from R7064) that will research improved strategies for seasonal water bodies has been approved to concept note stage and the development of a full proposal is currently underway. The expected partners are active over a broad area of Southern India and work in Sri Lanka will focus on locations within the conflict zone. Preliminary fieldwork and institutional analysis has already been carried out with prospective partners at both sites to scope the proposed collaborative work. In both cases the proposed research will be nested within development programming of local partners and geared towards producing outputs of with direct development impact but also contribute to the production of broader more generic guidelines.

Dissemination

All of the partner institutes in project R8119 were found to have good communications with the extension services and all provided information on aquatic animal health to various end-users. These information dissemination routes were similar in all of the countries but their relative importance varied between the individual countries. However participants agreed that the existing mechanisms would benefit from improvement and the poverty level of the end users was not necessarily clear.

Primarily it was concluded that aquatic animal health (AAH) did matter to poor people. However, poorer communities are affected by the lack of reliable AAH information. Interpretation of the affect of AAH strategies on poor people was not found to be easy to extract by any existing method. Nevertheless it was found that aquaculture producers have increased vulnerability as a direct result of poor aquatic animal health. Furthermore this vulnerability can be increased if the producers have no direct access to reliable sources of information related to optimal production and reducing risks of poor AAH. The fish producers that were regarded as resource rich had the best access to all information, not only that related to AAH but also to marketing and husbandry management.

Information exchange occurred between researchers, farmers and extension workers within the target countries. However the project clearly showed where increased effort should be made to improve the exchange of information relating to aquatic animal health. The Thai partners incorporated several of the findings from the project to the National Programme Strategy for Aquaculture. In general, all of the participating Asian Institutes supplied information on AAH and management strategies to end-users but the project raised the awareness of the weaknesses within each of the Institutes when targeting the poor.

CASE STUDY CLUSTER 2:

FRP: Forestry Research Programme

http://www.frp.uk.com/

Problem Identification Cluster

Project ZF0132: Feasibility study on the numbers of forest dependent people. 2000. The study assessed existing information on the numbers of forest dependent people (FDP) and suggested alternative methodologies to allow numbers of FDP to be estimated using reliable economic modelling and/or statistical techniques.

Project ZF0046: Review of research priorities – Indonesia. 1998.
Project ZF0047: Review of forestry research priorities – Ghana. 1998.
Project ZF0048: Review of forestry research priorities – Bolivia. 1998.
Project ZF0049: Review of research priorities – Nepal. 1998.

Project ZF0101: **Researchable constraints to the use of forest and tree resources by the forest-dependent poor in Southern Africa.** 1999. A poverty survey was carried out with the aim of mapping the cause-and-effect relationship of poverty amongst the forest-dependent poor and natural resource management. The survey focused on identifying the demands of poor people themselves.

Project ZF0131: FRP demand surveys in Belize, Guyana and the eastern Caribbean states (including Jamaica). 2000. The surveys carried out under this project aimed to ensure that the resources of FRP were efficiently targeted towards poverty eradication; were demand-led; and local institutions were involved in the research process from the beginning.

Project ZF0143: A Demand Study Of The Priority Researchable Constraints For Four Groups Of Forest dependent Poor People In The Management Of Forest And Tree Resources In Central America. 2000. The study identified and prioritised issues related to the management of forest and tree resources in Honduras, El Salvador, Guatemala and Nicaragua, research into which by the FRP might contribute to combating poverty among four target groups of poor people.

ZF0172: Problem Survey Nepal. 2003. The survey listed the underlying causes for poverty, as perceived by poor people who rely on forest and tree resources, as well as different categories of institutions representing government, I/NGOs, bilateral agencies, research institutions and the private sector, which seek to reduce poverty.

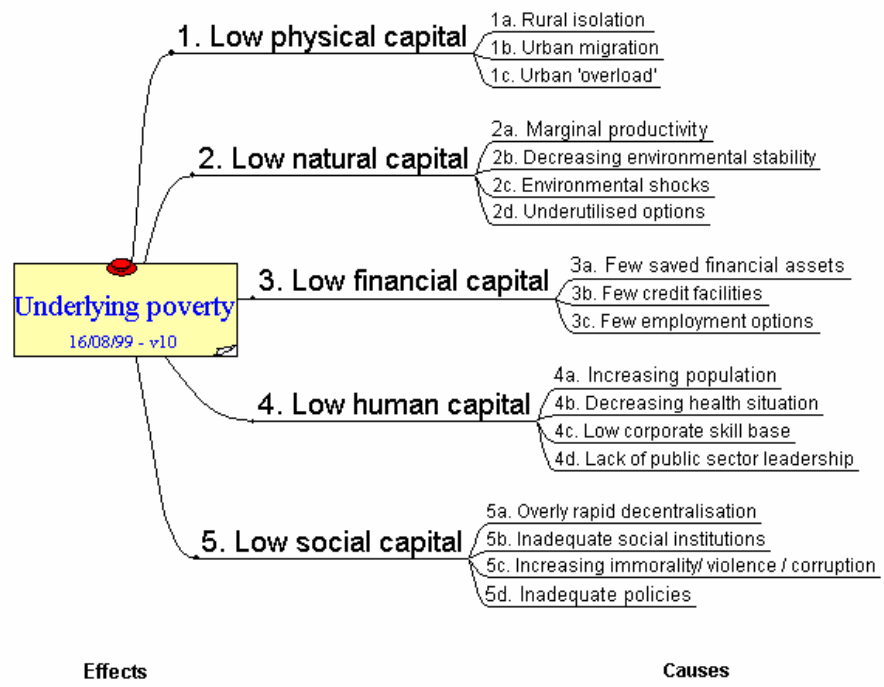
ZF0172E: Priority problems of forest dependent poor people in a conflict situation in Nepal: an update report. 2005. This survey provided an update of the 2003 report (ZF0172). It focused on understanding how the escalating violent conflict in Nepal had affected livelihoods and reconfigured the structure of livelihood problems.

