A Synthesis of
Monitoring and Evaluation
Experience in the
Renewable Natural Resources
Research Strategy (RNRRS)

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Acknowledgements

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

List of Acronyms and Abbreviations

AHP   Animal Health Programme
AFGRP   Aquaculture and Fish Genetics Research Programme
CPHP   Crop Post Harvest Programme
CPP   Crop Production Programme
CRD   Central Research Department
DFID   Department for International Development
FMSP   Fisheries Management Science Programme
FRP   Forestry Research programme
FTR   Final Technical report
IA   Impact assessment
IFAD   International Fund for Agriculture Development
IFPRI   International Food Policy Research Institute
ILAC   Institutional Learning and Change
LPP   Livestock Production Programme
Logframe   Logical Framework
M&E   Monitoring and Evaluation
MoV   Means of Verification
MSC   Most Significant Change Stories
MTR   Medium Term Review
NGO   Non Governmental Organisation
NRSP   Natural Resource Systems Programme
NSI   National Systems of Innovation
OPR   Output to Purpose Review
OVI   Objectively Verifiable Indicator
PSP   Plant Science Programme
PHFRP   Post Harvest Fisheries Programme
RNRRS   Renewable Natural Resources and Research Strategy
STREAM   Support to Regional Aquatic Resource Management

Executive Summary

Background

S1. This study synthesises new knowledge generated from monitoring and evaluation (M&E) experience within the DFID funded Renewable Natural Resources Research Strategy (RNRRS). It is one of a number of syntheses commissioned to distil learning from the eleven year strategy (1995-2005), and inform the new DFID Strategy for Research on Sustainable Agriculture (2006-2016).

S2. The RNNRS comprised ten (originally eleven) programmes which were contracted out to UK research institutions. It aimed to achieve economically and environmentally sustainable enhancement of productive capacity in the renewable natural resource sector. The new strategy will have a regional focus with decision-making, management and administration moving to the South. It will focus on encouraging innovation, exploring scientific potential, and the scaling-up of successful innovations and best practice developed.

S3. Monitoring and evaluation is increasingly important for accountability, informing decision-making and more broadly, learning. For research funders, it is key to ensuring that the work supported makes efficient use of funds and has a long term positive developmental impact. It also provides evidence to inform strategic decision-making. Increasingly, learning has become a focus of M&E to ensure progress and adapt processes according to lessons learnt.

S4. This synthesis provides an overview of the current relevant literature on M&E, reviews the RNRRS guidelines for M&E and synthesises innovative new methods and tools created. It also identifies research gaps and makes recommendations for the new strategy.

A Literature Review of M&E

S5. We first explore the current M&E literature in order to place the new knowledge generated within the RNRRS in a broader context, and to identify what is considered to be innovative.

S6. The logical framework is a commonly used framework for M&E and identifies four levels of analysis from inputs and activities, through outputs and outcomes. Recent literature however shows that focus on these four elements (inputs, activities, outputs, outcomes) in the logframe fails to capture the complexity of the intervening processes that take place. The relationships between these are dependent on processes or pathways which facilitate the uptake, adoption and adaptation of research products. Pathway analysis places research within the broader social and political contexts and attempts to construct possible sequences of events that will lead from one stage (such as inputs) to another (such as outputs).

S7. It is increasingly being recognised that an understanding of the context in which research is implemented or disseminated is also important in order to ensure an appropriate environment for successful uptake of a research product. The National Systems of Innovation offers a conceptual framework

for understanding the institutional context of agricultural technology and processes by mapping the associated network of actors, relationships and activities.

S8. Organisation learning provides a welcome addition to M&E thinking with a focus upon individual and collective reflection and learning. The emphasis within organisational and institutional learning is upon developing the organisational culture and systems that stimulate, support and reward new ways of reflection and learning.

RNRRS Guidance for M&E

S9. The DFID context, priorities and expectations have changed during the lifetime of the RNRRS which has had implications for M&E. A significant change has been the emphasis upon poverty reduction since the White Paper in 1997, and the increased understanding of the multi-faceted nature of poverty. A further important change has been DFID's move away from project based funding towards programmes and budget support which has meant that DFID country offices and projects are no longer considered the target audience and alternative dissemination and uptake pathways have been focussed upon.

S10. RNRRS guidelines for M&E were based around the logframe. Projects and programmes logframes were expected to fit into the overall RNRRS logframe. The monitoring of projects and their contribution to programme outputs was the responsibility of programme managers. M&E largely took place through traditional reporting formats and assessments at the activities and output levels. M&E procedures varied across programmes but on the whole guidance and support to project leaders appears to be fine, but limited in its encouragement of innovation .

Innovative M&E from the RNRRS

S11. With over 1600 projects over the lifetime of the RNRRS, drawing out the innovative M&E methods was an overwhelming task. We relied on Programme Managers to 'signpost' us to projects which were particularly relevant within their programmes, and assessed it in terms of the extent to which it could be classified as new knowledge. The synthesis can not be said to be a comprehensive review and was very much dependent on institutional memory.

S12. There was limited development or documentation of frameworks for M&E systems in RNRRS projects with some exceptions. Of note are the STREAM M&E framework, Crop Post Harvest Programme's Participatory M&E Guidelines and the Balanced Scorecard Approach. These are interesting in terms of their scope – taking account of aspects such as stakeholders, relationships and learning – and their emphasis – on negative as well as positive effects and unintended as well as intended effects. Their key strength lay in representing different measures (rather than focussing on one measure), and using these to gain a more comprehensive understanding of the 'bigger picture'.

S13. The monitoring of activities and outputs of projects was largely carried out on a routine basis with very little new knowledge generated in terms of

methods and techniques. There was more innovative practice within the M&E of developmental outcomes. These were largely the creation of participatory techniques (such as participatory budgets) and adaptation of existing techniques to different contexts or sectors . Of note was the Most Significant Change Story method which is used to capture unintended changes or effects.

S14.   The RNRRS reflects findings in the literature that there is an increasing interest in focussing on monitoring and evaluation of processes rather than solely on logframe-based outputs or outcomes of research.

S15.   Innovative work took place across RNRRS in a few projects with a focus on process in the areas of pathway analysis, understanding institutional contexts and organisational learning. Pathway analysis explores the causal links along a chain from activity to impact. Analysis may take place at different stages of a pathway and as such it has different names from uptake mapping, outcome mapping, critical path analysis amongst others. Such methods were used within the RNRRS, for example uptake mapping methods and impact pathway mapping. Ideally the pathway is constructed at the project planning stage to establish the necessary factors and assumptions relating to how research uptake and/or impacts will be achieved. Within the RNRRS, one project sought to predict uptake pathways using specific software which plots possible outcomes.

S16.   The majority of projects have tended to monitor project level outcomes and impacts, however in some cases there was a move towards longer term institutional capacity building. One programme in particular, the Crop Post Harvest Programme, has been evolving a 'new research paradigm' which emphasises the importance of understanding and working with national institutional systems in order to convert research into successful innovation'. Some guidance has been developed on how to monitor changes in institutional context, and tools created include institutional histories and actor linkage maps and matrices.

S17.   Two approaches which were widely used within projects are participatory and sustainable livelihoods approaches to M&E. Participatory approaches have received a great deal of attention over the past years and are perhaps no longer considered particularly innovative. However they have largely been developed in project implementation rather than research. A number of projects have developed participatory monitoring activities, and a series of best practice guidelines for participatory monitoring and evaluation for natural resource management and research were produced.

S18.   The sustainable livelihoods approach strongly influenced RNRRS programming during the late 1990s and early 2000s. The livelihoods framework offered a useful basis around which to improve thinking about M&E to ensure a more holistic approach to assessing change. There are some examples of livelihoods thinking having influenced approaches to M&E. Examples include the development of livelihoods asset indicators and the specific adaptation of participatory approaches to diifferent aspects of the livelihoods framework.

S19.   Few examples were found of scaling-up of M&E approaches with two notable exceptions which were M&E frameworks (Balanced Scorecard approach, CPHP Participatory M&E) rather than tools and methods. It is more

appropriate to think about the scaling up of M&E frameworks rather than particular tools and methods which tend to be more context specific.

S20.　　The coverage of impact assessment within this study has been challenging given that the focus is upon project level work and impact assessment was not a requirement of project or programmes, (but a responsibility of DFID). However the study provides some insights into programme wide impact assessment, and innovative tools used by other international agencies for assessing research impact, particularly the International Food and Policy Research Institute (IFPRI) and the World Bank.

Key Issues and Recommendations

S21.　　The new DFID Strategy for Research on Sustainable Agriculture consist of four integrated elements:
- funding to international agricultural research centres
- the commissioning and funding of regional research programmes
- a facility to capitalise of RNRRS research achievement, networks etc.
- a responsive programme in partnership with UK research councils to support long term research linked to southern based organisations

S22.　　It proposes to take an innovation systems approach based on experiences and lessons from RNRRS work through building greater regionally based connections between institutions. It implies a fundamental shift in the approach to research from aiming towards narrowly defined impacts on poor people, to building innovation systems which lead to this end. This has strong implications for M&E thinking.

S23.　　A number of recommendations are asserted in this report in the areas of research gaps and capacity building, and M&E within the new strategy.

Research Gaps and Capacity Building Recommendations:
S24.　　**A systematic review of useful M&E strategies, frameworks and methods beyond the RNRRS.** It is advisable to collate and synthesise methods and tools from beyond the RNRRS. This would provide a practical resource for those embarking on research programmes and projects of valuable M&E strategies, frameworks and methods.

S25.　　**Further research on pathway/process mapping.** It is vital to commission new research in the areas of pathways and process mapping , providing practical guidance. There is little evidence at present of actual experiences and methods for monitoring pathways , or practical insights into implications of this type of approach.

S26.　　**Draw on experience from other agencies around organisational learning.** Other agencies have valuable experience of organisational and institutional learning from, notably the CGIAR experiences with Institutional Learning and Change (ILAC). Collaboration around this issue would be beneficial in order to share experience and not 'reinvent the wheel'.

S27.　　**Increased attention to capacity building** Documentation and dissemination of M&E experience can go a long way to enhancing capacity, but practical capacity needs also to be strengthened through cross-

fertilisation of ideas and experience between projects and programmes through the lifetime of the strategy.

M&E and Development of the New Strategy

S28. **Develop an M&E and Impact Assessment Strategy from the Outset** It is important to avoid the challenges and frustrations regarding understanding levels of M&E and respective responsibilities within the new strategy. It is advisable to develop a framework and strategy for M&E/IA from the outset. This should outline objectives, expectations, different levels of M&E/IA at different stages, clarify roles and responsibilities at the different levels/ stages and how the systems contribute to longer term impact assessment. The need for baseline data and common indicators should also be set out. This would not constitute strict guidelines as regards methods as appropriate methods for data collection can be left to institutions.

S29. **Take steps towards harmonisation of M&E with other donors** Many projects with multiple sources of funding find they have a number of different reporting requirements. Given the move towards more collaborative types of research systems, this is likely to occur more and more. Taking steps towards matching reporting demands across institutions is important but will require a new 'way of working'.

S30. **A greater allocation of resources for M&E** Sufficient allocation of staff and financial resources is vital for developing effective M&E systems . A failure to ensure the spending of a reasonable proportion of resources on this important aspect of programme and project management is likely to reduce internal learning and result in poor performance.

S31. **Ensure lesson learning and collaboration occurs within and between regional programmes, as well as with other elements of the strategy.** The new strategy will comprise a number of different programmes in different regions of the globe, as opposed to the UK institutions of the RNRRS (with 5 of the 10 programmes managed by one UK institution). It will be important to ensure that more effort is placed on facilitating learning across the programmes and seeking areas for potential collaboration.

S32. **Foster organisational incentives and a culture of learning.** The development of a genuine organisational culture of learning and reflection in the new strategy will be a huge challenge, but a critical one if the approach is to flourish. Institutional incentives are needed, as well as individual's capacity in order for effective learning.

1. Introduction

1.1 Purpose of Study

1. This study is one of a number of syntheses studies which have been commissioned by the Renewable Natural Resources Research Strategy (RNRRS) in order to document new knowledge and draw lessons from the eleven year research strategy. The RNRRS has been operating from 1995 to 2005, with ten (originally eleven) individually contracted research programmes, which have together managed over 1600 research projects worldwide. A huge amount of knowledge has been created over the lifetime of the strategy and this study aims to synthesise and distil some of the new knowledge which has been generated about monitoring and evaluation methodologies, in the light of current literature.

2. Effective monitoring and evaluation (M & E) is increasingly important within international development for accountability and informing decision-making. Research funders aim to ensure that the work that they support makes efficient use of resources, and that the resulting work is taken up, applied, and results in longer term positive development outcomes for poor people. M & E also feeds into strategic decision making as to where and how to allocate resources. Learning has more recently been accepted as a focus of M&E - in order to ensure progress towards the research goal is effectively achieved, to keep track of changes in the research environment, and adapt processes to take account of lessons learned.

3. DFID's Research Funding Framework (2005-2007) states that in order to maximise the impact of centrally funded research on the achievement of the Millennium Development Goals, progress needs to be made on monitoring and evaluation[1]. This study aims to contribute to this, by providing a body of knowledge, synthesised from RNRRS projects, that is relevant specifically to DFID's principle interest of how monitoring and evaluation can be used to improve pro-poor impacts of research.

4. This paper by no means claim to be a comprehensive review, but rather a synthesis of new knowledge generated. It explores the implications for DFID's future research and development policy. Knowledge gaps are identified, and research questions formulated with respect to how monitoring and evaluation of natural resources research can better achieve pro-poor impacts.

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[1] This is one of 5 key areas including: 1) focus on the right research priorities; 2) strengthen collaboration with other UK funders of research with application for developing countries; 3)contribute to better co-ordination among research financiers internationally; 4) strengthen links with the private sector

1.2 The Renewable Natural Resources Research Strategy

5. DFID's Renewable Natural Resources Research Strategy (RNRRS) constituted one of the sectoral strategies designed 'to help the resolution of problems faced by the poor in developing countries'[2]. As stated above, it was functional from 1995-2005, and encompassed over 1600 projects worldwide. Support was given to 10 (initially 11) research programmes managed on behalf of DFID by academic and private sector institutions in the UK.

6. The Goal of the RNRRS framework was the alleviation of poverty, the promotion of economic growth and of economic reform, and the mitigation of environmental problems. The outputs were the removal of researchable constraints to economically and environmentally sustainable renewable natural resource development or resource management, with demonstrable impact on productivity, productive potential and/or production achieved within the 10 years of the strategy. Research projects were to be demand-led, and contribute to Programme Purpose as well as as benefiting project stakeholders by responding to clearly defined problems.

7. All research had to focus upon one or more resource / commodity system in whch the RNRRS was arranged, namely tropical-moist forest, forest-agriculture interface, land-water interface, hillside, semi-arid, high potential, peri-urban interface. The different natural resource systems clearly have bearings on M&E systems as will be discussed later.

8. Projects were differentiated by their type, relating to DFID's Poverty Aim Markers. Projects that were 'enabling' were those which aimed at policy or institutional change necessary to ensure benefits to poor people (such as the majority of FMSP projects). Those that were 'inclusive' referred to initiatives where wider social groupings including poor people benefited from the project. A project referred to as a 'Focus' project indicated that the primary aim of the project was to ensure a more exclusive focus on benefits to specific groups of poor people.