Analysing Poverty

Causal Diagrams and Poverty Surveys

Since 1999, FRP has invested in a number of poverty surveys to help set the priority areas for research and ensure that these were demand-led by the poor themselves and those who represent the interests of the poor. FRP's poverty survey reports have shown the possibility of structuring causal diagrams around five causes of poverty, which equate to low levels of the five capital assets within the Sustainable Livelihoods (SL) approach (Figure 1).

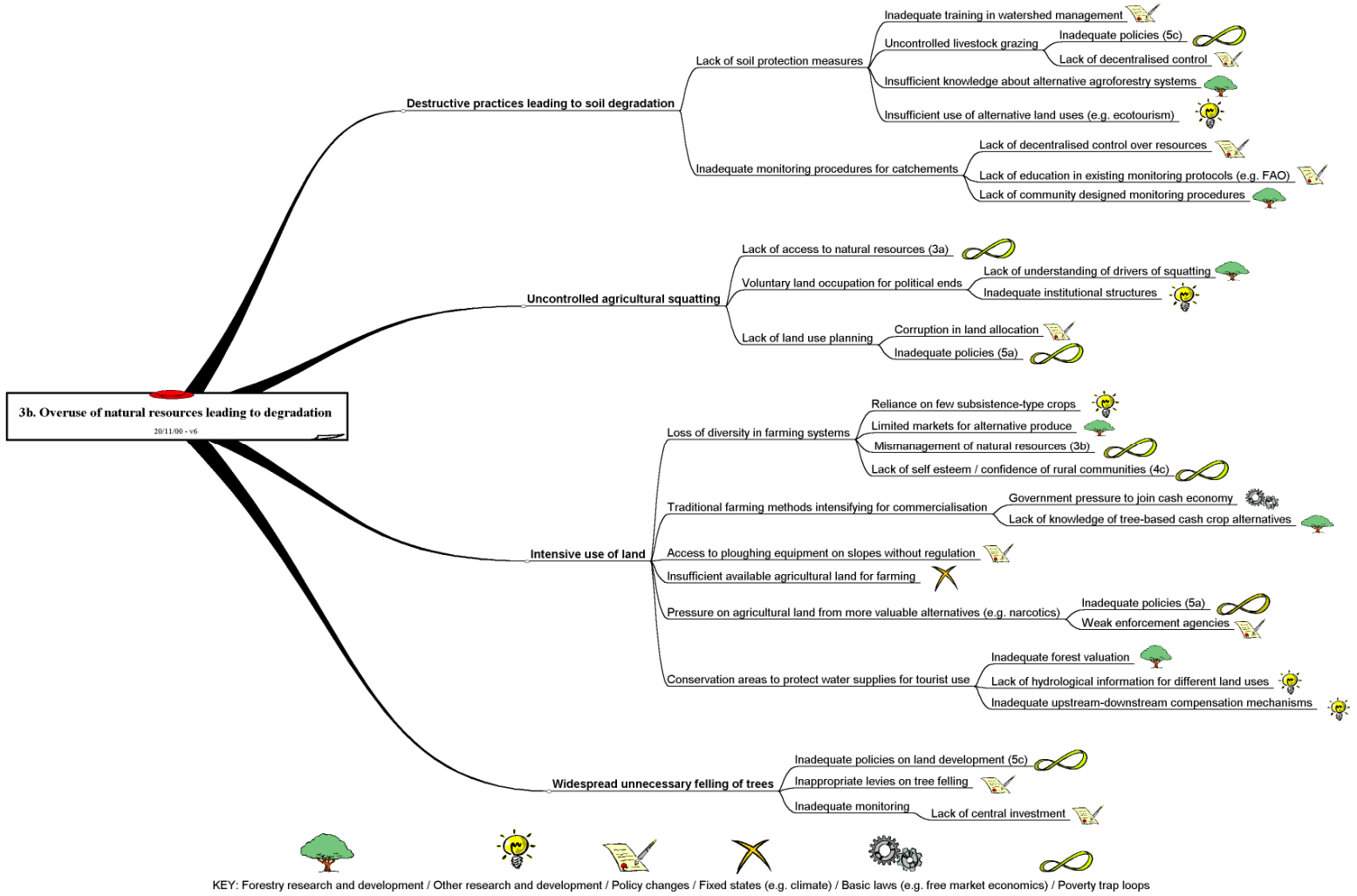
Figure 1. Causal diagram of cause and effect linkages relating to poverty (an example from a forestry-focused poverty survey in Southern Africa):



Within causal diagrams, there are five possible types of branch tip or underlying causes of poverty (Figure 2):

- *Poverty trap loops:* branch tips which refer to other branches, thereby opening up the possibility of infinite loops (e.g. the lack of credit facilities may be a possible underlying cause of continuing marginal productivity, which itself may be a reason why few credit facilities are offered to poor farmers).
- *Fixed states:* physical states which cannot be changed through research (e.g., climatic aridity).
- *Basic laws:* principles which cannot be changed by research (e.g., free market economics).
- *Current developmental policies:* government positions which mitigate against the resolution of a constraint through research at this time (e.g., policies on debt relief).
- *Researchable constraints:* These are essentially constraints which are based on a lack of knowledge or the application of that knowledge. Consequently, research can overcome the lack of knowledge or its application through well targeted systematic investigation. Such factors can be divided into those that could be addressed by FRP, and those which cannot be addressed under the FRP.