9. The ten contracted out research programmes and their relative size (in spend) are shown on Table 1 below:

Research Programme	Contracted Institute	Relative Expenditure by Programmes[3]
Animal Health (AHP)	University of Edinburgh	9%
Aquaculture and Fish Genetics (AFGRP)	University of Stirling	4%
Crop Post Harvest (CPHP)	Natural Resources International	13%
Crop Protection (CPP)	Natural Resources International	26%
Fisheries Management Science (FMSP)	MRAG ltd.	2%
Forest Research (FRP)	Natural Resources	14%

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[2] DFID 2000, Guidance Notes for Programme Managers
[3] Expenditure by programmes 1995/6-2001/2 in PARC 2003

	International	
Livestock Production (LPP)	Natural Resources International	8%
Natural Resources Systems (NRSP)	HTSPE Ltd. since 1999. Pre 1999 - DFID.	14%
Plant Sciences (PSP)	University of Wales	8%
Post Harvest Fisheries (PHFRP)	Natural Resources International	2%

Table 1:   RNRRS Research Programmes

10. The strategy evolved over time in response to the changing context and expectations, as discussed further in Section Three.

1.2 Research Methodology

11. The purpose of this synthesis is to assemble, develop and promote new knowledge on how monitoring and evaluation of research at the project level can be used to improve pro-poor impacts, in order to formulate research questions and guide policy priorities within or outside DFID (see ToRs Annex 1). This was to be achieved through identifying and analysing relevant project level experiences, comparing experiences with a review of the general research M&E literature and drawing relevant lessons and recommendations for future practice.

12. The review of relevant literature provided insight into what were typical M&E expectations and what could be referred to as 'innovative' and 'new knowledge'. A typology was developed which provided a conceptual framework for thinking about M&E/IA and for grouping the methodologies. DFID guidance was explored by reading relevant RNRRS documents, reflecting upon subsequent reports and carrying out interviews with Programme Managers. The DFID RNRRS Guidance Notes provided some information about responsibilities and roles for M&E/IA. A number of RNRRS strategy wide evaluation studies gave reflections on the value and use of the guidance. Programme managers were interviewed about how they used the guidance, their perspectives and what programmes and projects tended to actually do in terms of M&E/IA.

13. The review of projects was the most substantial aspect of the research. All of the ten programmes were considered. Given the huge amount of information generated from the ten programmes and 1600 projects, programme managers were contacted and asked to 'signpost' projects which would provide relevant information regarding new knowledge generated within M&E/IA methodologies. Information was gathered through contacting project leaders, downloading documents and collating all relevant materials. Although a great deal of energy was devoted to persistent information gathering, in a few cases project leaders failed to respond to requests for information. A 'sifting' process took place of all information collected in which the more innovative methodologies were pulled out, and considered in the light of the current literature. Due to the length of the RNRRS, the lapse of time and staff changes some interesting examples may not have come to mind and could therefore have been omitted from the study.

2. A Literature Review of Monitoring, Evaluation and Impact Assessment

14. The purpose of this section is to review some of the broader thinking around monitoring and evaluation of natural resources research and to develop a framework which will inform later sections which explore in more detail the M&E activities with RNRRS. Monitoring and evaluation always requires a certain amount of clarification given the multifarious use of the terms, such as outputs, outcomes, impacts.

2.1 Defining M&E

15. Broadly speaking, monitoring is carried out in order to track progress and performance during the process of research implementation as a basis for decisions for subsequent steps in the research process and to contribute to accountability for the use of resources. Evaluation, on the other hand, is a more generalised assessment of data or experience to establish how far research has achieved its immediate objectives (including implementation, outputs and outcomes). The term impact assessment is used broadly, often embracing evaluation and assessment of outputs and outcomes as well as long term impact ends (Horton et al 1993). In this report it is used to denote the measurement of developmental impact which is hoped to result from research. Challenges associated with impact assessment, and the reasons for limited focus on this aspect in the synthesis will be considered later in this section. Table 2 highlights the distinction between monitoring, evaluation and impact assessment.

	Monitoring	Evaluation	Impact assessment
Timing	At the time or shortly afterwards Frequently	Often at end of an initiative Periodic	After certain time following completion of initiative
Analytical Level	Mainly descriptive, recording inputs, outputs and activities	More analytical than monitoring and examines processes, outcomes	Mainly analytical and concerned with longer term and more diverse poverty
Specificity	Very specific – compares a plan and its results	Same as monitoring , but also looks at processes outcomes	Less specific and in addition considers external influences and events

Table 2: What is M&E/ IA (adapted from Roche, 1999)

16. An important starting point for thinking about M&E is to consider the purpose or intention of the exercise. On the one hand M&E may be employed for accountability purposes, requiring individuals or organisations to account for efficient use of funds and for effective and timely progress against proposed plans. On the other hand M&E also serves for decision making in order that improvements can be made during the planning and implementation process, and to improve future programming or strategic decision making when lessons are learned from final evaluations. Accountability and decision

making are both important aims and should ideally be linked, but in terms of incentives the balance is often in favour of accountability due to donor demands, whereas the internal incentive for improved learning for better decisions is often lacking.

17. M&E for decision making is increasingly being expanded to embrace organisational learning as an aim, in other words, not merely does M&E provide lessons to improve the project process and strategy, but should also lead to broader lessons about organisational strategy, functioning and relationships, ultimately resulting in organisational changes.

18. A further variable in clarifying what is meant by M&E is what exactly is the focus of measurement (i.e. activities, outputs, outcomes, impact etc). What is lacking in much of the literature relating to M&E of research is a clear and shared framework for identifying what M&E aims to measure. Whereas in project M&E literature there is more emphasis on monitoring at different levels, in the research M&E literature there tends to be a heavy focus on impact assessment, the term being used to embrace a huge variety of interpretations of what kind of impact is being implied (Alex, 1998).

19. A key challenge with regard to M&E is that there are many different types of research projects implying a wide range of expectations in terms of outputs, outcomes and impact, potentially requiring different methods and presenting different challenges in terms of measurement. Stirrat (2003) describes three types: 'technical' research, 'soft' research and 'policy' research, with different types of 'knowledge' being produced in each. Hard technical research might involve developing new crop varieties, new techniques of dealing with pests, or more efficient water conservation. Outputs are new technical forms of knowledge, and aims might be to increase crop productivity through technical change and innovation. Soft research is social science research, e.g. on gender, on management of common property resources; institutions and rules of the game. Outputs relate to understanding and improvements to social, economic and political context which makes people poor. Policy research overlaps with soft but with more focus on the context within which technologies are used – role of subsidies, taxation, institutions, etc. Outputs in this case involve influencing policy processes.

20. The same methods of monitoring and impact assessment are unlikely to be applicable across the board for all research disciplines and results may not be comparable. This should clearly be borne in mind when considering scaling up of particular innovative methods used within RNRRS.

21. The rest of this section will explore different frameworks and approaches to thinking about M&E in order to be able to set RNRRS experiences within this context and shared understanding.

2.2 The Logical Framework and M&E/IA

22. The logical framework (logframe) is a commonly used framework for M&E as it identifies four hierarchical levels of analysis, from inputs and activities, through outputs and outcomes (corresponding to the purpose level of the logframe) to impact (corresponding to the goal level) (see figure 1). These four levels are linked by an "if-then" logic, if assumptions are correct and risks

circumvented. It is widely used in donor programming, particularly in DFID and including the RNRRS.

Inputs and activities	→	Outputs (technology / knowledge)	→	Outcomes (direct benefits of adoption)	→	Poverty Impact (Social, economic or environment)
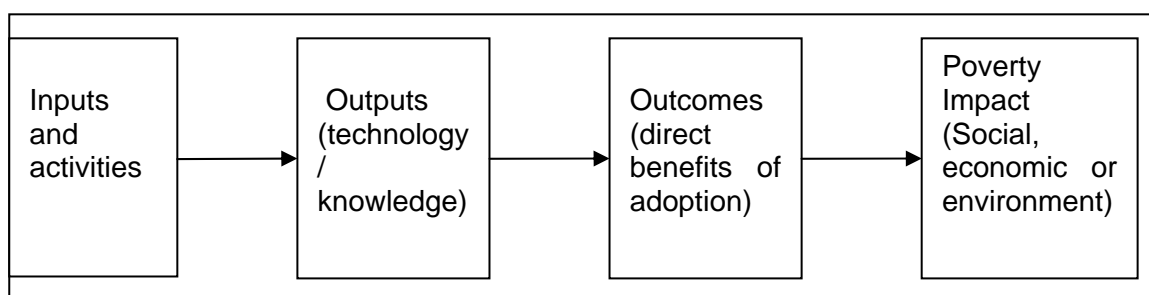
Figure 1: The Logical Framework sequence applied to agricultural research

23. Monitoring of the **inputs and activities** which are outlined in the logframe is generally demanded of most donors as an accountability measure through reporting on a quarterly and/or annual basis. However, increasing attention is being paid to the role of M&E at this level for internal learning purposes with the aim of improving performance, whether at the project or the organisational level. At its simplest, monitoring at this level plots implementation progress against proposed timescales, and resource use against budgets. Evaluation at this level implies reflection on the overall implementation strategy, the selection and successful implementation of activities, client satisfaction, and output delivery.

24. **Outputs** are the direct products of agriculture and natural resources research projects. As noted above, different types of research will produce different types of knowledge product, from new technologies, to new management techniques, or new perspectives on existing problems. Traditionally outputs have been measured in terms of journal articles, books, manuals, workshops, policy advice and new technologies. Quality has generally been measured in terms of acceptance of research outputs by peer reviewed journals. However, as much research increasingly aims to directly influence policy processes or agricultural institutions, there has been greater focus on relevance as a criteria for assessment, and the scope of potential outputs has broadened to include capacity building workshops, tailored briefing papers and the like which are targeted towards particular audiences.

25. The outputs of agriculture and natural resources research are intended to achieve some direct effect, or **outcome**, in a variety of ways: through the uptake of new technologies, other forms of change in agricultural or resource management practice, or influence on institutional or policy processes. Effects can be instrumental (actual changes in policy, practice or behaviour) or conceptual (changing peoples knowledge, attitudes or understanding of an issue) which is particularly the case with more social or policy research (Davies, et al, 2005). A relatively clear and direct relationship between outputs and outcomes can be established in most cases, as the direct target or beneficiary group are usually clearly identifiable, and it is possible to assesses the immediate usefulness of the deliverables of a research project or programme.

26. The term **impact,** as noted earlier, is used broadly, often embracing outputs or outcomes in its reach. In this synthesis impact is considered to be the product of the multiplication of outcomes or effects either spatially or temporally which result in broad, long term economic, social and

environmental changes in livelihoods. Impacts can be measured against indicators such as income, well-being, social inclusion, vulnerability and food security. Achievement of impact is usually considered to be outside of the direct spatial and temporal reach of the research programme being dependent on a wide variety of factors which are beyond the control of researchers themselves, i.e. supportive policy context; institutional willingness; or appropriate market context (Alex 1998).

27. A large proportion of the literature relating to monitoring and evaluation of agricultural research addresses itself principally towards the issue of impact assessment, often immediately coming up with a number of reasons why this is a difficult undertaking (Hartwich and Springer-Heinze 2004, Stirrat 2003). As Stirrat (2003) warns: "to talk of 'impact' can open up an uncontrollable and unmanageable Pandora's box. Impacts of a research project can in theory be infinite" (p2)

28. The key question is: what is impact? What is usually implied is impact on poverty, however there is little agreement on the definition of poverty, and the very ways in which poverty is conceptualised will have different implications for how the impact of research will be understood and assessed. Stirrat (2003) highlights three broad approaches to poverty: productivity; income measures; and more holistic understandings of wellbeing, such as that proposed by the sustainable livelihoods approach. These will result in contrasting research aims: to maximise productivity; to increase incomes; or to improve livelihood sustainability and wellbeing. Clearly these different aims impact on the choice of methods for impact assessment.

29. Attribution poses a key challenge. It is frequently difficult to establish a cause and effect relationship between research and impact due to the influence of other contextual factors which might also be having an influence. The causal links become weaker where there is more complexity and a greater number of steps between outputs, via outcomes to impact. Furthermore, the moment at which impact will occur is also hard to predict and may not occur for many years after a project is completed, when conditions for uptake become favourable. Time lags in agricultural and natural resources research are particularly long, particularly in forestry where impact may not be visible for several decades after project completion. Where impact is dependent on creation of other supportive environmental factors it can be difficult to predict when impact might be expected to occur. (Hartwich and Springel Heinze 2004).Therefore knowing when is an appropriate time to measure impact is a further challenge.

30. Kuby (1999 cited in Douthwaite 2003) argues that due to the spatial, temporal and logical "impact gap", impact assessment should be viewed and carried out quite independently of other aspects of project monitoring and evaluation using triangulation of data sources to build a persuasive case.
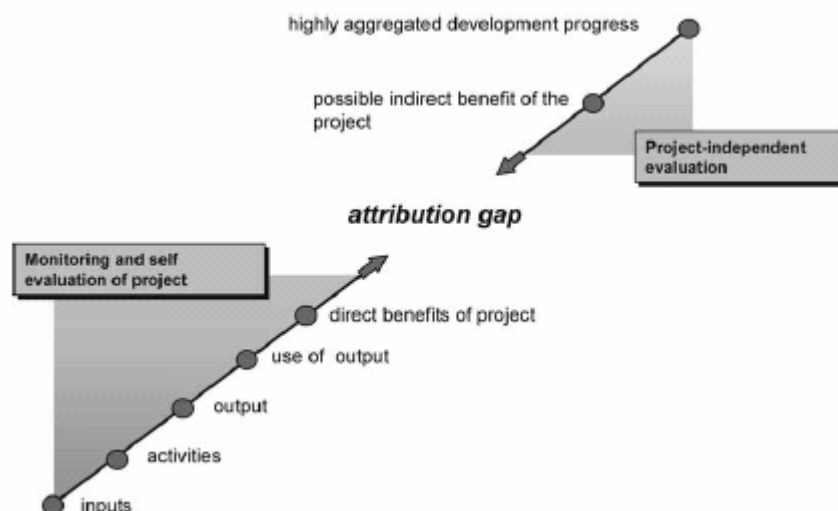
Figure 2: The GTZ Impact Model after Kuby 1999, taken from Douthwaite et al 2003

2.3 Beyond Logframe-Based Monitoring and Evaluation

31. The simple linear causality of the four stages in the logframe based impact chain described above fails to capture the complexity of the intervening processes that tend to take place in reality (Springer Heinze et al 2003, Shaxson, 1999). Impact is not always direct or linear. The relationships between output and outcome, and between outcome and impact, are dependent on processes or pathways which facilitate or obstruct the adoption, adaptation and transformation of research technologies and outputs and their eventual impact on people's livelihoods. These should be the subject of greater emphasis and monitoring in order to ensure that activities and outputs are, over time, likely to have the impact intended (Springer Heinze et al 2003, Shaxson, 1999).

32. A project can be highly successful in producing the outputs it proposed in the logframe, which may meet quality standards within the research community. However, this alone does not guarantee that research will be applied in local agricultural practice or sector policy decision making. Furthermore, even where a research project may have a successful local level outcome in terms of technology uptake or influence on key decision makers, to ensure that outcomes are translated into impacts (e.g. increased production, higher incomes, improved livelihoods), other factors may need to be in place (credit systems, marketing mechanisms, supportive policy, etc). Increased attention is being paid to understanding the pathways from output to outcomes, and from outcome to impact (Hartwich and Springel Heinze 2004).

2.3.1 Pathway Analysis

33. Uptake, outcomes and impact pathway methods attempt to construct possible sequences of events that will lead from inputs to outputs, outcomes and impact, recognising that these may be complex, dependent and multi-stranded. They place research processes within the social and political context both at local and at national level, taking into consideration the wide range of factors or processes which filter, obstruct or enhance the ways in which research outputs achieve an outcome or impact, and can be both within and outwith the influence of project strategy.
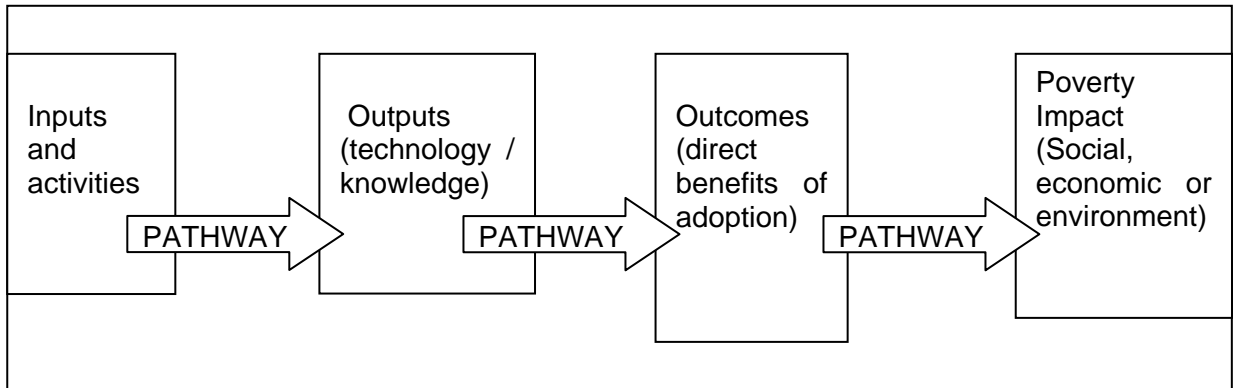
Figure 3: The Logical Framework sequence including pathways between different levels

34. The simple generic sequence of the logical framework (activities, outputs, outcomes, impact) serves as a starting point for pathway analysis, but rather than looking at the products of each stage, the focus is on mapping and monitoring the process of moving from one stage to another. This raises questions such as how the information or technology is being packaged and communicated to ensure it effectively reaches the appropriate audience; or whether the institutional and political relationships between researchers and expected research users have been established or strengthened to increase the possibility that findings or technologies are adopted? (Shaxson 1999). Whilst there is an increasing literature describing the benefits of impact pathway analysis, and describing the construction of the pathways, less attention has been paid to how and when to monitor them.

2.3.2 Monitoring the Institutional Context

35. The impact of research is largely governed by the context in which research is implemented or disseminated and therefore understanding and responding to changes in context is key in order to ensure an appropriate environment for successful impact of a new technology or policy advice (Cox et al.; Shaxson 1999). Contextual analyses, such as stakeholder analysis, institutional analysis or gender analysis, are often carried out at the outset of the project or programme, but in order to effectively respond to changes in the context, such baselines should be regularly monitored and feedback mechanisms applied to adapt projects or programmes appropriately in response to change. Contextual factors are often highlighted in the risks and assumptions column of the logframe, but tend to be considered beyond the control and influence of the project and do not tend to be the subject of attention unless or until they do in fact become realised. However, rather than treating these factors as uncontrollable, they should be monitored to ensure that alternative strategies are quickly sought if risks are realised or context changes (Stirrat 2003).