Figure 2. Causal diagram of the cause and effect linkages relating to the overuse of natural resources leading to degradation[4]



[4] The identification and prioritisation of constraints and opportunities for greater integration between forest-based industries and communities: a sustainable livelihoods approach based on data from Belize, Guyana and the Eastern Caribbean States. Duncan Maqueen. 1999. DFID/Forest Research Programme (FRP) UK.

Prioritising researchable constraints for poverty eradication

Causal diagrams are a particularly useful tool, not only for co-ordinating developmental actions, but also for prioritising them. The most straight-forward means of using causal diagrams in the prioritisation of researchable constraints is to weight each of the branches. This can be done through some form of participatory ranking exercise where a score is given to each researchable constraint by a representative sample of key informants. If large numbers of informants are interviewed separately, then the number of times a researchable constraint is mentioned without prompting can be used to weight that constraint.

The objectivity of such prioritisation depends to a great extent on the composition and breadth of understanding of the interviewer and interviewees. Interviewers and interviewees inevitably focus on, and rate highly, those underlying causes of poverty of which they have experience or which affect them directly. This can be called "immediacy". The broader the areas of poverty being considered, the harder it is to give a fair rating to issues that are outside the immediate interest of interviewers and interviewees, or which underpin poverty in a way that is indirect or diffuse.

Alternative methods can be used that are more objective. Poverty trap loops, which refer branch tips back to other branches in the tree structure, can be a useful priority-setting tool. Repetition is another priority-setting tool. Some of the underlying causes of a central problem (the branch tips) can occur more than once in the same causal diagram. Researchable constraints that occur on several branches are more likely to be significant to the eradication of a central problem than constraints relating to only one branch. Similarly, researchable constraints that are repeated within one branch are likely to be more significant than those that are not.

Using Causal Diagrams for Poverty Surveys[5]

This tool was used during the surveys of six Southern African Development Community (SADC) countries in 1999[6]. More than 140 semi-structured interviews with members of 17 governmental institutions, 12 NGOs, 11 universities and 11 international agencies or regional offices were conducted. A logical progression was followed from the central problem (in this case extreme poverty) to its underlying causes, which involved more than 50 researchable constraints. The constraints were then prioritised using the scoring methods described above to arrive at priorities for future research funding.

The FRP survey had two main shortcomings: the participatory discussion process involved only one discipline and there was no differentiation between different categories of poor people. The focus on a single discipline meant that researchable constraints ranked as the highest priorities in other areas (health, sanitation etc.) might have been preferred by the poor had a more holistic survey been conducted. In addition, by treating the poor as a single group, there was a loss of resolution as to

[5] Please note that some of the information in this section could also be considered under 'Poverty Measurement'.

[6] FRP discussion visit to Southern Africa, 12 April 1999 – 6 June 1999. FRP problem surveys – No. 1. Duncan Macqueen. DFID/Forest Research Programme (FRP) UK.

which researchable constraints were especially important to different groups of the poor. In subsequent surveys, the methodology allowed differentiation of problems for different categories of the forest-dependent poor.

If the focus is broadened to poverty-eradication research and development more generally, important implications and/or requirements become evident.

The Nepalese Poverty Surveys (Projects ZF0172 and ZF0172E)

FRP poverty surveys were conducted in a number of regions including those in Southern Africa, the Caribbean and Central America[7]. In this section, the two Nepalese poverty survey projects are described as an example of the methodology in action.

Participatory Situation Analysis: The initial survey[8] was conducted in seven districts in Nepal between April and October 2002, incorporating the views of 79 poor people. Interviews with Kathmandu based heads and officers of government, non-government and donor projects were also taken.

The survey identified prioritised problems and their underlying causes for four groups of poor people who had varying degrees of dependencies on forest and tree resources. The findings were cross-referenced to published national strategies, action plans or priority setting documents and participatory poverty analyses. In addition to a short description of 16 prioritised researchable constraints, the problems and their underlying causes were displayed in the form of poverty maps. Priority problems of the four focus groups were briefly discussed in four broad thematic clusters:

- Global issues and strategic concerns (policies),
- Land-use and forest decision making (technologies)
- Institutional change and reform (social structures)
- Sustainable livelihoods (employment and income)

The findings indicated that all four groups suffered from a lack of favourable policies and support services relevant to their livelihoods. They also suffer from lack of food security and low wages, in addition to problems of exploitation and issues associated with large family sizes.

Three key limitations of the survey method were:

a) Within the limited time allocated, it was not possible to explore every poverty issue/problem in detail and so the results might best be described as indicative
b) There was limited availability of relevant documents for review
c) Frequent disturbances in field movement were due to security-related reasons

[7] http://www.frp.uk.com/sub_page.cfm/title/Poverty%20focus/section/about_frp/editID/62

[8] A report on 'A survey of the priority problems of the forest and tree-dependent poor people in Nepal' was prepared by Krishna P. Paudel, Harisharan Luintel, Basundhara Bhattarai and Hermant Ojha, ForestAction Nepal in collaboration with Hannah Jaenicke, DFID/Forest Research Programme (FRP) UK in July 2003.

Key issues for focus groups identified during the 2003 poverty survey:

- R*esource poor farmers* suffer mainly from limited access to land resources, deteriorating productivity and limited ability to purchase agricultural inputs, often caused by underemployment.
- *Poor small-scale artisans* suffer from limited access to raw materials, from shrinking marketing opportunities, lack of financial capital and alternative employment opportunities.
- The *landless* and *urban poor* generally share the same problems, including no or limited land and lack of knowledge/awareness on livelihood options and strategies.
- The *landless poor* also suffer from forced child labour, unemployment and lack of financial capital, and the *urban poor* from lack of employment and low wages.

The second survey was carried out by ForestAction in 2005[9]. This new survey sought to understand how the escalating violent conflict in Nepal had affected livelihoods and reconfigured the structure of livelihood problems. The survey attempted to capture the perceived priority problems of the forest and tree-dependent poor by service providers and the poor themselves in the context of armed political conflict.

The survey was conducted in four districts in Nepal incorporating the views of 52 poor people (this small sample size was dictated by the limited funding available). Interviews with NGO/CBO representatives, both at district and national level, and high level government officials in Kathmandu were also taken to learn their views on what they saw as the main causes of poverty in the context of conflict. An extensive review of literature, particularly of the armed insurgency in Nepal and its implications, and the national policy and action plan to address poverty reduction, was also carried out. Due to the stronghold of insurgency in the rural areas, respondents were not as open as in the earlier survey in 2002.

The survey identified a number of prioritised problems of poor people. Poor people have a number of problems to overcome. For example, all respondents interviewed suffered from unfavourable policies and support services relevant to their livelihoods. More severe than this, they had suffered badly as a result of the armed insurgency that had destroyed their mental peace and social security. In addition to this lack of peace and security, regular strikes, declining basic health care, and lack of employment opportunities were other priority problems mentioned during the interviews. Traditional rural livelihood opportunities such as the collection and marketing of non-timber forest products had also been seriously disrupted. After the insurgency escalated and the Maoists began to use the forest as their shelter and training centres, access to these areas by non-combatants was denied. As a result, in some areas the poor were deprived of forest products for both subsistence use and trade. Elsewhere, reduced patrolling by forestry staff in government forest areas increased access for the poor to collect forest products.

[9] A report on 'A survey of the priority problems of the forest and tree-dependent poor people in Nepal during a time of conflict' was prepared by Bal Krishna Kattel, Krishna Paudel, and Hermant Ojha, ForestAction Nepal in collaboration with Neil Bird, DFID/Forest Research Programme (FRP) UK in December 2005.

Joint Animal Health Programme and Livestock Production Programme Cluster

(AHP) Animal Health Programme

http://www.dfid-ahp.org.uk/index.php?section=1

Programme Development Project: In 2000 the donors supporting livestock research and development (R&D) in the developing world embarked on a new initiative to improve the communication, collaboration, and complementarity between them to enhance the impact of their investments. This DFID commissioned study had the objective of identifying major collaborative research opportunities with potential to achieve significant impacts on the livelihoods of the poor. The Epidemiology and Disease Control Research Group at the International Livestock Research Institute (ILRI) in Nairobi, Kenya, conducted the study.

Full details are published in:
B D Perry, T F Randolph, J J McDermott, K R Sones and P K Thornton (2002) Investing in animal health research to alleviate poverty. International Livestock Research Institute (ILRI) Nairobi, Kenya, 130 pages plus annexes

Programme Development Project: A description and quantification of the distribution and extent of poverty in the target regions. This was accomplished in a companion study made by the Systems Analysis and Impact Assessment Research Group at ILRI

Full details are published in:
P K Thornton, R K Kruska, N Henninger, P M Kristjanson, R S Reid, F Atieno, A Odero and T Ndegwa (2002) Mapping poverty and livestock in developing countries, International Livestock Research Institute (ILRI) Nairobi, Kenya, 132 pp.

(LPP) Livestock Production Programme

http://www.lpp.uk.com/

Project ZC0216, July 2002 – July 2004: **LPP Priority Country Poverty Mapping** (Bangladesh, Bolivia, Ethiopia, Ghana, India, Kenya, Mexico, Nepal, South Africa, Tanzania, Uganda and Zimbabwe). The aim of this study was to complement the livestock poverty mapping carried out by ILRI with AHP (see above) through generating a series of maps on the location of different groups of livestock keepers and integrating this information with associated natural resource, climatological, communication and marketing maps for different systems in various East African countries.

Measuring Poverty

Stakeholder Analysis

Workshops were set up in four regions: West Africa (in Sikasso, Mali), Eastern, Central and Southern Africa (ECSA) (in Nairobi, Kenya), South Asia (SA) (in Hyderabad, India) and South-East Asia (SEA) (in Bangkok, Thailand). Participants (from 9–15 per workshop) were drawn from departments of veterinary services, non-governmental organisations (NGOs), research institutions, universities, animal health service development projects and international organisations. Following a pre-determined structure and using selected criteria, workshop participants were asked to rank the livestock species of greatest importance to the livelihoods of the poor in each livestock production system occurring in their region.

There were some clear patterns that emerged. In pastoral systems, several livestock species play an important role, but within these, sheep and goats are generally the most important, often playing a more important role than cattle. In the agro-pastoral (mixed) systems, cattle predominate, except in WA where sheep and goats are again the priority species to the poor. In peri-urban landless systems, poultry, sheep and goats, and pigs play the most important roles. Within these production system groupings, each region has a slightly different pattern to the priority species of the poor. In SEA, pigs and poultry were considered the most important species in both mixed rainfed and irrigated systems. Moving further west to SA, buffalo rank second after cattle, and yaks are important in the grassland humid systems. In ECSA, cattle ranked first in the mixed agro-pastoral systems, replaced in WA by sheep and goats, followed by poultry.