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POVERTY AND POLICY CONTEXT

Inputs          Outputs          Outcomes         Poverty
and             (technology /    (direct          impact
activities      knowledge)       benefits of      (Social,
                                 adoption)        economic or
         PATHWAY         PATHWAY         PATHWAY   environment)
```
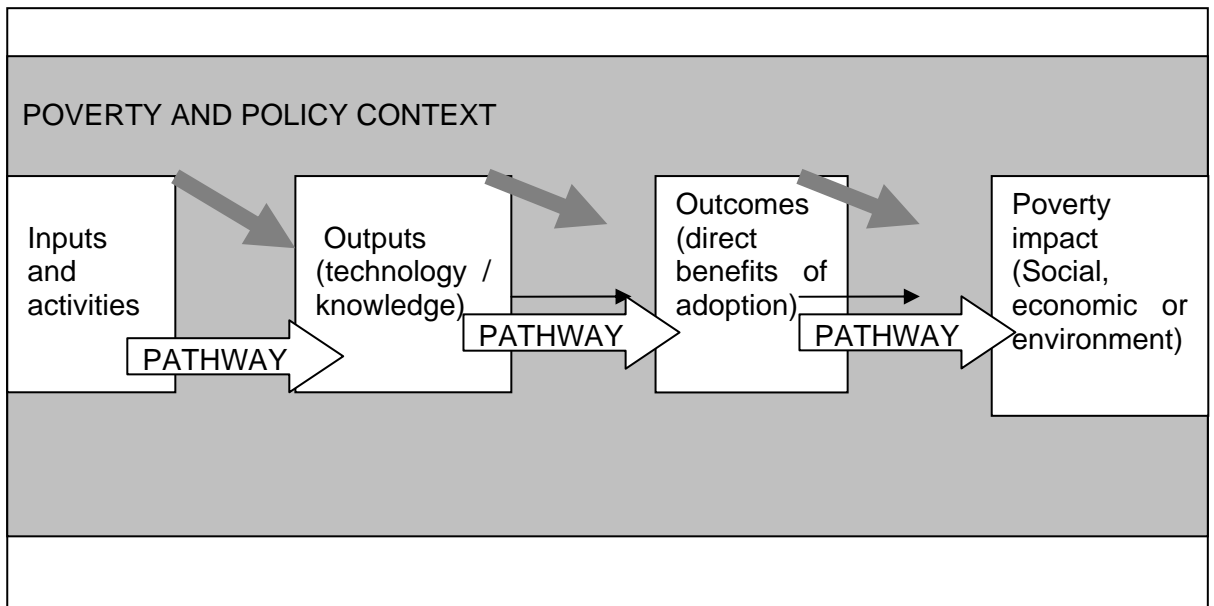
Figure 4: The Logical Framework sequence including pathways between different levels and illustrating the poverty and policy context

36. The National Systems of Innovation (NSI) approach offers a similar conceptual framework for understanding the institutional context of agricultural technology and processes of change by mapping the associated web of actors, relationships and activities. Based on work on how private companies behave in market-driven economic systems by Freeman (1987) and Lundvall (1992), the concepts were developed in the agricultural context in the developing world under the Crop Post Harvest Programme by Hall and others at ICRISAT in India. They contend that innovation emerges from interaction and knowledge flows between research and entrepreneurial organisations in the public and private sectors. It involves an interactive learning process involving a variety of scientific and economic agents (Hall et al 2003). Thus, innovation has multiple sources (not just formal research organisations) as well as multiple routes to impact on policy and practice. As new innovations take place, the innovation context will evolve in response to them (e.g. institutions such as intellectual property rights regimes emerged as a result of biotechnology developments). This iterative and complex evolution of systems is simultaneously driven by technology and user demand. All elements or actors within the system are continually learning and hence the system is continuously evolving.

37. The NSI approach implies a fundamental shift in the approach to research management from aiming towards narrowly defined impacts on poor people, to building an innovation system which leads to this end. There are a number of key implications for M&E which result from this shift in thinking. Evaluation must clearly address itself toward systems changes, i.e. changes in the interactions within the research community and its interactions with other organisational and institutional contexts, as well as the more conventional outcomes for poor people.

2.3.3 Organisational learning

38. What Hall et al (2003b) call for now is what is termed institutional or organisational learning. This implies behaviours, attitudes, relationships and

activities which support individual and collective reflection and learning from both positive and negative experiences. It is based on the premise that "*improved performance requires a spirit of deliberate and critical self-awareness amongst professionals and an open culture of reflective learning within organisations – a culture that encourages the identification and examination of less successful research paths to help direct changes in objectives strategies and methods. In such an environment, errors and dead ends are recognised not as failures but as opportunities for both individual and institutional learning that can lead to improved performance*" (Watts et al 2003:3). The CGIAR (co-ordinated by IPGRI) have done considerable work in this area terming the approach Institutional Learning and Change (ILAC). Much emphasis is placed on an organisational culture and systems that stimulate, support and reward new ways of systemic reflection and learning. It recognises that research institutions must encourage and enable open and critical reflection through fostering a supportive environment and non-hierarchical relationships.

39. There are important implications in terms of the need for new skills to help researchers to learn more effectively, to learn collectively and to incorporate lessons learned, as well as appropriate institutional incentives and time allocation for this purpose. (Hall et al 2003b)

2.3.4 Summary

40. The above section has discussed the rudiments of monitoring and evaluation and explored the recent literature of both M&E and IA at different logframe levels and beyond. As such, it has provided a conceptual framework in which to discuss both reporting requirements and the new knowledge generated from the RNRRS, i.e.

  ➢ M&E of activities
  ➢ M&E of outputs
  ➢ M&E of outcomes
  ➢ Pathway analysis and monitoring
  ➢ Institutional analysis / organisational learning

3. RNRRS Background and Expectations for Monitoring and Evaluation and Impact Assessment

41. This section explores the M & E/IA reporting requirements for the RNRRS, based on a review of the DFID guidance notes for RNRRS Programme Managers and reflections in RNRRS reports and by Programme Managers (through personal communication). First, it is important to consider the wider development context and changes within DFID which shaped the RNRRS strategy and affected 6+the expectations for M&E systems within that strategy.

3.1 DFID context and expectations

42. There have been considerable changes in organisational structure and priorities within DFID during the lifetime of the RNRRS, which have had implications for the focus and expectations of the research strategy and for monitoring and evaluation of the strategy, programmes and projects.

43. DFID's White Paper in 1997 'Eliminating World Poverty: A Challenge for the 21st Century' placed poverty reduction at the centre stage of all DFID's work and significantly moved its focus from outputs to impacts and towards achieving the Millennium Development Goals (or International Development Targets as hitherto known). Although the RNRRS always had poverty reduction as one of its overriding goals, the shift in DFID policy led to a greater emphasis on the nature of poverty and poverty reduction and there was considerable reworking of RNRRS programme logframes and guidance to incorporate this shift.

44. At a similar time the multidimensional aspects of poverty became more familiar development parlance, thus requiring a more multi-disciplinary approach to research. Those RNRRS programmes adopting a systems approach such as the Natural Resources Systems Programme (NRSP) have incorporated social science research from the outset and those focussed upon commodities such as Livestock Production Programme (LPP) and Plant Science Programme (PSP) have substantially increased multidisciplinary research in recent years (LTS 2005)

45. The adoption of the sustainable livelihoods approach by DFID in 1999 also implied changes for RNRRS programmes and projects. It helped to convey and conceptualise the multidimensional aspects of poverty and linkages between people's assets and the policy and institutional context. RNRRS projects have adapted it to different degrees with for example FRP and LPP using the framework as a tool for prioritising interventions (LTS 2005). At a similar time, the RNRRS's 'home' within DFID amongst the Natural Resources cadre was renamed the Rural Livelihoods (and more recently Livelihoods) cadre.

46. During the period of the programme, there has been a significant move away from projects to programmes and budget support, which has had considerable implications for the RNRRS in terms of uptake and

dissemination of its work. The DFID country offices and their portfolio of projects were considered to be the target audience of the research at the outset of the RNRRS. However since the number of projects has been reduced, DFID no longer sees itself as the primary client for RNRRS research (LTS 2005). It sees it rather as a public good and thus the projects and programmes have had to explore other dissemination and uptake pathways in order to reach relevant audiences.

47. The RNRRS review (LTS 2005) noted that Programme Managers have successfully adapted the approach and scope of their programmes to these changes as shown in the focus and balance of the work, supported by the high degree of flexibility given by the Central Research Department (CRD). In the area of M&E there have clearly been knock on implications of these 'shifting goalposts' which were not always clearly articulated by DFID to Programme Managers. Only minor revisions were made to the 1995 Guidelines to Programme Managers (known as the 'Yellow Brick'), rather than a substantial re-write. PMs did, however, respond to varying degrees, e.g. through a greater focus upon exploring links between project outcomes and effect on poverty, in its multidimensional nature, and tracing uptake pathways though target institutions other than DFID, which will be discussed further in later sections of the report.

3.2 M&E/IA Reporting Expectations

48. As stated earlier the principal focus of this study is on monitoring and evaluation at the project level as this was the extent of requirements of the Programmes from DFID. Programme level and strategy–wide monitoring and evaluation or impact assessment were the responsibility of DFID and are not included in the ToRs of this study. This section however contextualises project level M&E requirements within the wider context RNRRS strategy and touches on programme level M&E and impact assessment activities to give a complete picture.

49. The RNRRS guidelines were based around the then-recently introduced Logical Framework approach. Projects and programmes were expected to fit in a nested manner into the overall strategy as illustrated in Table 3. The reporting requirements for project M&E/IA were set out in the 'Yellow Brick' Guidelines to Programme Managers. The guidance notes clearly state that "*monitoring projects and their contribution to programme outputs is a function of programme management whereas monitoring programmes and, periodically, evaluating the impact of programmes, in whole or in part, is a DFID responsibility*" (DFID, 2000, 5.03). Programme Managers were therefore expected to ensure monitoring of project performance and the delivery of the output set for projects. Whilst not expected to monitor or evaluate programmes per se they were to produce an annual review of the progress of their programmes, highlighting potential impact on development problems and identifying the clients for research outputs and the uptake packaging, promoting and uptake of research outputs (DFID 2000, Annex D 3 of 6 key tasks).

RNRRS STRATEGY LEVEL	RESEARCH PROGRAMME LEVEL	RESEARCH PROJECT LEVEL
GOAL Poverty reduced, economic growth and reform promoted, national environmental problems mitigated.		
PURPOSE Productive capacity in the RNR sector enhanced on an economically and environmentally sustainable basis	GOAL Productive capacity in the RNR sector enhanced on an economically and environmentally sustainable basis	
OUTPUTS Researchable constraints removed	PURPOSE Researchable constraints removed	GOAL Researchable constraints removed
ACTIVITIES Research products packaged and their uptake promoted	OUTPUTS Research products packaged and their uptake promoted	PURPOSE Research products packaged and their uptake promoted
	ACTIVITIES Research results created and adapted: promotion pathways established	OUTPUTS Research results created and adapted: promotion pathways established
		ACTIVITIES Research studies, surveys, experiments etc designed and implemented and promotion pathways identified

Table 3: Nested logframes of the RNRRS

50. The Guidelines set out that PM's should produce a quarterly financial report and an annual programme report which would contribute information and data to DFID's RNRRS strategy-level monitoring by:
    ➢ assessing progress towards delivering outputs and therefore towards achieving Programme purpose
    ➢ assessing financial performance
    ➢ ensuring efficient and effective management
    ➢ informing decisions on future priorities and uses of funds

51. The use of the logframe was central to M&E within the RNRRS, however there was often huge variation in the quality and detail of logframes produced by projects and as a result in the quality of reporting against them. Furthermore, the focus of logframes is on activities, outputs and outcomes, whereas increasingly in many projects, as discussed in the literature review, it

is the processes followed in the projects that are most valuable. These are not highlighted within the logframe and are therefore often not reported against.

52. The RNRRS evaluation (LTS 2005) argued that if the value of the logframe, and in particular the nested logframe used in the RNRRS, is to be fully captured then monitoring should be carried out across all parts of the logframe: activities, outputs, purpose and assumptions. For coherence across the strategy, the system should be linked into a strategy-wide, co-ordinated M&E/IA framework.

53. The next section discusses reporting requirements in more detail by examining M&E of activities and outputs, monitoring and evaluation or outcomes and project reviews before going on to discuss RNRRS-wide M&E.

3.2.1 Monitoring Responsibilities at the Project Level

54. Quarterly reports, produced by Project Leaders, were the key tool employed to monitor progress at activity to output level and to provide an overview of progress particularly in relation to project purpose using the indicators of achievement as milestones. The main purpose of quarterly reports was to detail expenditure with a very brief narrative (no more than 2 sides) with an overview of project achievements and developments.

55. A final technical report (FTR) was requested at project completion and included detailed information about project purpose, research activities, outputs and contribution of outputs to developmental impact. Programmes placed different degrees of emphasis on the Final Technical Reports (FTR). Based on a perceived lack of interest by DFID in FTRs, some programmes reduced the level of importance attached to these and projects were encouraged to devote their energy towards outputs (such as published papers) rather than the FTR. Other programmes continued to give it a high priority and it may go through one or two iterations before the Programme Managers (PM) will accept it. Some programmes assessed FTRs internally whilst others such as FMSP requested external peer reviews.

56. Research quality was largely measured through bibliometrics - the quantitative analysis of information about publications and their use. Initially most programmes required one to three peer reviewed journal articles as an indication of research quality. Publication output measures the number and body of research outputs produced to assess publication impact. The number and types of acceptable outputs broadened in more recent years to cater for Southern users and different stakeholders (some non academics) for example the Forestry Research Programme changed acceptable outputs from 1 academic paper every 3 years to any of 100 or more different types of output as long as they meet the needs of clearly defined audiences.

57. Whilst some PMs felt that the quarterly and final technical reports could be 'bureaucratic' and 'cumbersome' for project staff, many then mentioned the importance of routinely informally catching up with project leaders, whether for general purposes or to follow up on specific issues 'signposted' by the quarterly reports. Such personal contact has been considered extremely important by those programmes. In some cases dialogue with projects is daily

or weekly so relationships and understanding of project progress is really quite close. Involvement by PMs varies from programme to programme. In the case of the Plant Science Programme (PSP) both the PM and deputy PM have been active researchers on projects and as such have been heavily involved. For others it has evolved over time, for example Forestry Research Programme (FRP) moved in 1999 to a more proactive approach to project monitoring and the programme manager stated that there has been about 9 times more correspondence since then.

58. In 2000 CPHP changed their quarterly reporting format to allow a greater degree of self assessment of progress. Quarterly reports required reporting on assumptions and their status, i.e. changes in the external roles and relationship, such as policies, regulations etc that may affect the institutional context of the project. The flux of partners moving in and out of projects is monitored through the self monitoring and assessment by the projects (action research). The Final Technical Report was also then required to include more reflective self assessment of the research process. In terms of methods (i.e. indicator development, Means of Verification, process and skills required) these are the project responsibilities and new projects were required to provide this information under the new project M&E guidelines.

59. Alongside the regular reporting, the DFID Guidance Notes stated that research projects should also be evaluated through the use of independent external reviews. Visits to project sites and regular meetings with project management were recommended. Project reviews, the Guidance states, should be carried out by Programme staff (e.g. members of the programme advisory committee, PAC) with other key stakeholders including other donors, primary stakeholders and the implementing agency. These should take a strategic view, assessing progress to achieve project purpose and goal. Such internal reviews (mid term reviews, or output to purpose reviews) were carried out by programmes to varying extents. For some, it was built into the project cycle management, whilst for others it was rather more ad hoc.

60. On the whole guidance and support to Project Leaders in relation to M&E appears to have been satisfactory, but limited in its encouragement of innovation. Some programmes identified an M&E advisor as part of the programme advisory committee to support projects, however their role seems principally to have been in support of routine reporting, e.g. to respond on issues raised in reports, or assist in reviews and external evaluations, rather than supporting projects in the development of innovative M&E tools and methods.

61. Several programmes developed their own guidance for M&E, in many cases merely reiterating the DFID guidelines, but in some cases making more specific recommendations. NRSP produced a guidance paper on participatory M&E, and CPHP more recently developed guidance on developing a monitoring plan, and required a stakeholder monitoring table (outlining responsibilities) and a monitoring framework (for outputs and purpose) as part of project inception report. Wide participation in monitoring by all coalition members, rather than just the managing partner, was encouraged. Partners are expected to generate their own monitoring data, e.g. recording institutional events, as integral to the project activity. The format for this might be narrative, such as a diary. Monitoring of changes in the institutional context are given particular emphasis.

3.2.2 Monitoring at the Programme level

62. Annual reports were the key mechanism by which PMs monitored progress at activity to output level and covered programme management strategy, delivery of outputs, uptake promotion and progress review against milestones amongst other information. Delivery of outputs comprised summarised success of projects; whether reporting by project leaders is adequate and timely; and details of peer-reviewed (and non peer-reviewed) project publications, and other reports and datasets. It also required information about uptake promotion (see below).

63. It was largely felt that the guidance which was given to programme managers was limited, and open to interpretation. One PM stated that the guidance could be rigid and awkward at times, for example requesting references in a format different to that requested elsewhere. Some PMs interpreted the Guidance as providing the flexibility to manage as they saw fit. One PM mentioned that DFID management was via 'signals' rather than through guidance, and that the Guidance Notes were not sufficiently adapted to meet the changing context and expectations.

64. Feedback by DFID to the annual reports was variable according to the responsible staff member in the DFID research division at any one time. However, it was felt that feedback deteriorated in quality and timeliness towards the end of the 11 years.

65. The annual report required information about uptake promotion and the extent to which research was being adopted in policy and practice. It included an explanation of the approach taken to the promotion of project outputs for uptake by target institutions; identification of action taken to promote uptake with examples; and recording evidence of progress towards achievement of developmental impact, especially in relation to programme purpose-level objectively variable indicators (OVIs) and associated interim indicators. In terms of impact, the A-H scale (see below) was used to present a rapid and simplified picture of progress towards impact in project portfolio.

DFID Key to Scoring for Uptake Pathway:
A - Generation of relevant research results
B - Formal/informal agreement with target institutions
C - Development of appropriate research-based products through adaptation/packaging
D – Promotion of products into target institutions
E – Adoption of products by target institutions
F – Application and replication of results in target institution programmes
G – Promotion of technology or behavioural change among end-users by target institutions
H – Adoption of technology by end-users and generation of economic benefits

66. This was the only requirement in terms of tracing outcomes for many years of the RNRRS, which as stated earlier was the responsibility of DFID rather than PMs.

67. In order to facilitate more learning and exchange between projects, some programmes such as The Plant Science Programme (PSP), Animal Health programme (AHP) and the Crop Protection Programme (CPP) grouped

projects into clusters. Some arranged workshops across clusters which has provided opportunities for feedback and some degree of cluster level monitoring. The Crop Protection programme (CPP) has a team of external Programme Advisors who 'look after' clusters of projects and are responsible for monitoring those projects' progress through checking their workplans and reports, and completing a monitoring report. The Crop Post Harvest programme (CPHP) similarly use regional advisors to oversee and advise clusters of regional projects.