Quantitative Measurement

The workshops were also the setting for the identification and quantification of disease impacts. A total of 76 syndromes, general diseases, and specific disease entities were identified as having impact on the poor. A disease was more likely to score highly if the impacts occured across the two main categories of impact scored (economic impact at the poor farmer level, and economic impact at the national level), occured in species that are ranked highly by the poor, occur in multiple species, and occur in multiple regions or production systems with high numbers of poor (particularly SA). Similarly, diseases that are confined to one species and one region are more likely to score low on the scale. It must be emphasised that this is a ranking of diseases based on their impact on poor livestock keepers, and not a ranking of research priorities.

On a global basis, the 20 highest ranked conditions with impact on the poor comprise three syndromes (neonatal mortality, reproductive disorders and nutritional/micronutrient deficiencies that all rank in the top 10), four general disease categories (gastrointestinal [GI] parasites, ectoparasites, respiratory complex and mastitis, the first two of which rank in the top 10), and 13 specific diseases. The presence of the three syndromes of neonatal mortality, reproductive disorders and nutritional/micronutrient deficiencies in the top 10 reflected the general recognition of production inefficiencies compounded by nutritional inadequacy across all of the species as being among the most important health impacts on the livestock of the poor.

It is very interesting to note that these are syndromes that are generally no longer major constraints to livestock farming in the developed world. It is also interesting to note the remarkable similarity with human medicine. In the World Health Organization (WHO) study of research investment opportunities for human medicine, the group of

three old enemies, responsible for more than half the disease burden in Africa, are listed as the diseases of childhood, malnutrition and poor reproductive health. There is a predictable homogeneity across the species barrier.

Poverty is a predisposing factor for these conditions, in both animals and people, but is also a consequence of them.

The more qualitative components of the study were in the identification of research opportunities and in the synthesis of disease impacts and research opportunities to develop a listing of best bet options for poverty alleviation. Putting disease impacts together with research opportunities, a conceptual framework matrix was developed to classify different types of disease-specific research. When the desired outcomes of poverty alleviation approaches are combined with the R&D opportunity categories in a matrix, it becomes apparent that there are priority investment opportunities to suit different philosophical approaches to poverty alleviation.

Impact

Feed resources are recognised to be an important constraint to the productivity of mixed crop–livestock systems throughout the tropics. This is one area of research where ILRI's cross-centre linkages have been exploited very effectively with other CGIAR centers and NARS. In 2004, the System Wide Livestock Programme provided funds for the development of a framework to assess the impacts of feed resource interventions on crop–livestock systems. This work was designed to provide answers to three basic questions: Which data are required for *ex ante* impact assessment? How do we collect the data? How can the data be integrated to assess different impacts of feed resources? An international workshop was organised to discuss and develop a generic framework that could be used to assess the potential impact of all feed resource work. The major output from the project will form the basis for a coherent and cohesive SLP-lead research and development plan on feed resources in the coming years.

It is too early to assess impact as yet, since although it has been developed as a tool but it has not yet been installed anywhere.

Mapping Poverty

Mapping Poverty as a Decision Making Tool

The poverty-mapping product is a decision tool (through utilisation of different series of overlays) to enable policy makers, researchers and service providers to make appropriate judgements. The tool is available on CD and is called PRIMAS (Poverty Reduction Intervention Mapping in Agricultural Systems) a filtering tool that matches the characteristics of particular technological options with the spatial characteristics of particular target groups in the landscape. A second tool called EXTRAPOLATE (*EX-ante* Tool for RAnking POLicy AlTErnatives) assesses the impact of policy measures on different target groups. The mapping architecture was designed to enable details of the individual poverty groups to be 'fully-screened' at he 'touch of a button'. The

updated maps include the location and numbers of smallholder milk producers, crop/livestock farmers, smallstock keepers, landless livestock keepers, pastoralists and transhumant groups.

ILRI is in the process of synthesising the results and policy lessons from four country case studies (India, Kenya, Peru, and Uganda) on pathways out of poverty and the role of livestock will be completed as well as a methodological guide on the application of the Stages of Growth Approach for analysis of livestock-poverty issues.

The analytical tools and techniques of poverty analysis, such as poverty mapping and spatial overlays with markets and other key drivers of livestock systems changes as well as the insights into pathways into and out of poverty are beginning to attract interests from other sectors, such as the health sector, that are interested customised to their specific institutions.

ILRI have started discussions with a number of development partners on how the analytical tools and methods from the Targeting Project can be used for the design of pro-poor policies and projects in other sectors.

Investment Analysis

The conceptual framework enabled the selection of different categories of sponsor for each of the different identified funding opportunities. Research opportunities were presented according to the type of research and the likely impact the research product would have on different processes of poverty alleviation. This provided a framework for evaluating any animal health research proposal, and it also provided a basket of opportunities within the different groupings. What it did not do was to rank them within any one basket, i.e. a fixed criteria.

Opportunities over the next 15 years were identified for improving the control of high-priority diseases within a vision of alleviating poverty through enhancing benefits from livestock. In many cases, not only is little known about the incidence and impact of livestock diseases on the poor, particularly for livestock species other than cattle, for diseases that are difficult to diagnose and for populations in more remote areas, but even less is known about the expected benefit to the poor of specific interventions using the products of the research proposed.

The research opportunities identified by the project needed to be considered in a broader financial and socio-political context. The ultimate impact of the opportunities identified in alleviating poverty will very much depend on developing enabling circumstances in which they can succeed. This reality demands a coordinated approach by governments, civil societies, the R&D community and investors. The identification of priority animal health research opportunities in this report is the start of this process. The eventual benefits that these have for the poor will very much depend on coordinated and focused action by many.

This study emphasised the impacts that research in animal health has on poverty alleviation rather than purely on national agricultural development.