68. In the latter years of RNRRS the some reviews were commissioned by programme managers to look at impact across projects. AFGRP carried out two external reviews in 2002/03 as well as an impact study undertaken by the Cambridge Resource Economics of selected projects within the four fisheries programmes in 2000 (FMSP, PHFRP, Aquaculture and Fish Genetics which was later merged into AFGRP). FRP selected a total of 5 ongoing medium-length projects a year that use point-in-time questionnaire information to look at 'impact' in greater detail. PSP developed tables for scoring the impact of research outputs and research themes and to explain the impact pathways of the programme's outputs (participatory baseline data was collected in the 1st year of each PRSP project). CPHP commissioned an impact assessment of their programmes in Ghana – only one country due to lack of funds available for more. They also commissioned a study on the impact of the National Systems of Innovation (NSI) approach (in progress). LPP, FRP and CPP also carried out IA of clusters of projects, even though DFID did not require this and even discouraged them.

69. NRSP began to look at the issue of impact assessment in 2002, by commissioning a study into methods for tracking the research uptake and developmental impact of NRSP funded research. The study focused on selected projects to distil best practice on tracking uptake and impact and developed methods. NRSP aimed to investigate the potential for integrating impact tracking into the activities of projects, thus taking a strategic approach. NRSP also developed a Conceptual Impact Model (CIM) which defined five generic stakeholder domains which specify the beneficiaries with whom the programme can achieve or make progress towards developmental impact through research uptake. The RNRRS evaluation (LTS 2005) comments that this can be linked to the A-H Pathway and usefully used as a basis for a general impact monitoring tool.

70. FMSP commissioned and carried out an overview of developmental impact across the FMSP in 2005. It assessed and summarised the impact of 11 project clusters using a mix or internal and external reviewers (Arthur et al. 2005). Interestingly, it concluded that at the programme level the means of tracking and illustrating impact and potential impact used was helpful but that it would also be useful to provide an assessment of the project clusters using innovations systems indicators.

71. PHFRP has also commissioned impact studies to look at its three phases of work: technical (1995-2000); policies, institutions and processes (2001-2004) and action research (2004-2006). The first of these studies has been completed and emphasised that seeking poverty impact was unrealistic given that this was not the original goal of the programmes. The review team reported that *"…it seems unlikely to the team that there has been much impact on poverty and that the benefits of better fish handling probably accrue to fish traders. This is not surprising given that FLAC* [i.e. the package of

outputs from projects undertaken prior to 2000] *was not originally conceived of in terms of direct poverty eradication but rather in the wider context of encouraging the more efficient use of natural resources, as a means of measuring post harvest losses to focus and direct development needs..."* (PHFRP Annual Report 2004-2005)

72. Many of the above examples monitor direct effects of project outputs and largely took place at the end of a project (and do not allow a time lag felt necessary for impact assessment), and would thus be termed as outcome assessments or evaluations in this study.

3.3 RNRRS Strategy-Wide Impact Assessment

73. Three levels of expected impact were identified by DFID in its guidance notes to programme managers: impact on science; impact on development; and impact on public and official perceptions of RNRRS. Impact on tropical science is said to be generated by the publication of results in appropriate peer-review journals. It goes on to say that impact on tropical development is achieved when research results are translated into actions, policies or investments and successfully implemented. For this to occur it states that an uptake pathway must be clearly identified and planned from the outset when projects are being designed. The third area – impact on public and official perceptions of renewable natural resources research – focuses upon making information available in formats appropriate to their purpose. These three areas of impact were not prioritised in any way.

74. As noted earlier, DFID did not require Programme Managers to plan or undertake programme wide impact assessment as part of their responsibilities. This was clearly stated as being DFID's own domain in the Yellow Brick. In 1997, a study was commissioned regarding monitoring the impact of the RNRRS, undertaken by Brown. It concluded that there was little justification for routine impact assessments given that the cost was too high to be justified on a general basis, which might explain the lack of attention to this issue until late in the strategy's time frame.

75. The introduction of the SL approach and growing focus on policy outcomes as a priority alongside technical outputs were significant. DFID began to put more emphasis on impact, commissioning an evaluation of impact on sustainable livelihoods in 1999 (DTZ Pieda). Programmes followed this lead and shifted focus to maximising uptake and impact and looking to commission more studies to gather evidence of impact. However, resources had to be sanctioned by and on occasions this was discouraged, e.g. in 2003 CPP, LPP and CPHP look at exploring the differences between economic and SL approaches in terms of impact but are discouraged by DFID.

76. Flint and Underwood conducted a synthesis of the RNRRS programmes in 2002 and stated that it would be difficult to assess impact across the RNRRS as a whole due to a lack of a systematic approach to M&E, lack of common indicators and poor monitoring of research uptake. They commented that monitoring and evaluation had not been made a sufficiently high priority, and that most of the information currently available is anecdotal, rather than based on systematic M&E systems or processes. The data on research uptake is

patchy, and the information on impacts on poverty or livelihoods is currently limited. Their study drew attention to the need for better project-level uptake monitoring during and after implementation; and for greater attention to be given to programme-level purpose monitoring. Furthermore, it encouraged greater lesson learning between programmes.

77. The report emphasised that the lack of evidence should not be interpreted as meaning that there has not been, or will not be, real and significant benefits from these research programmes. It stated that there were strong indications of uptake and impact from all of the programmes. However judgments about the relative effectiveness and impact of the different research programmes, or about the overall performance of the RNRRS were difficult due to the paucity of systematic information: "a more coordinated, consistent and concerted approach to evaluation and impact assessment is now required if the situation in 2005 is to be different" (Flint and Underwood 2002).

78. Also in 2002 Surr et al carried out a study on DFID's (wider) research policy and recommended that DFID report more regularly and effectively on the impact of its research programmes. It focussed upon uptake pathways and stated that 'user engagement' should be increased not only to determine research needs but also to facilitate uptake. Networks and uptake mechanisms were seen as vital for going 'beyond dissemination' to more pro-active uptake.

79. In response, particularly to the Flint and Underwood paper, in 2003 the DFID Central Research Department (CRD) commissioned Performance and Assessment Review Centre (PARC) to develop some commonly agreed impact assessment tools to enable a more systematic assessment across the ten programmes. Four tools were developed:

Tool	Description
Structured Impact Matrix	A comprehensive spreadsheet of all the projects undertaken through RNRRS funding, with details to indicate focus and achievement (for all projects) and the availability of qualitative and quantitative data against which to assess project achievement
Impact Pathways (Ips)	A spectrum of possible levels of uptake (the A-H scale) to demonstrate how particular projects or clusters of projects were designed to meet the overall purpose of the programme (see PARC 2003, 5.2)
Impact Assessment Questionnaires	Questionnaires required details about each project's focus and achievement, in order to show evaluators where they might search for further relevant detail
Impact Timelines	Timelines which showed how individual projects or clusters of projects actually progressed towards the programme purpose over time

Table 4: PACR impact Assessment Tools. Adapted from PARC (2003) pp13

80. The task of creating a benchmarking system to standardise assessments between programmes was certainly an onerous one given the different systems and procedures which had evolved within each programme. As the report notes, all of the programmes had collected some impact /outcome data

by 2003. Some of the tools are derived from methods developed within the RNRRS and the impact assessment questionnaire drew on the International Fund for Agriculture Development's (IFAD) Methodological Framework for Project Evaluation. However, on the whole the report does not appear to draw on the best practice from a range of disciplines.

81. The PARC tools were felt to provide too static a view and were excessively focused on scoring which didn't pick up on softer impacts (personal correspondence with PMs). Stirrat and Clucas (2004) commented on its non-consultative nature - being based entirely on comments and feedback from project managers, not from partners, nor from beneficiaries. They question the purpose of the PARC report, as it appears merely to provide a 'census' i.e. quantification of success and failure, rather than seek to enhance understanding or learn any lessons from process in order to improve this in the future. Only the impact pathway tool received much positive feedback from Programme Managers.

82. PARC, in its follow up report, (2004) stated that programme managers had found carrying out the methods to be onerous particularly without additional funds available at that stage. For some projects the information collection was said to be too early, for others too late. Many PMs argued that it was premature to investigate signs of impact amongst project participants at that stage of the strategy, particularly in the case of production systems which required a sufficient time lag such as transgenic crops and forestry. The report was based on self-assessments which may vary widely (PARC 2004).

83. In 2005, an evaluation of the RNRRS (already referred to in this study) was conducted by LTS, which drew on the preliminary activities of PARC. It evaluated the strategy in terms of three aspects: quality of science, impact or potential impact on poverty, and quality of management. The findings are documented elsewhere, but it made a number of interesting observations, relevant to this study discussed below. Notably the report commented on the general scarcity of external evaluation review processes, particularly given the financial size of strategy (LTS 2005).

84. The report found that it is hard to present substantial evidence of impact across the strategy as a whole, again due to the lack of formal M&E systems, lack of baseline and monitoring data. It concurred with Flint and Underwood (2002) that there was no evidence of insufficiency but coherence and analysis across the whole strategy is difficult. It emphasised that in the future any strategy should formalise M&E and IA systems throughout the strategy and, importantly, resource them adequately (LTS 2005).

4. Examples of Innovative Types of Monitoring and Evaluation

85. The central purpose of this study is to assemble, develop and promote new knowledge on how monitoring and evaluation of research has been used to improve pro-poor impacts. This section outlines some of the new knowledge and innovative methods for monitoring and evaluation which were developed in the context of RNRRS projects. The innovative areas of M&E have been grouped thematically, though many of the issues covered are not incompatible or wholly divisible one from another. First, frameworks for planning and organising M&E are considered. This is followed by a section on approaches which details participatory methods and sustainable livelihoods based methods for M&E which have been used in a variety of different contexts. Finally, other methodologies are discussed with reference to how they relate to the framework outlined in section 2 (see figure 5 below).

86. The expectations of project leaders and programme managers in relation to monitoring and evaluation were fairly limited as outlined in the previous section. Input and activity M&E were requested specifically through traditional reporting formats and assessment at the project goal level – i.e. poverty impact assessment was not deemed to be within the remit of project or programme level staff. For this reason, the innovative methodologies outlined tend to fall within the middle sections of this framework: i.e. M&E outputs, outcomes and pathways.
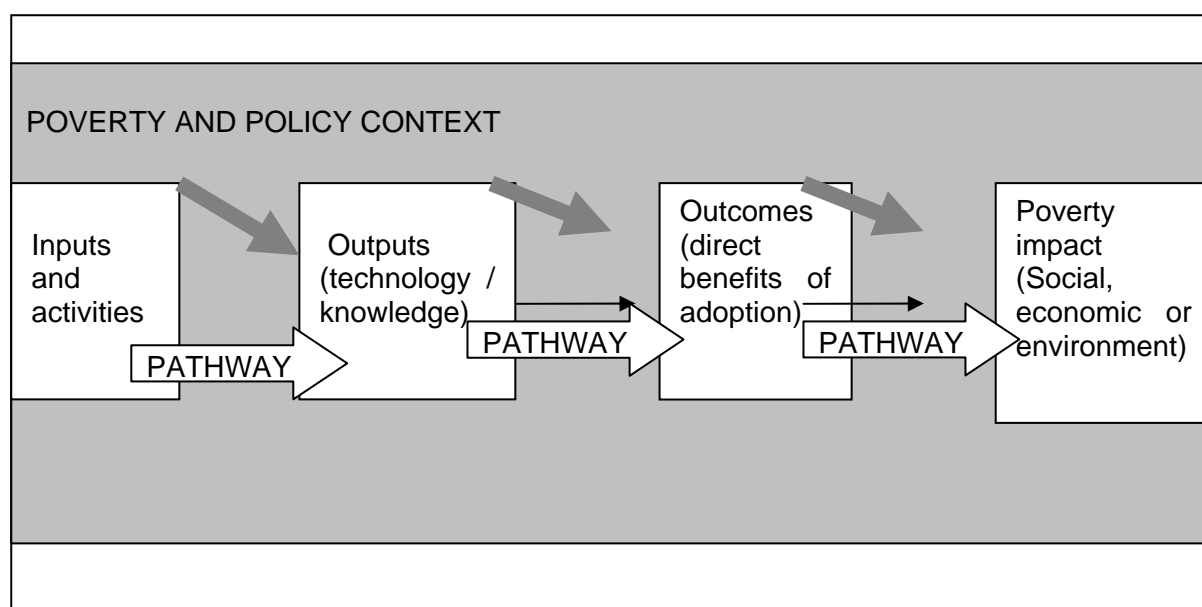
Figure 5. The logical framework sequence illustrating the poverty and policy context

4.1 M&E Frameworks

87. As illustrated in the literature review section, there are many aspects to monitoring and evaluation and impact assessment, and a comprehensive approach would pay attention to information collection needs and learning at different stages of the project cycle and for different ends. Few projects documented M&E systems which covered more than one single aspect of

M&E. Notable examples of more comprehensive attention to an M&E system are STREAM; CPHP East Africa, and the balanced scorecard approach explored by FRP.

88. Support to Regional Aquatic Resources Management (STREAM), funded by NRSP for Project (R8334) Promoting the Pro-Poolicy Actors in India aimed to design, develop and pilot with stakeholders a system for understanding the quality of performance in service delivery to poor people. This system focused on M&E/IA at a number of different levels and stages of the project as illustrated in the following table:

Activities	What does STREAM do within its four themes? (livelihoods, institutions, policy development, communications)
Stakeholders and relationships (e.g., Department of Fisheries, STREAM, research institutes, farmers)	Who has participated in and/or been affected by STREAM activities? What relationships exist among them?
Outcomes and impacts (i.e., indicators of progress and significant changes from villagers' perspectives because that is the ultimate goal)	What changes have STREAM activities contributed to? How have these changes happened?
Learning (and how it is integrated into activities).	How will learning from the evaluation be applied?

Table 5: Stream M&E Framework

89. For each of these levels information collection, information processing, and evaluation is carried out. It is noteworthy that for each of the outputs, indicators are identified for when, how much and the nature of what the project wanted to achieve. The STREAM M&E System uses a combination of a significant change story method (described later in this section) and reporting against objectively verifiable indicators (OVIs) to assess the outcomes and impacts of its work. This is so that when activities are carried out, indicators (OVIs) show how these are achieved. But given that when initiatives are planned, it is not possible to always predict what will happen the Significant Change Stories also capture unanticipated changes.

4.1.1 CPHP East Africa Participatory M&E

90. A set of M&E guidelines was developed by CPHP East Africa for project implementing teams using the Partnerships for Innovation Approach (DFID East Africa CPHP, 2005). The following aspects of projects are monitored:
   ➢ Progress of physical implementation of project activities
   ➢ Outputs resulting from the activities
   ➢ Impacts (benefits and negative effects) of the outputs
   ➢ Changes in partnerships and relationships between key stakeholders involved in the project
   ➢ Changes in the norms and rules governing the interactions within the coalition.

Monitoring and evaluation is undertaken by three sets of stakeholders: routine monitoring is carried out both by management and by beneficiaries; and monitoring of the institutional context and relationship is carried out with the involvement of coalition partners. The aim of the M&E framework is to guide lesson learning in order to shape future actions in the partnership though identifying key players and proposing processes and principles (e.g.

participatory workshops). However, it does also share some more structured reporting formats and one or two tools.

4.1.2 Balanced Scorecard Approach applied in Forestry

91. The Balanced Scorecard approach is an organisational performance measurement system which has been adapted from private sector use and is based on work by Kaplan and Norton (1992, 1993, 1996). The Forest Research Programme (FRP) commissioned an Impact Assessment Study (R7079) in 1999 to review potential methodologies for assessing the economic impact of forest research and the study cited the Balanced Scorecard Approach as a potentially useful tool (Henderson 1999). The review drew on the FRP project Sustainable Management of Miombo Woodland by Local Communities in Malawi (R6709) as an example of where its principles had been applied in practice.

92. There are four broad components (two internally looking and two externally focused) around which specific indicators can be developed. In the adapted version of the scorecard as developed by the FRP project R6709 (Sustainable management of Miombo woodland by local communities in Malawi) the balanced scorecard components are:

Internal perspective	Assessment of current and likely future performance of research against internally established targets, i.e. logframe outputs. Indicators are based on the logframe OVIs.
Client perspective	Consulting those who make use of results. Are there significant levels of dissatisfaction with the research process to date; what is the degree of commitment to the future implementation of the research. Indicators should be defined by clients themselves. The client base can vary from project to project – in this case it is treated as beneficiaries.
Test of research effects	What are the economic benefits of the research? Evidence of positive change; qualitative assessment of significance of change; local perspectives regarding costs and benefits of participation; comparison of different groups in terms of performance or benefits (gender, wealth etc)
Uptake network	Who are the external actors relied upon to ensure research is applied more widely. Assessment of the prospects for wider adoption/impact, e.g. using Bayesian Belief Networks (see later section for details)

Table 6: Elements of the Balance Scorecard

93. No single component provides an adequate measure of overall performance, but rather the inter-linkages between the different components should be explored to ensure internal consistency. Indicators are developed under each of the four components to generate a balanced data set for organisational assessment. In this case attention was paid to developing a mix of lagged and leading indicators, i.e. those which assess progress to date, and those which project future prospects. Different methods were used to collect the data on the indicators, e.g. assessment of the client perspective was based on a formal questionnaire whilst the test of research results used a mix of formal and informal survey methods, including PRA methods. The measures are relative rather than absolute, constituting measures of progress towards impact.

94. The use of the balanced scorecard approach by FRP R6709 differs somewhat from the approach promoted in a later FRP project

"Institutionalising impact Orientation" (R8086) in that the latter puts more focus on internal process learning, e.g. employee learning and growth and clearer attention to activity/process monitoring. However, documentation of neither of these projects detail the challenges and limits of this approach in practice. It would be useful to explore the best elements of each, drawing on practical lessons from experience, in order to develop this methodology further in the future.

95. The spiral diagram shows repeating activities which evolve into another level given incorporation of monitoring information. The project emphasised involving farmers from the planning stage including the setting of indicators.

4.1.3 Summary

96. The key advantage of each of these frameworks is that they attempt to overcome the potential weakness of relying on a single measure such as economic impact. The components represent the different variables on which overall research success depends and help to facilitate an understanding of the "bigger picture". They help to provide a more realistic and balanced assessment of ongoing research, and to highlight potential problem areas.

97. The use of a consistent framework aids aggregate programme reporting across a range of projects. However, too much focus on measuring and scoring should not detract from the key purpose of project learning and adaptation to incorporate lessons.

4.2 Innovative Tools and Methods Uses at Different Stages

4.2.1 Activities

98. As noted in section three – monitoring of project activities tended to be carried out through the use of a standard reporting format completed by Project Leaders and submitted to Programme Managers. As this process was quite rigorously adhered to, it is possible the project leaders did not invest much effort in designing more innovative monitoring tools at the activity level. CPHP East Africa office has recently developed guidelines and methods for participatory monitoring and evaluation based around the traditional quarterly reporting framework but incorporating routine beneficiary level monitoring. Beneficiary M&E groups are formed in communities where projects are operating who collect data around their experience of workplan implementation as well as the outputs under development, and, over time, the effects or benefits of the project. This information is collected through participants ranking or commenting against a range of generic and project specific sets of indicators (DFID East Africa CPHP, 2005)

99. Reference is made to the monitoring of activities by other projects (e.g. STREAM and the Balanced Scorecard approaches described above; as well as in the Participatory Monitoring and Impact Assessment of Sustainable Agriculture project experiences mentioned again later in this section) however, there is no description of methods used or detailed reflection on experiences from which we can draw lessons for this synthesis. The Balanced Scorecard approach similarly has some focus on the activity level

but the approach to data collection is not particularly innovative, being achieved through questionnaire surveys.

4.2.2 Outputs

100.	Similar to the case for activities, the expectation from DFID via Programme Managers for output monitoring was fairly minimal, i.e. the assessment of bibliometrics (i.e. the quantity and quality of written outputs) as described in Section 3. In many cases new technologies were developed and/or field tested in collaboration with beneficiaries, and hence outputs can be interpreted not only as the documentation of those new technologies, but the application of those technologies in the field. Hence, some project aimed to monitor the success of such outputs, evaluate their potential for uptake, and identify any potential challenges during the research process.

101.	The Plant Science Programme for example used farm level participatory M&E as a basis for farmers to evaluate new seed varieties in a number of different projects in India, Bangladesh and Nepal within participatory plant breeding (PPB) and participatory varietal selection (PVS) (R6748, R6826, R7452, R8221). Through direct observation, formal methods (questionnaires), informal or participatory approaches farmers evaluated the traits that are important to them from new varieties. In the Bangladesh High Barind Tract region (Project R8269), eleven rice varieties were introduced from Nepal. Participatory varietal selection (PVS) was used to test the varieties in mother (research trials) and baby trials (on farms under farmers conditions and management). Over 190 farmers tested the varieties in their fields using farmers' levels of inputs, and the varieties were evaluated using focus group discussion, preference ranking, household level questionnaires and in depth interviews. Most of the new varieties were preferred in all locations because of the criteria identified by the farmers - their early maturity, high yield potential, good grain quality, market price, input responsiveness, lodging-resistance and ease of threshing. It was felt that the farmers own evaluation of the varieties provided a simple, rapid, and cost-effective approach to identifying appropriate technologies (Joshi et al. 2005)

4.2.3 Outcomes

102.	The development of the Farmer Field School (FFS) methodology for smallholder dairy farmers (R7986), This project was designed to test and adapt the FFS approach for use with smallholder dairy farmers in Kenya to address both livestock production and health issues. The project undertook a monitoring and evaluation exercise on the first eight FFS groups. The objective of which was to evaluate the social and technological impact of the FFS on smallholder dairy farmers in these eight pilot groups. As well as interviews with individuals, a one day farmers workshop was held in which farmers were encouraged to evaluate the FFS process so far. A total of 28 subgroups gave presentations. This was done in order to evaluate the extent to which farmers internalised the knowledge they acquired during the one year LFFS training. Pictorial self-assessment was also used . Farmers drew pictures depicting their lives before and after FFS. They then presented these pictures to the rest of the group and explained what they meant.

103.	Taking the participation a step further, the AFGRP project, Self-recruiting Species in Aquaculture (R7917), organised workshops in which the farmer groups themselves decided how to measure the impact of their

activities. They set their own indicators for not only measuring the effects of activities. Regular meetings were held and the monitoring information was incorporated into the planning process.

104.   The AHP funded project (R7359) The Delivery of Veterinary Service to the Poor adapted many participatory techniques specifically to the livestock sector. The Livestock and Poverty Assessment (LPA) Manual is a tool kit for practitioners to assess factors relating to livestock, poverty and development. All of the methods contained within the manual can be used for ex-ante and ex-post assessment at the community and project level. The toolkit offers three key parameters to assess the impact and uptake of livestock projects on the poor: access, affordability and acceptability. These key parameters and the other tools are described in the LPA toolkit (Heffernan et al. 2003) .

105.   Participatory Budgets were used to assess outcomes in CPP Project R7401, Improving Production in the Teso Farming System Through the Development of Sustainable Draught Animal Technologies, was designed to investigate ways of alleviating labour constraints associated with weeding annual crops in the Teso Farming System (TFS). The project involved testing and evaluating weeder technologies and as such a baseline survey was carried out, beneficiary impact assessments. A participatory assessment of the weeder technologies was carried out using participatory budget methods to compare use and non-use of the technology in weeding annual crops: to gauge the social and economic impact and sustainability of the technologies on the beneficiary populations; and to assess future potential demand. The participatory budgets were developed with groups of farmers through semi-structured interviews to explore general impacts on lives and livelihoods, then a volunteer example was carried out of a household budget and how it had changed. The steps involved are outlined in box. 1. (Aliguma, 2004)

Box 1: Steps in a participatory budget (from Aliguma 2004)
  ➤ Timeframes are established and size of enterprise clarified
  ➤ A large grid is drawn (on the ground) with the number of columns equal to the number of months of the year
  ➤ Farmers symbolise different months across the top of the grid and the different activities involved in the enterprise during each month in the second column
  ➤ Discussions were held with farmers about which resources it was important to include in the budget
  ➤ Different counters are selected to represent different resources and farmers identify units for each of the resources (e.g. labour by days and number of people) then add to the budget the amount of resources used each month.
  ➤ Outputs and income that the farmer receives from the enterprise are also indicated
  ➤ Farmers calculate the final balance by comparing resources used and products received (income).

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106.   Most Significant Change Stories is a tool used by the NRSP project promoting the pro-poor policy lessons of an earlier aquaculture service provision project managed by STREAM (R8334/R8100). Most Significant Change (MSC) is a participatory monitoring technique based on stories rather than indicators of change resulting from project activities or outputs. MSC stories give a rich picture of the impact of development work and provide the basis for dialogue over key objectives and values of development programmes (see figure 6). MSC doesn't replace other methods of monitoring

and evaluation – in fact it works well in conjunction with more quantitative analysis – but it comes into its own where outcomes are unexpected and meanings are disputed, which indicator methods are unlikely to identify. It also allows for broad participation, and sets experiences and outcomes in context.

107.   The methodology for MSC is simple. Beneficiaries and partners are asked to describe what they think is the most significant change that has happened in their life, livelihood, work or broader context, since the last time of reporting. The following advice guides the selection of stories:

➢ Where possible, choose the most significant change after discussions with colleagues and others.
➢ There may have been many changes, great and small, positive and negative. Choose the change that you feel is most significant.
➢ Describe who was involved, what happened, where and when.
➢ Include enough detail to make it understandable by someone not familiar with your situation and to make it possible to follow up later to see if the change has continued. (STREAM 2004)

Significant change stories were collected and analysed using the process below

Collecting Most Significant Change (MSC) Stories
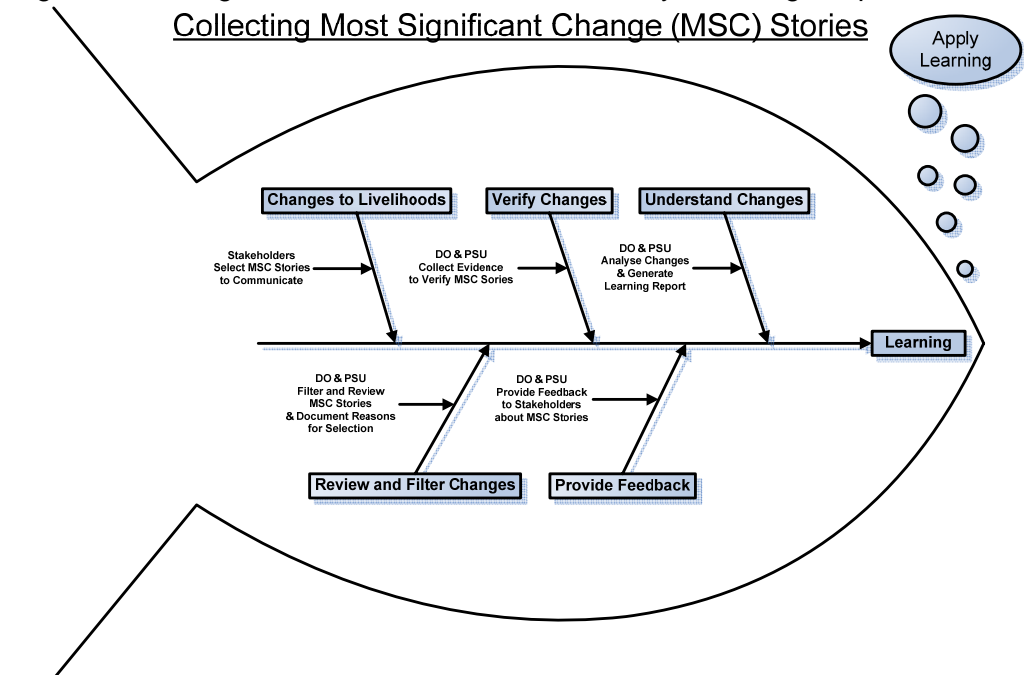
Figure 6: Guidance for collecting MSC Stories (STREAM no date)

108.   Case studies or stories of change have been used elsewhere amongst RNRRS project as a more informal tool for demonstrating outcomes, and have been used in annual reports and in other publicity materials for promoting the work of the research programmes. There are challenges to using stories as a formal methodology for M&E (e.g. bias towards success stories and subjectivity in the selection process) which the literature around MSC has gone some way to explore. The approach has been applied now by a number of agencies and is being scaled up by some, e.g. Voluntary Services Overseas (VSO). A very useful source for further details on this approach is by Rick Davies and Jess Dart (2005)

109.   FMSP's Adaptive Learning Approaches to Fisheries Management (R8292) designed a results workshop to enable district staff to analyse project data, produce graphs and explain results to each other. This 'learning by doing' approach is more usually associated with 'skills' training but here used as a workshop methodology. It was time and energy consuming but proved successful in disseminating experimental results. Not only did district staff understand results better, they also increased their analytical capacity, and gained ownership of the information, which in turn led to more motivation and interest in project activities. Having district staff involved in the process from start to finish - from data collection, to analysis, to interpretation - was unusual for those who either supply data to provincial staff or provide advice (Arthur, 2004).

110.   The LPP project 'Understanding Small Stock as Livelihood Assets: Indicators for Facilitating Technology Development and Dissemination' (R7823) explored the use of livestock as a livelihood asset in Bolivia and investigated the development of indicators to show the changing contribution that livestock keeping can make to livestock-keeper's livelihoods. A set of methods were developed, based on an understanding of livelihood assets and their functions. Central to this was the recognition that assets have diverse functions, for example livestock may act as a form of consumption, savings, a buffer or insurance. Furthermore, each asset has diverse attributes which might make them more effective in fulfilling particular functions. These functions were acknowledged to vary in importance, as was the effectiveness of assets and activities to fulfill such functions, both over time and according to people's individual circumstances shaped by market and other external opportunities and constraints (Dorward et al. 2005) .

111.   The methods developed involve a sequence of matrices or tables to help project participants think through the contributions that their current assets and activities make to their livelihoods, how they would like these contributions to change in the future (also considering other changes which they anticipate in their livelihoods and environment), and what indicators they might use to monitor these potential desired changes over time (Dorward et al. 2005). The five methods developed, are shown in table 7 below.

Method name	Purpose	Contribution to indicator development & application	Description
1. Current species by function matrix	Identify the current livestock species & livestock keeping activities of beneficiaries, & the functions of livestock keeping for each species	Determination of beneficiaries' current activities, assets, priorities & options	Matrix for ranking species according to the current importance of their contribution to different functions
2. Function priority and preliminary indicator matrix	Identify high priority functions, the reasons for their importance, processes of change affecting them, & indicators for measuring functional achievements	Determination of beneficiaries' broader livelihood priorities & options. Development of broader indicators	Matrix identifying high priority functions, reasons for their importance, current changes in their achievement or importance, reasons for changes, & indicators of achievement
3. Household animal inventory	Identify in more detail the herd or flock structure & composition for each livestock species & significant changes over the year, to gain greater understanding of livestock keeping activities	Determination of beneficiaries' current assets, activities, priorities & options in livestock keeping	Matrix showing the flock/herd composition for each species kept. Ranges of numbers kept can be related to parts of the year to show seasonal variation
4. Species, function and alternatives matrix	Identify potential livestock species & livestock keeping activities of beneficiaries, the functions of such livestock keeping for each species, & alternative (non-livestock based) ways of achieving these functions	Determination of beneficiaries' priorities & options in livestock keeping	Matrix for ranking species according to the potential future importance of their contribution to different functions
5. Species indicator matrix	Identify for each species its major functional contributions, constraints limiting those contributions, means of addressing those constraints, & indicators for assessing progress in activities addressing those constraints	Determination of beneficiaries' priorities & options in livestock keeping Design of livestock development indicators.	Matrix showing each species' major functional contributions, constraints, interventions, & intervention indicators

Table 7 Methods for developing indicators for assessing livestock keeping contributions to people's livelihoods,
Source: Dorward et al 2005

4.2.4 Pathway Analysis

112.   As noted in Section 2, there is a growing body of thought that monitoring and evaluation should focus more strongly on process rather than solely on the outputs, outcomes or impact of research. One key tool for doing this is through analysis of the causal links along the chain from activity to impact. This approach has spawned a range of different names including, amongst others, uptake mapping, outcome mapping, critical path analysis

39

and impact pathway analysis, depending in part on how far the pathway extends. Ideally, the pathway is constructed at the project planning stage to articulate the hypotheses and assumptions relating to how research uptake and /or impacts will be achieved, e.g. which stakeholders need to be involved to ensure a research product is applied by target individuals or institutions and finally by the end-user. This model can then be used as monitoring tool through tracking achievement of different stages in the analysis.

113.   Most approaches involve developing a visual representation of the various segments of the pathway into smaller sequences of events and intermediary steps. It can be a participatory process involving programme staff and different external stakeholders help identify causal linkages and critical factors. Critical path analysis also involving the development of a diagram which development activities are represented by nodes connected by causal links. These nodes represent events or factors, either internal or external to the project, which are critical to the success of the project (see Henderson et al 2000).

114.   Uptake mapping methods, for monitoring technology adoption and spread at the village level, were developed by a CPHP project (R6639) which aimed to develop improved cassava processing methods (Kajimbwa et al, 1998). The approach involved developing local indicators (such as technology borrowing, technology fabrication, etc) information relating to which was recorded using symbols on a 'social map'. Key to the success of such as system was participation at earlier stages in the project process (e.g. needs assessment), decentralisation of research management, the client oriented and demand driven nature of the research, and the knowledge of skills of extension staff, including use of participatory approaches in their extension work more generally. The experiences with participatory M&E further strengthened the research-farmer linkages and the capacity of extension staff to develop and apply a new technology and analyse its impact.

115.   Looking beyond RNRRS, similar mapping methods have been used, including Innovation Trees (Van Male and Zakaria, 2002) and Innovation Histories (Douthwaite et al no date). These both help to reveal and explain the innovation adoption and diffusion process through PRA methods (timelines and network maps) and through provoking reflection through questioning and discussion.

116.   The above methods are all reflective, aiming to draw lessons from adoption processes that have already occurred. In the case of the Malawi Miombo forest management (R6709, R7925) sought to predict uptake pathways by use of a Bayesian Belief Network approach using Netica software. Where this was applied, the probabilities were elicited by key informants (experts) giving estimates, and assessment by the evaluation team themselves, based on review of secondary data (Marsland et al, no date).

117.   A Bayesian Belief Network is essentially a causal flow diagram which plots possible outcomes through a series of 'nodes', which represent events, or critical success factors, connected by 'links' which represent the relationships of influence or dependency between them. Critical success factors (CSFs) can be internal to the research process (performance milestones) or external (e.g. inputs or actions required by other actors). The probabilities of different outcomes for each CSF are then assessed and

added to the diagram. The BBN approach models uncertainty by means of tables of conditional probabilities linking each noted to its parent node(s) (see figure below for an example from the Malawi project).
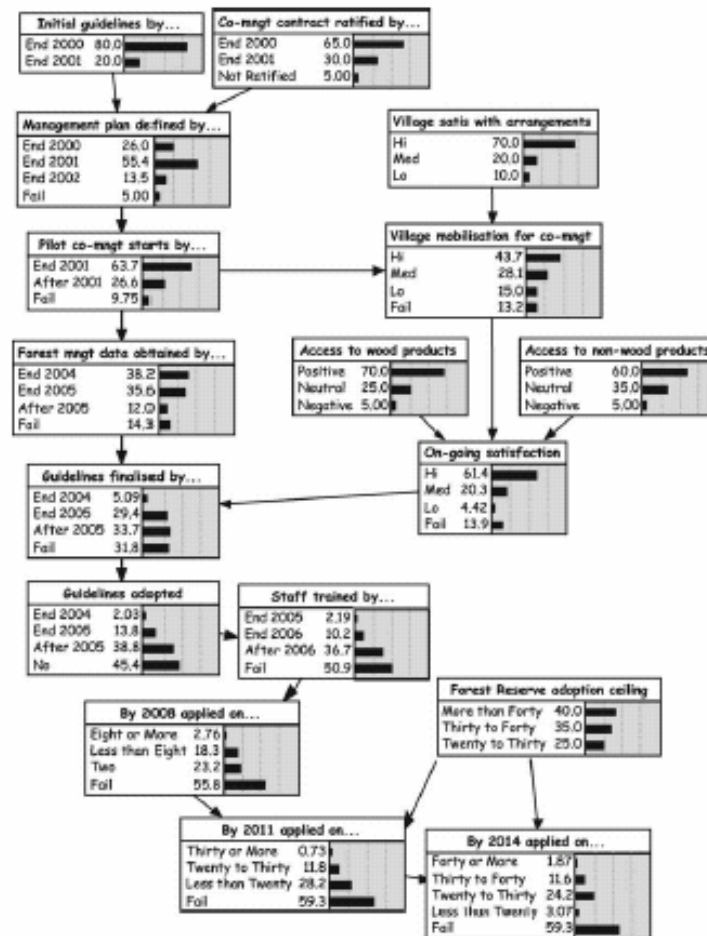
Figure 7: Detailed Network for Malawi Miombo Forest Management Project,
Source: Henderson and Burn 2004 p9.

118.   The BBN approach addresses concerns with simpler pathway models: that they do not consider risk nor assess the implications of variance from plan. Furthermore, the pathway model can, and should, be monitored and amended over time to incorporate changes in circumstances which might revise the odds of final success, or elicit other options for more effective pathways.

119.   In 1999 DFID Crop Protection Programme commissioned a series of multidisciplinary studies to better understand the factors affecting uptake and adoption of outputs of research in banana, maize, yam, rice and vegetable cropping systems in Sub Saharan Africa and South Asia. A workshop was held in 2000 to share the findings and to tease out the main issues and develop recommendations for action to promote uptake and adoption (Hainsworth and Eden-Green 2000). The case studies revealed that even if farmers are made aware of improved procedures or new technologies, there are many and complex reasons why they may still fail to adopt and therefore farmers should be more systematically consulted and involved during the technology development process. It was also recognised that simple methodologies are needed for monitoring and evaluation of uptake-adoption-

impact pathways though no such methods were proposed for M&E in this workshop.

120.   Impact Pathway Mapping was one of the tools applied at the programme level as part of the PARC impact assessment study (PARC 2004). Some programme managers found this to be a useful tool and adapted to use at the project level, e.g. CPP has produced a number of project level pathway analyses which show how projects build upon previous research and how knowledge accumulates as scientific and social understanding of the cropping systems increases. They also begin to show how, even given the usual time lag between knowledge generation, promotion, adoption and ultimate impact for end users, research improving poor people's livelihoods (see Annex 2 for example from tomato leaf curl virus research (R7460, R8041, R8247)). However, these were principally retrospectively constructed pathways and methods for monitoring against the proposed pathways and examples of corrective action being taken when reality does not concur with the proposed pathway were not cited by programme managers.

121.   It is worth mentioning here that IDRC have developed useful resources for Outcome Mapping which recognize that 'impacts' are often the product of a confluence of circumstance for which no single project or agency can claim full credit. Thus it limits itself to monitoring and evaluating the factors and actors that are within its sphere of influence, i.e. changes in the behaviours of people, groups or organizations with whom a project is directly engaged (Earl et al, 2001). A selection of manuals, training materials, presentations and articles are available on the IDRC website for more details, at: http://www.idrc.ca/en/ev-26586-201-1-DO_TOPIC.html

122.   It should also be noted that the AHP funded project (R8213) Listening to the Voices of the Poor: Developing a decision-making framework for livestock disease prioritisation and the uptake of animal health technologies by poor livestock keepers, has developed software which can enable tracing potential outcomes of particular interventions. The Poverty Assessor™ software links over 5,000 households on three continents to the poverty line in each of the countries to enable practitioners to view the exact poverty impacts of different demographic, geographic, livelihood and socio-economic characteristics particularly in the livestock sector. The program also enables decision-makers to assess the potential impact of interventions and as such may be utilised as both an ex-ante and ex-post tool for monitoring and evaluation. For further information, contact the Livestock Development Group at Reading University (LDG@rdg.ac.uk).