Using Mapping for Scenario Analysis

The study was undertaken to develop a better understanding of how livestock could contribute to the livelihoods of poor people and by identifying significant groups of poor livestock keepers that donor initiatives may target. The resulting set of maps and tables that located significant populations of poor livestock keepers and broadly assessed how poor livestock keeping populations were likely to change over the next 3–5 decades. The outputs of the study were based on innovative analyses using new global data sets:

- Mapping a global livestock production system classification, using definitions based on agroclimatology and human population density.
- Mapping human population growth scenarios to 2050 for sub-Saharan Africa (SSA), Central and South America (CSA), and Asia.
- Development of climate surfaces for Africa to 2050 as predicted from the downscaling of results from coarse-resolution global climate change models.
- Mapping the livestock system classification for Africa to 2050 as driven by predicted changes in human population and climate.
- Mapping district- and province-level poverty data for Kenya, Tanzania and Uganda as an example of high-resolution poverty data for more effective targeting of development assistance.

Key conclusions were that:

- Numbers of poor (and numbers of poor livestock keepers, as far as this analysis can be taken) were greatest in South Asia (SA), particularly in the mixed irrigated and rainfed agricultural production systems of the region and in SSA, particularly in the mixed rainfed systems.
- Population growth and climate change will produce substantial changes in livestock production systems over the next 3–5 decades. There are indications that the magnitude of these systems changes and the consequent need for adaptation and mitigation work, will be particularly large in SSA.
- Poverty and household survey data for East Africa in general, and Kenya in particular, indicate that many poor households keep cattle and have access to land for grazing them. These results showed that large livestock are not solely the prerogative of richer households. The results further indicate that the poorest people in East Africa with significant livestock populations live in dry pastoral areas.
- Considerably more work is required to better inform donors and the research and development community of where hotspots of change are located, who is likely to be affected and how. More collaborative assembling of global data sets is indicated, together with high-resolution poverty mapping based on small-area estimation techniques, collation of geo-referenced household surveys and better understanding of poverty–resource degradation links.
- Poverty mapping information is key to any convincing framework for livestock-related research and development priority setting. A consensus on appropriate criteria is needed, together with an action plan to fund and carry out the collection and maintenance of crucial baseline data.

Extrapolating the information internationally

Livestock production systems, and the households that operate them, face major changes in the next 5 decades. The spatial projections of human population growth, particularly in SSA, are quite startling. Equally startling are the predicted changes in length of growing period for SSA using the Hadley Global Circulation Model (GCM). Add

these projections to the increases in demand for livestock products forecast globally, in SSA as well as in Asia and South America, and the outlook is extremely dynamic. In terms of the numbers of poor and, so far as the analysis is capable of distinguishing, the numbers of poor livestock keepers, the critical regions are SA and SSA. In terms of the magnitude of poverty and the importance of livestock to poor households in the developing world, the analysis from this study suggests that there are at least 550 million poor livestock keepers globally.

Analysis using the global data sets as outlined above can be of value, not least as the first step in a two-tiered approach that involves identification of hot spots of rapid change, a second step then involving a zoom-in to these areas for more detail. At a global level, and even with relatively coarse data sets, hot spots can be identified where system changes are likely to be substantial over the next 3-5 decades, as a result of population growth and climate change. The magnitude of these system changes, particularly in SSA, may be so large as to be potentially overwhelming.

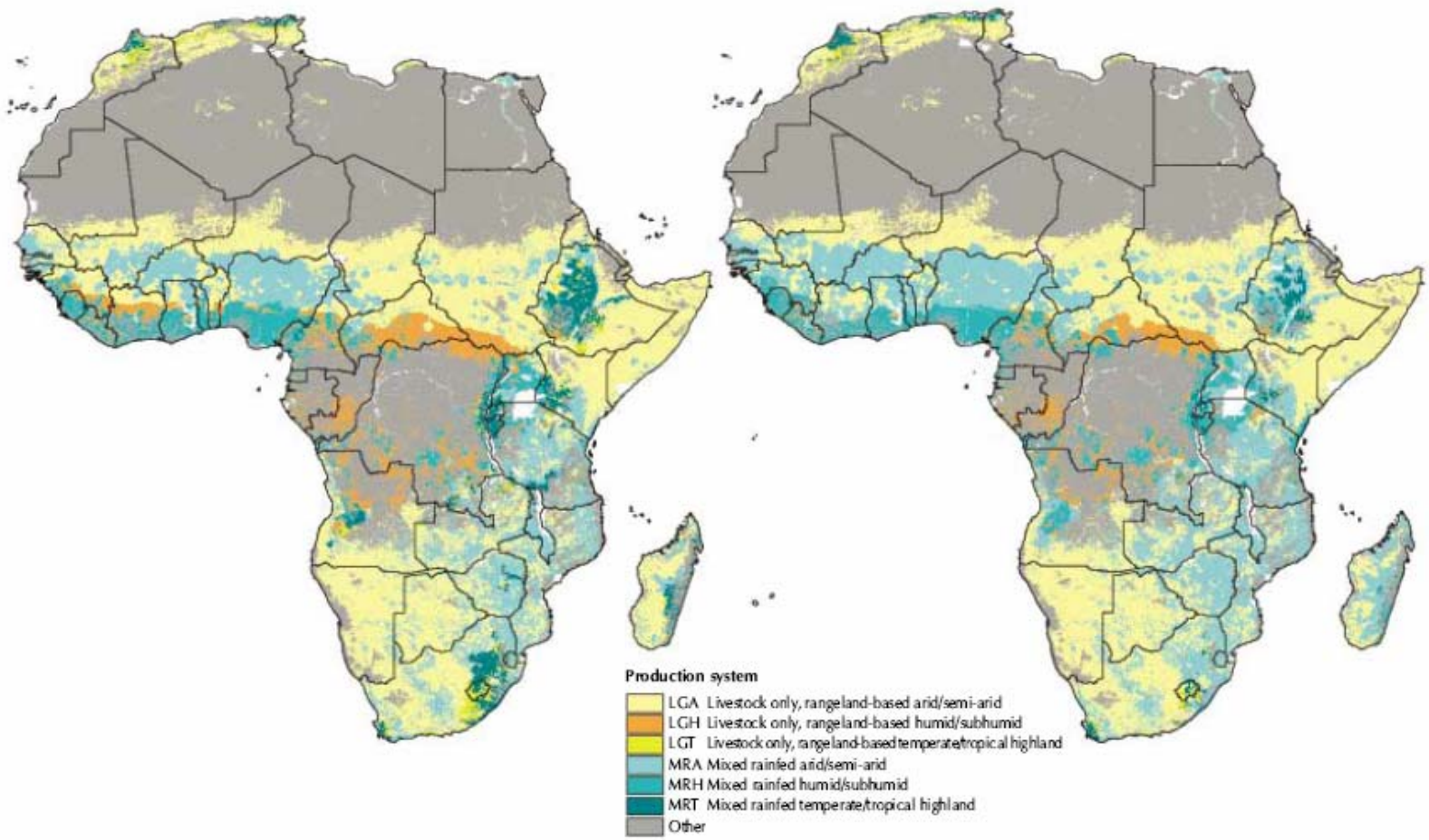
This overall (larger) study resulted in the development of sets of maps and tables that located significant populations of poor livestock keepers, and included a very broad assessment of how poor livestock-keeping populations were likely to change over the following 3–5 decades. The results provided figures on the number of poor (qualified as people surviving on less than US$ 1 day in this analysis) in each of 10 major livestock production systems of the world. These numbers served as a weighting factor in determining the importance of different livestock diseases to the poor. The subsequent analysis of disease and research impacts had both quantitative and qualitative components. The quantitative approach to describing poverty continued into the evaluation of priority species to the poor, and to an assessment of the impacts on these species of the different diseases and syndromes.