4.2.5 M&E of institutional context and relationships

123.   RNRRS has essentially been a project based research programme with relatively little attention to longer term institutional capacity building or strengthening of research networks within its stated remit. For this reason, the majority of M&E methods developed have tended to monitor project level outputs and outcomes. However, the limitations of this approach became clear within some programmes over the duration of RNRRS and

124.   Over the past nine years the Crop Post Harvest Programme (CPHP) has been evolving what it describes as "a new research paradigm, which emphasises the importance of understanding and working with national institutional systems in order to convert research into successful innovation"

(CPHP website www.cphp.uk.com). As noted in Section 2 the National Systems of Innovation (NSI) concept posits that innovations emerge from systems of actors, and that these systems are embedded in social, political and institutional contexts that determine how individual actors behave and how they interact with other elements of the system. Institutional context and relationships amongst actors are key components of such systems and understanding and monitoring these can be critical to the success of research undertakings.

125.   CPHP commissioned a study to systematically explore the ways in which the institutional context was affecting research looking at the portfolio of projects in India as case studies, whilst also extending experimentation with NSI concepts across the wider South Asia programme (Project R7502). Of relevance in terms of monitoring and evaluation was the finding that the output-oriented, problem solving framework of the conventional project cycle tended to result in under-reporting of process lessons associated with technological successes or failures. These kinds of lessons could be valuable and complementary to new technological knowledge (Hall et al 2003). The work also challenged the need to monitor direct poverty impacts at the project and programme level, in favour of tracking behavioural changes that the programme was stimulating among project partners as milestones towards poverty reduction.

126.   As Hall et al state: "*The principal point raised by the innovation systems perspective is that the nature and value of knowledge cannot be viewed as independent from the processes that produce and use it. The corollary is that to judge the value of impact of new knowledge requires an understanding of knowledge production and use contexts. It is this contextual information, typically institutional in nature, that determines outcomes and impacts. Once this position is accepted then evaluation and impact assessment assumes an importance greater than the resource allocation role of economic assessment, it becomes the principal mechanism for strengthening social learning processes that allow organisations to accomplish new tasks and mandates – such as achieving impact or becoming more poverty-relevant*" (2003, p232)

127.   The Participatory Monitoring and Evaluation procedures developed by CPHP in East Africa offer guidance on how to monitor changes in the institutional context within with the project is operating and the partnerships and relations between key organisations and individuals involved. As crop post harvest systems are complex, involving many actors in the chain from 'field to food', it is important for coalition projects to understand this diversity and complexity through analysis of this context at the design stage, and monitoring of institutional dynamics throughout the projects.

128.   The User Manual emphasises the importance of establishing a baseline study of the institutional context highlighting the organisations which will be involved in the project and their relationships to one another; and the context within which those organisations and relationships are operating, including incentives and disincentives, norms of interaction and market factors. Hypotheses and assumptions about the institutional environment required for effective production and uptake of outputs should be carefully examined at this stage and the aspects that need to be monitored should be identified on this basis.

129.   Two tools are proposed for monitoring of relationships and context: quarterly reflection and lesson learning workshops; and construction of institutional histories. Reflection and lesson learning workshops would not only involve reporting on actions taken during a period, but critical analysis of project experiences and questioning of assumptions around key themes, namely: partnerships; institutional arrangements within the coalition; institutional arrangements with external organisations; and how learning is happening. Institutional histories are used to reflect on the evolution of processes and institutional arrangements in a project in order to draw lessons and improve performance. The process involves interviews to construct a time line, gain a clear understanding of roles and relationships, enquire into what triggers successful innovation, and reflect on any failures.

130.   As part of another CPHP project (R8310) actor linkage maps and actor linkage matrices were used in the Chars Bangladesh to map out key actors and to identify strengths, opportunities and weak linkages (Biggs and Matsaert 2004). Actor linkage maps provide a starting point for discussing relationships and flows of information within an innovation system. They consist of a diagram linking key actors with arrows between them indicating flows of information (by direction of arrows), and the strength of those flows (by thickness of arrows). The actor linkage matrix is similar to the map in that it identifies all the actors and links between them in an innovation system, however these are represented in along vertical and horizontal axes of a matrix. The corresponding cells can be completed with more analytical information relating to those relationships which can be monitored over time. Project R8310 found the actor linkage matrix particularly useful for internal team working, using it for monitoring the team's progress in building relationships with other key actors, revisiting and enhancing the matrix on a quarterly basis. During the early phase of this monitoring the research team noted that most new linkages were between the project team and a single actor, rather than more sustainable development of multiple linkages between other actors within the system.

131.   PSP also explored institutional change processes which occurred whilst a client-oriented breeding rice improvement system was operating in Nepal from 1996-2005 (R6748). A number of actors were noted to have contributed to the changing rice innovation systems – from public sector, private sector and civil society for example plant breeders, labourers, cultivators, marketing agents, consumers amongst others. The analysis (Joshi et al., 2005) argued that 'a dynamic socially responsible innovation is not so much focussed on 'new' technology from research station plant breeding, but as much concerned with institutional innovations that leads to overall systems which direct its energy towards increasing social inclusion, improved gender relationships, and reducing poverty' (p2). The project considered institutional changes as most important in terms of contributing to long lasting changes in crop research and development in the area, but significantly for this study, stated that most of the significant institutional innovations were not foreseen in the original project documents - and thus not incorporated in the M&E system.

4.2.6 Organisational Learning and Systemic Learning

132.   The concept of organisational or institutional learning takes the above section one stage further. It is more about creating the context for reflective learning which helps actors to question and understand processes, to learn

lessons from practice, and to apply what is learned to change behaviour and improve performance. It is not so much about developing methods and procedures, but about creating a context and environment in which the results of M&E exercises genuinely contribute to reflective learning and critical self awareness amongst professionals, and lead to action for change.

133.   CPHP work on national systems of innovation contends that innovation is enhanced when arrangements are in place that support learning and institutional change amongst groups of stakeholders. This means that those stakeholders reflect, both individually and collectively, on successes and failures and adapt strategies and methods to take account of lessons and improve practice.

134.   Traditional output oriented, problem solving approaches to research tend to under report lessons associated with technological failures, which may in themselves lead to valuable innovations (Hall et al 2003). Drawing on such lessons should be part and parcel of technical projects and their outputs. An action research approach is recommended, involving self-reflection and process monitoring and documentation. These skills need to be developed in project teams. Where team members come from a formal scientific research background these skills tend to be underdeveloped.

135.   The ability to learn and change is affected by the external environment, the internal environment and organisational and individual capacity. Institutional learning requires top level legitimisation if change is really to happen. An organisational culture that supports learning through experimentation which may result in some failures will have greater overall success.

136.   Much of the reference to learning gives the impression that it is largely an intuitive, ad hoc process that can be enhanced by an organisational culture which legitimises this process. This is, to some extent correct, however, learning can be enhanced and made more systematic through investing resources in building the learning capacities of project staff and through developing an organisational culture that is open to sharing, analysing and learning from failures as well as successes (Hall et al 2003). It requires top down support, legitimisation and protection alongside bottom up learning from practice, and M&E by field staff and farmers.

137.   Here again we must look beyond RNRRS for further evidence of this approach in practice. A team based at the Institute of Development Studies (IDS) looked at organisational learning in theory and in practice in DFID, ActionAid and Sida (Swedish International Development Agency), testing out different approaches to facilitating more reflective learning around key issues such as participation, partnerships, ownership, etc and what those ideals mean in practice for large development organisations. Action learning sets, workshops, external studies, and other participatory reflective tools were used to encourage staff to really question assumptions and challenge accepted practice in relation to their ways of working, their working relationships (both internal and with partners) and their organisational structures and processes. A key lesson from this work was that methods and tools for reflection can help, but these need to be supported by organisational incentives as well as a personal desire to learn and change (see IDS Lessons for Change series).

138.   More very interesting work under the title of Institutional Learning and Change is being spearheaded by IPGRI (International Plant Genetic Resources Institute) for scaling up throughout the CGIAR. This work also emphasises the need for institutional incentives as well as individuals' capacity in order for learning to be effective. Watts et al (2003) propose four areas of capacity building and contextual support:

> Developing a supportive external environment: donors/managers need to encourage and reward transparent and self critical learning and change.
> Fostering a culture of learning and change: promoting values, beliefs, norms and traditions that positively influence behaviour and performance. Supporting and facilitating critical review and reflection
> Reorienting management systems: to encourage and celebrate risk taking, innovation and learning
> Developing and enhancing individual awareness, knowledge and capabilities: training to develop new process-oriented skills

139.   Whilst this work is challenging conventional norms of learning through tools and processes such as M&E and impact assessment, and pushing for more wholesale organisational change amongst agencies in support of learning attitudes and, it is going to be key under the innovation systems approach proposed by DFID for its new research strategy.

4.2.7 Impact assessment

140.   The coverage of impact assessment has been a challenge in this study, as the requirement was to look principally at the project level work, and according to the framework and discussions of Chapter 2 as well as the DFID requirements described in Chapter 3, Impact Assessment was a requirement of neither projects nor programmes. Rather, it was the responsibility of DFID. Chapter 3 discussed some more recent Programme Level and DFID's strategy wide attempts at impact assessment and the tools and methodologies used. In order to supplement that, it seems worth briefly mentioning here a few innovative tools used by other international research agencies or research funders for assessing research impact.

141.   Much literature has been devoted to the advantages (Alston et al 1995) and challenges (Alex 1998; Henderson 1999, Douthwaite et al 2003) of economic approaches to impact assessment which have tended to dominate until more recently. As an alternative to this more traditional approach IFPRI in particular has invested efforts in understanding different types of impact. Two notable studies are discussed below.

142.   Garrett and Islam (1997) posit that to assess the impact of research it is necessary to understand how research information is actually used by policymakers. Methodologies to assess impact should therefore be based around the workings of the policy process, and examine the factors affecting the use of research information by policymakers in this process, e.g. how research information is produced, communicated, and ultimately used in the policy process.

143.   More recently IFPRI (Meinzen Dick et al. 2003) carried out another large study into understanding impacts of agricultural research based around the use of the livelihoods framework. Seven case studies were used to

develop new approaches for assessing poverty impacts at different scales. Analysis of household and community level qualitative and quantitative data within an integrated social and economic analysis, was compared to econometric analysis of secondary data at district and community level. The former providing more detail on how agricultural research impacts on the poor and the latter providing better quantification of impacts. The study concluded drawing causal links remains a challenge, but comparing between large samples of adopters and non-adopters using both qualitative and quantitative analysis can help. It is important to pay attention to both direct and indirect impacts, including those which are not easily quantifiable. Finally, the SL framework was found to be a useful tool particularly in identifying influences that are normally overlooked in conventional impact assessment. Further resources relating to this work on the Impact of Agricultural Research on Poverty are available online at http://www.ifpri.org/themes/iarp/iarppubs.htm.

144.   Poverty and social impact analysis (PSIA) constitutes a set of tools and methods developed by the World Bank, principally for analysing the distributional impact of policy reforms on the well-being of different stakeholder groups, and used in the context of monitoring the implementation of poverty reduction strategy papers (PRSPs). Several methods are suggested for estimating impact such as poverty mapping, household models, social impact assessment and computable general equilibrium models (World Bank: 2003). More details can be found on the World Bank website at http://www.worldbank.org/psia.

4.3 Issues in Innovative M&E

145.   This section so far has synthesised the new methods which have been generated within M&E. This section goes on to discuss more general issues relating to approaches, scaling up, planning and management of M&E.

4.3.1 Participatory approaches to Monitoring and Evaluation

146.   Participatory approaches have attracted increasing interest in the development field over past decades and are perhaps no longer considered to be particularly innovative. However, participatory approaches in M&E have principally been developed in the context of project implementation, rather than in the area of research. More people centred approaches which go beyond mere stakeholder consultation are relatively limited and challenges still remain, hence it is included here. Participatory M&E principally implies the involvement of a much wider range of stakeholders in assessing the progress, outcomes and impacts of development projects, through their involvement in various aspects including selecting appropriate indicators, methods and measurement, supplying information, analysing findings and using the lessons learnt. The term is also used in a narrower sense to refer to the use of more participatory methodologies (e.g. PRA tools) for data collection in M&E, without the broader involvement of stakeholders at other stages. PM&E is perceived as having the advantages of improved public accountability, greater empowerment of stakeholders, and improved availability of relevant information for planning and action (Guijt 1999).

147.   Several references have been made in sections above to beneficiary involvement in monitoring activities, evaluating technologies, identifying

uptake pathways and assessing outcomes. The methods used have varied in terms of the degree of stakeholder involvement from beneficiary interviews and questionnaires to more interactive approaches, e.g. developing participatory maps assess the spread of innovations and encouraging stakeholder analysis in group discussions. The real key to participatory approaches is to shift the agenda of the poor to centre stage. This is by no means achieved through simply 'talking to people' as it the extent of much participatory research. It can tell us more about the local level, but does not necessarily give insight into the chains of influence, power and knowledge flows which link research to people's lives (Stirrat 2003). On the whole most examples involve direct beneficiaries of technologies rather than a broader scope of relevant stakeholders (such as policy makers, extension organisations, those involved in marketing or technology promotion, etc).

148.   "Participatory Monitoring and Impact Assessment of Sustainable Agriculture in Brazil" (R6547) developed participatory monitoring approaches to track implementation of project activities (Abbot and Guijt, 1998). Rather than the project imposing an M&E system, partnerships of multiple stakeholders were involved not only in data collection but in the design of the monitoring process, in the selection of indicators, and in the analysis and use of findings.   Four groups of stakeholders: farmers (men and women); representatives of the rural workers union; staff of a local NGO (CTA-ZM); and academics from the Department of Soils of a nearby university, collaborated to develop the monitoring methodology, negotiating which activities would be monitored, the identification of relevant indicators, who would collect and analyse the data and how, and how the final information would be used and shared.

149.   A key implication in the use of participatory approaches is the time required to develop methods in this way, and the compromises required in terms of choice of indicators and methods. Abbot and Guijt (1998) found the benefits (a set of methods and indicators that were going to be useful, that were clearly understood, and that everyone was keen to commit to) outweigh the costs, however, such tradeoffs need to be considered and judged on a case by case basis.

150.   A series of Best Practice Guidelines (BPG) for socio-economic methodologies (R6800) were produced between 1995 and 1999 in order to provide natural resources researchers with readily accessible information on social science methods for use in field-based natural resources projects. Under this project a guide to Participatory Monitoring and Evaluation for NRM and Research was produced by Irene Guijt (1999) with the aim of giving rural natural resources research staff the skills and understanding "*to improve design, delivery and impact … to make research more relevant to the needs of the intended beneficiaries, better targeted to wards developmental rather than scientific objectives and leading to better uptake and impact of research outputs*" (Guijt 1999:i). Guijt raises a number of questions in her guide which are relevant for researcher managers, including the issue of whether it is definitely necessary to make the M&E participatory. It is important to be sure that there is added value to a participatory process. It is unclear to what extent these guidelines were promoted amongst RNRRS project staff or used by them, however, they remain useful resources which should be more strongly promoted in the next round of research.

4.3.2 Livelihoods Approaches to M&E

151.   The sustainable livelihoods approach, introduced by DFID in 1999, encapsulated a number of important elements including the interplay between different assets (human, social, financial, physical and natural), factors that influence vulnerability, and the policy and institutional context within which livelihood choices are made. The approach aims to link micro, meso and macro levels and recognises the trade-offs and conflicts are inherent in process of poverty reduction. The livelihoods framework offers a useful basis around which to improve thinking around monitoring and evaluation to ensure a more holistic approach to assessing change. It is not so much that new methods are needed, but that existing methods can be adapted to this more holistic way of thinking about project and programme outcomes and impacts (Shaxson, 1999).