Follow on from RNRRS funding:

A major focus in 2005 was on the application of decision support tools for assessment of alternative livestock based interventions in sub-Saharan Africa (SSA) and Asia. PRIMAS/EXTRAPOLATE were applied in the analysis of smallholder dairy and small stock issues in Uganda and India. By the end of 2005, it was expected that the tool would have been thoroughly tested in new situations, spatial data and policy information collated, local counterparts trained in its use, and results utilised by local and national policy makers. In 2005, the focus was shifted to the application of the feed resources framework to help set crop improvement priorities. Within the context of the System-wide Livestock Programme, it is expected that the feed resources framework will assist with better selection and targeting of new and existing feed resource options that will have a beneficial impact on smallholders' livelihoods, groups of beneficiaries, and hence help identify policies and projects that are pro-poor.

(*Examples of the ILRI generated maps are shown on the next 2 pages)*

Map 16d. Expected changes in production systems, 2000 (left) to 2050 (right)



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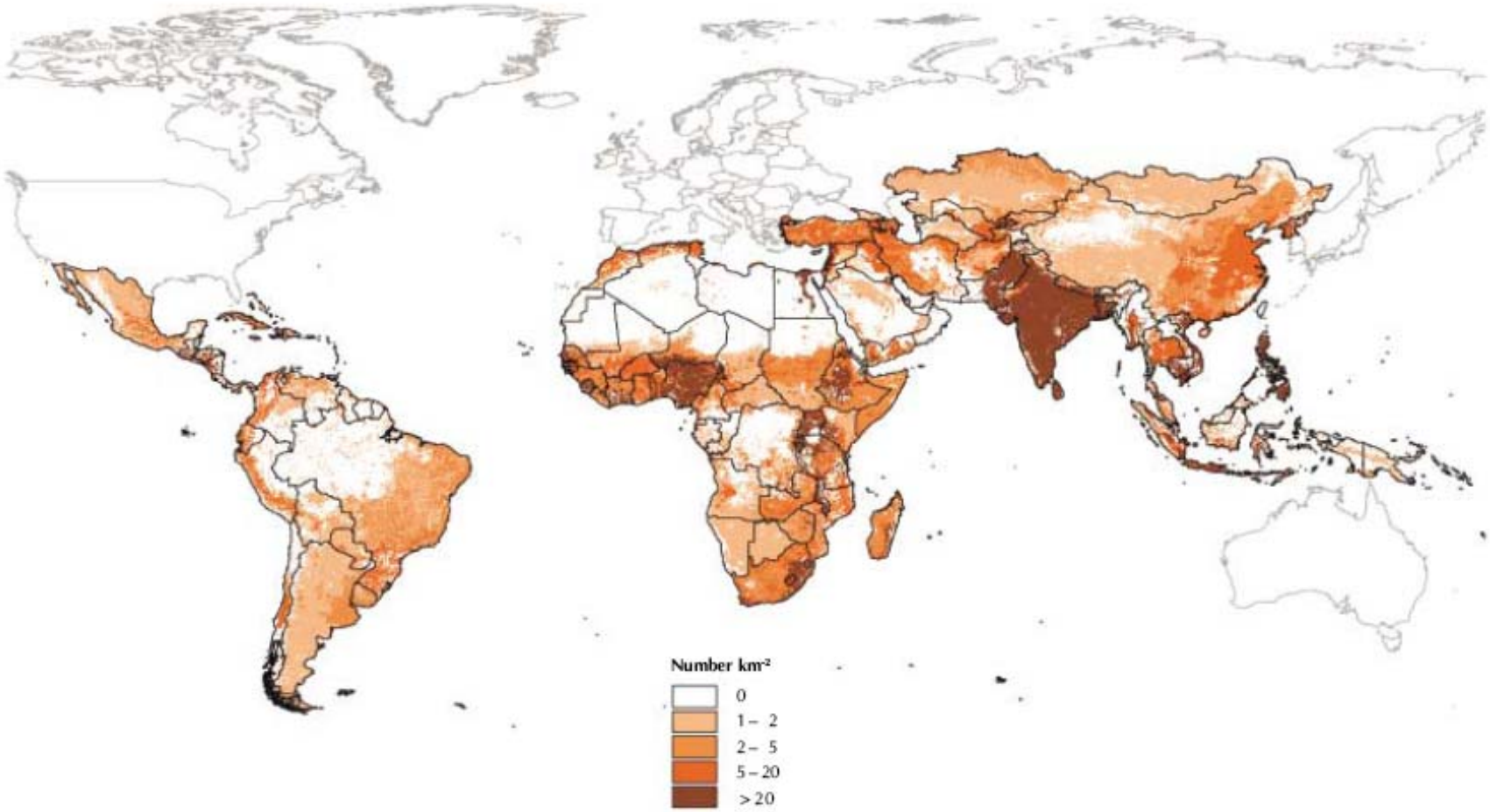
Map 9. Density of poor livestock keepers by farming system



ANNEX 1: Prioritisation tools for research and development

Prioritisation tool	Advantages	Disadvantages
Historical precedence (resources allocated on the basis of past quotas)	1. Able to cope with non-commodity based interventions 2. Quick 3. Inexpensive	1. No consultation 2. Unable to cope with changing situations 3. Unable to cope with different facets of poverty
Arbitrary/arm-chair analysis (resources allocated on the basis of the subjective experience and interests of decision makers)	1. Able to cope with non-commodity based interventions 2. Able to cope with pro-poor weighting 3. Able to cope with different facets of poverty 4. Quick 5. Inexpensive	1. Variable consultation 2. Subjective 3. Prone to miss important variables 4. Open to bias/partiality 5. Limited by experience of decision makers
Congruence (assuming all things are equal, resources are allocated to commodities in proportions equal to their existing contribution to the regional economy)	1. Ensures adequate investment in current well-established commodities 2. Relatively quick 3. Inexpensive, provided commodity market data exists 4. Impartial	1. No consultation 2. Only appropriate for commodity-based research 3. Favours only commodities which are well established 4. Unable to cope with pro-poor weighting 5. Unable to cope with different facets of poverty 6. Does not take account of independent interventions
Simple checklists (resources are allocated to interventions which meet specified criteria, or on the basis of a score derived from the number of criteria met)	1. Able to cope with non-commodity based interventions 2. Potentially able to cope with different facets of poverty 3. Quick 4. Inexpensive 5. Impartial	1. Variable consultation 2. Limited ability to cope with pro-poor weighting 3. Subjective inclusion or exclusion criteria 4. Limited by experience of decision makers
Weighted checklists (as above, but resource allocation depends on a score which weights certain criteria more highly than others)	1. Able to cope with non-commodity based interventions 2. Able to cope with pro-poor weighting 3. Potentially able to cope with different facets of poverty 4. Quick 5. Inexpensive	1. Variable consultation 2. Subjective presence and weightings for different criteria 3. Limited by experience of decision makers

	6. Impartial	
Prioritisation tool	**Advantages**	**Disadvantages**
Domestic resource cost ratios (resource allocation biased towards commodities which can be produced at a lower cost in one region than can be produced in other regions)	1. Maximises current competitive advantage of commodities 2. Impartial	1. No consultation 2. Only appropriate for commodity-based interventions 3. Restricted to commodities with current competitive advantage 4. Data often unavailable for pro-poor interventions 5. Unable to cope with different facets of poverty 6. Favours export crops over subsistence or domestic markets 7. Relatively slow 8. Relatively expensive
Non-econometric cost benefit analyses (resources allocated towards interventions that yield the highest discounted return on any investment assuming certain trends in market prices, and supply and demand elasticities)	1. Reasonably detailed and persuasive 2. Impartial	1. No consultation 2. Limited ability to cope with non-commodity interventions 3. Limited ability to cope with pro-poor weighting 4. Unable to cope with different facets of poverty 5. Depends on accurate data and assumptions 6. Relatively slow 7. Relatively expensive 8. Limited by economic competence of decision makers
Econometric analyses (resources allocated as above, but using modelled relationships between specific types and costs of interventions and the likely outcomes)	1. Highly detailed and persuasive 2. Impartial	1. No consultation 2. Limited ability to cope with non-commodity interventions 3. Limited ability to cope with pro-poor weighting 4. Unable to cope with different facets of poverty 5. Depends on accurate data and assumptions 6. Very slow 7. Very expensive 8. Limited by economic competence of decision

		makers
Prioritisation tool	**Advantages**	**Disadvantages**
Causal diagrams based on capital assets (resources allocated on the basis of maximum likely impact on the five capital assets of poverty based on cause and effect linkages of poverty for specified groups of poor people)	1. Detailed and easy to understand 2. Able to cope with non-commodity based interventions 3. Designed to cope with pro-poor weighting 4. Designed to cope with different facets of poverty 5. Impartial 6. High degree of consultation	1. Depends on accurate broadly based participatory surveys 2. Relatively slow 3. Relatively expensive