152.   The Livelihoods approach strongly influenced RNRRS programming during the late 1990s and early 2000s and whilst there are a number of examples of livelihoods thinking having influenced approaches to M&E, they are relatively few in number. Many projects do not apply SL approach rigorously, but the more holistic approach implied is recognised and taken into account (Henderson 1999). Projects in the RNR and agriculture sector will principally aim to impact directly on natural capital assets. However, research may also affect other aspect of participants livelihoods – other assets, vulnerability, policy and institutions.

153.   NRSP's Impact Assessment Case Studies: PU Suite 1 (PD138) used an approach based around the livelihoods framework to explore and assess pro poor impacts of four projects implemented between 2001 and 2005 were assessed: two in India (Natural Resource Management (NRM) Action Plan Development (R7959) and Enhancing Livelihoods and NR Management in Peri-urban Villages (R8084)); and two in Ghana (Implementation Plans for Natural Resource Management strategies (R7995) and Baofo Ye Na: Who Can Help the Peri-urban Poor? (R8090). They aimed to identify the potential uptake pathways for outputs during 2005-2015 by assessing which agencies (NGOs, district government, etc) would be likely to continue and replicate the work or benefit from the research in some way, and to what extent.

154.   The SL framework was initially employed by the study to inform which relationships to examine, particularly assets, institutions, livelihoods strategies, technologies, livelihoods outcomes and vulnerability context. The assessment focused on measurement of change in capitals as a proxy for outcome. The impact pathway explored the impact on livelihoods and poverty, pathways by which impact could be expanded (household assets/ livelihood strategies / institutions), and the changes that needed to be made. The SL framework enabled the study to take account of the multiple dimensions of poverty and the diverse causal pathways among agricultural research, dissemination, production and poverty (ITAD, 2005).

155.   A Crop Protection Programme Project (R7885) on promoting the adoption of improved disease and pest management technologies in chickpea in Nepal based their mid-term impact assessment around a livelihoods approach. Using informal qualitative methods involving interviews with groups of farmers to elicit a range of livelihood information such as farmers' asset portfolio, their expenditure priorities and the existence of agricultural

infrastructure and institutional support. Specific questioning regarding the cultivation of chickpea (reasons for cultivation, profits from cultivation, the seed sector, market links, etc) then revealed more detailed insights into the opportunities and constrains in promoting this crop. The process highlighted that literacy and location were important factors influencing farmer involvement in extension projects which would be of relevance when up-scaling to a national program (Stevenson et al 2002).

156.   As already described in section 4.2.3 above, the LPP project 'Understanding Small Stock as Livelihood Assets: Indicators for Facilitating Technology Development and Dissemination' (R7823) developed indicators of asset change based as a measure of livelihood improvement, recognizing that assets have diverse functions (Dorward et al. 2005).

157.   The Sustainable Livelihoods approach has been shown to offer a useful construct for developing both indicators for M&E, as well as a framework for impact assessment (e.g. the IFPRI study described in section 4.2.7). Although the livelihoods language is notably being dropped from much DFID literature and project proposals, including the new agriculture research strategy outline, the concepts remain extremely useful and their potential should be further explored in the context of M&E in the future.

4.4 Scaling up of M&E practice

158.   It is important to discuss the scaling up of the M&E methods generated within the RNRRS. However few examples were found of evidence of scaling up of M&E approaches amongst RNRRS projects, with two notable exceptions. The FRP project "Institutionalising Impact Orientation" (R8086) developed a process for scaling up performance management based on the Balanced Scorecard approach within the forestry sector, which it pilot tested in three agricultural research organisations[4]. A set of tools was developed to build understanding of performance management, diagnose organisational capacity and performance management issues, and begin developing systems. These tools were applied and diagnoses carried out during visits to the three organisations. Scorecard construction itself was then managed through a three day workshop in each organisation. This project only went as far as developing the performance management system: continued accompaniment and support to these agencies was dependent on further funding. Evidence of wider take up of the methods or the tools for scaling up was not available.

159.   This experience is the only reference found amongst the literature and experiences which details scaling up of M&E in partner institutions, rather than merely at the project level. Scaling up of M&E at the institutional level, or more importantly at the level of coalitions of institutions is going to be far more critical in the next phase of DFID agricultural research funding. However, this is likely to pose huge challenges in terms of getting buy-in across institutions and matching requirements to those of other donors which obviously also make reporting demands on these same organisations.

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[4] Crops Research Institute and Food Research Institute in Ghana, and the National Banana Research Programme in Uganda

160.   The CPHP East Africa participatory M&E framework is an attempt at moves towards a scaling up of tools and approaches amongst research coalitions, building on tools that had previously been applied in a more ad hoc fashion amongst projects. Although developed late in the RNRRS processes it is being developed in parallel for application in IFAD projects and will therefore continue to be of use. Once completed it is likely to provide a very useful framework for future research coalition M&E under the future DFID research funding framework.

161.   It is more appropriate to think about scaling up of M&E frameworks to provide guiding principles and ensure that all aspects described in the literature review are considered, and that an effective environment for learning and change is created. Particular tools should be selected appropriate to context and purpose rather than a single method being promoted across the board.

4.4.1 Planning, design and management

162.   Again, few studies refer to issues around the planning, design and management of M&E systems. There is little reference to the collection of baseline data, apart from those studies which mention its deficiency. Issues of costing, and management systems (e.g. responsibilities, information systems, etc) are not touched upon in any studies from RNRRS projects. Consultation around these questions with programme managers and project staff was limited due to availability of time but conversations reiterated the fact that innovation in M&E was neither expected nor encouraged by DFID, and hence by programme managers, and guidance around design and management tended not to be provided, particularly in the earlier years of the strategy.

163.   The fact that financial resources were not specifically allocated for this purpose is also significant as there are additional costs – both time and financial – in establishing M&E systems. A final management challenge raised was that M&E is too often regarded as being external to a project – i.e. seen as an "add on", rather than an integral element of project learning with implications for change (e.g. shifts and strategy and focus and adaptations to logframes). These issues clearly need to be addressed to ensure that M&E is systematically taken on board in future research funded by DFID.

4.4.2 Summary

164.   This section has illustrated that there has been some good practice and important lessons resulting form the RNRRS projects and programmes experiences with M&E, albeit fairly ad hoc. The table below (Table 8) summarises the methods outlined in this report showing the method, the project in which it was developed, a brief description and the paragraph number (in this study).

Method	Project	Description	Para no.
M&E Framework	NRSP R8334/R8100	Components include stakeholders and relationships as well as activities, outcomes, impacts to stakeholders, learning. Ppy. Uses MSC (see below)	88
PM&E	CPHP (no project number)	Components include relationships, and changes in norms and rules as well as activities, outputs, impacts. Ppy.	90
Balanced Scorecard	FRP R6709	Organisational performance management system. Components are : internal perspective, client perspective, test of research effects, uptake networks. Ppy.	91
Participatory Varietal Selection/ Participatory Plant Breeding	PSP R8269/	Farmers evaluate new varieties/ plants in situ using own criteria. Ppy.	101
Pictorial self-assessment	AHP R7986	Pictures draw by participants of 'before and after' intervention scenarios.Ppy.	102
Participatory Indicator Development	AFGRP R7917	Development and assessment of indicators by farmers Ppy.	103
Livestock and Poverty Assessment Manual	AHP R7359	A tool kit for practitioners to assess factors relating to livestock, poverty and development within the manual can be used for ex-ante and ex-post assessment at the community and project level	104
Participatory Budgets	CPP R7401	Creation of budget scenarios 'with and without' interventions with farmer groups.Ppy.	105
Most Significant Change Stories (MSC)	NRSP R8334/R8100	Story of change since an intervention. Captures unexpected outcomes which indicators unlikely to identify. Ppy.	106
Livelihoods Indicators	LPP R7823	Development of indicators to show changing contribution of assets to livelihoods. Ppy.	110
Uptake Mapping	CPHP R6639	Development of local indicators and mapping of uptake process. Ppy	114
Bayesian Belief Network	R6709 R7925	A causal flow diagram which plots possible outcomes, connected by links or relationships which affect them. Critical success factors can be drawn out. `	117
Impact Pathway Mapping	PARC IA method applied in various programmes	A spectrum of possible levels of uptake (the A-H scale) to demonstrate how particular projects or clusters of projects were designed to meet the overall purpose of the programme	120
Poverty Assessor™	AHP R8213	A software programme which enables decision-makers to	122

		assess the potential impact of interventions for ex-ante and ex-post tool for monitoring and evaluation.	
Institutional Histories	CPHP no project number	Used to reflect on institutional arrangements and processes in the context of innovation systems	129
Actor Linkage Maps	CPHP R8310	Map out key actors, and flows of information between them, in context of innovation systems	130
Multi-stakeholder Implementation Tracking	NRSP R6547	Partnerships of multiple stakeholders involved in design of monitoring, indicator development and analysis. Ppy.	148
Livelihoods Pathway Analysis	NRSP PD138	SL framework used to guide thinking of likely impact pathway beyond project timeframe	153
Livelihoods Evaluation	CPP R7885	SL used as holistic tool to guide questions about impact on livelihoods. Ppy.	155

Table 8: Table of key innovative methods covered in this study
Key : Ppy – denotes where a method contains at least anelement of participatory approaches
     SL – sustainable livelihoods

165.   Whilst there was no expectation for projects to develop comprehensive strategies for monitoring and evaluation at activity, output, outcome, pathway and impact levels, there are examples of M&E strategy development, including efforts on the part of the Forest Research Programme to scale up the approach developed.

166.   In terms of methodological approaches, participation may no longer be considered to be "cutting edge". However, it is still not a mainstream approach particularly in some of the more traditional agricultural science sectors. Hence, people centred approaches such as participatory methodologies and the livelihoods approach.

167.   Key areas of innovation in terms of tools have been with respect to understanding outcomes and pathways to impact, as well as those which look at ways to monitor institutional relationships and changes in context in order to ensure a more responsive and dynamic research system. The principles of organisational or institutional learning have begun to be explored in this respect and will prove to be key to ensuring systemic learning and sharing both with and between institutions and research systems in the next phase of DFID funded research.

168.   There are considerable gaps in the above synthesis section due to key aspects of M&E practice not being documented within the project literature available, and the limited time for direct consultation with more than a few project staff. For example attention to management information systems for M&E has not been touched on, and neither have issues relating to budget and time implications of M&E. Whilst the number of methods associated with performance or activity level monitoring, as well as particular tools for measuring pathways to impact, were both found to be limited, in all other areas there has been a considerable degree of innovation and experience to share.

5. Key Issues and Recommendations

169.   The above section has highlighted the key areas of innovative experience with monitoring and evaluation from amongst RNRRS projects. It can by no means claim to be a comprehensive review, due to the challenges of systematic access to information, and therefore an accurate analysis of the gaps in experience is not possible.

170.   It is important to recognise those innovations discussed in the context of the literature review and to build these concepts and ideas into the future research strategy.

171.   The new DFID Strategy for Research on Sustainable Agriculture (2006-2016) will consist of four integrated elements:
➢ Funding to International Agricultural Research Centres (e.g. CGIAR Centres, Challenge Programmes, CABI etc)
➢ Commissioning and funding of regional research programmes
➢ A facility to capitalise on RNRRS achievements, research products, networks, partnerships and know-how; and
➢ A responsive programme in partnership with UK research councils in support of long term fundamental research linked to applied research in southern based organizations

172.   The strategy proposes to take an innovation systems approach, based on experiences and lessons from RNRRS work principally in the CPHP already described in this report. This will be achieved through building greater regionally based connections between institutions that create, store and transfer knowledge, skills and artifacts which define new technologies (p7). There will be increased linkages around demand appraisal and problem identification, participatory research, and effective promotion of outputs.

173.   The strategy also highlights the importance in this next phase of research of ensuring standardised monitoring and evaluation processes at programme and project levels, as well as a system of external impact assessment, with explicit funding attached. The following sections will highlight some of the salient issues which have emerged through reflections on the RNRRS monitoring and evaluation experiences which provide recommendations for future research, support and action.

5.1 Areas for further research and capacity building

5.1.1 Further review of existing tools and experience

174.   It is important, for reasons of accountability and learning that M&E methods and experiences are shared. DFID's broader guidance on Evaluation and Review (for all projects and programmes not just research) highlights broadly the different types of M&E and describes the characteristics of best practice. To supplement these guides, and to advance the progress made in this synthesis, it is advisable to commission a more systematic review of useful and innovative frameworks, methods and strategies

(including experience of management, funding and scaling up) as a more practical resource for those at the point of planning an M&E/IA strategy.

Recommendation 1: Produce a systematic review of useful frameworks methods and strategies which includes those beyond RNRRS

5.1.2 Process and pathway mapping

175.   Considerable attention has been paid in recent years to the concepts of understanding and mapping processes and pathways towards impact as an extremely valuable aspect of an M&E/IA framework. However, there is less evidence of actual experiences and methods for monitoring and evaluating progress along these pathways, nor many insights into the practical implications of this type of approach. Further work could be focussed upon analysing experiences from beyond RNRRS .

Recommendation 2:   Develop further work to enhance understanding and develop methods for pathway/process mapping and M&E

5.1.3 Institutional learning and change

176.   The implications for organizational learning approaches within the context of innovation systems approach of the new DFID research strategy are great, however, practical experiences from the RNRRS have been limited. Further lessons can be drawn from beyond the RNRRS, in particular from the CGIAR experiences with Institutional Learning and Change (ILAC). Collaboration with the CGIAR around this programme may be a cost effective way of advancing understanding and may help to draw other institutions into this area of action research and hence develop a shared approach across existing and future research coalitions.

Recommendation 3: Learn from and collaborate with CGIAR around Institutional Learning and Change

5.1.4 Capacity Building

177.   Documentation and dissemination of M&E/IA experiences and methods can go a long way to enhancing understanding and awareness of M&E methodologies. However, practical capacity could be strengthened not only through people attending formal training opportunities, but through DFID encouraging cross-fertilisation of M&E ideas and methods between projects and programmes during the lifetime of the strategy through supported initiatives such as the convening of events and dissemination of outputs.

Recommendation 4: Give increased attention to capacity building for monitoring and evaluation and impact assessment.

5.2 Implications for DFID's new research strategy

5.2.1 Planning from the outset

178.　　In order to overcome many of the challenges and frustrations of understanding outcomes and impact in the RNRRS, it is important to develop a framework and strategy for M&E/IA at the initial stages of the new research strategy. It should outline expectations regarding M&E for accountability purposes as well as strategies to encourage internal learning and decision making. It should embrace the different stages of the planning cycle, and clarify how different 'levels' of M&E (e.g. projects where they still exist, programmes, institutional support etc) fit together, and how they should contribute to longer term impact assessment. For example what baseline data should be collected and which indicators should be measured for both short term and long term learning.

179.　　Such a framework should not constitute strict guidelines with respect to methods. Beyond encouraging a mix of internal and external learning strategies, choice of appropriate methods for data collection can be left to institutions. However it should be clear as to how monitoring and evaluation systems (during the process of the strategy) feed into impact assessment which might take place towards the end or beyond the end of the strategy. If and when changes in strategy and expectations occur then these should be clearly communicated.

Recommendation 5: Pay early attention to planning an M&E and Impact Assessment strategy from the outset.

5.2.2 Harmonisation amongst donors

180.　　Matching reporting demands across institutions and donor harmonisation is likely to be challenging but extremely important given the more collaborative style of research systems which are being pursued. Many projects which have multiple sources of funding find that they have different reporting requirements. Sharing of monitoring and evaluation frameworks across institutions can reduce transaction costs for projects. This requires flexibility, a new 'way of working' and would have to adhere to each organisations overriding information requirements so that cross project assessments can be carried out.

Recommendation 6: Take steps towards harmonization of M&E and impact assessment expectations with those of other donors

5.2.3 Allocation of resources

181.　　Allocation of staff and financial resources are key to incentivising and facilitating the development of effective M&E/IA systems, including appropriate management information systems and opportunities for face to face experience sharing. A failure to legitimize, or even ensure the spending of a reasonable proportion of resources on this important aspect of project management is likely to result in poor performance.

Recommendation 7: Resources (both staff and financial) should be allocated to M&E in project plans

5.2.4 Lessons learning and collaboration

182.   Under RNRRS research was managed under 10 (originally 11) independent programmes with a diversity of approaches to management, dissemination and research promotion. There was some sharing between RNRRS programmes on occasions, particularly as 5 of the 10 programmes were managed by one institution. The new strategy will comprise more disparate regional research programmes and is likely to be more diverse. It will be important to ensure that more efforts are devoted to facilitating cross regional learning and seeking areas for potential collaboration under the new strategy as natural opportunities for this may otherwise not occur.

Recommendation 8: Ensure that lesson learning and collaboration occurs both within and between regional research programmes, as well as with other elements of the strategy

5.2.5 Incentives for learning

183.   Developing a genuine organizational culture of learning and reflection within and between those institutions who will be involved in the new strategy of agricultural research will be a huge challenge, but a critical one if the approach is really to flourish. Watts (2005) and Hall et al (2003b) emphasise the need for institutional incentives as well as individuals' capacity in order for learning to be effective. The four areas of capacity building and contextual support for learning proposed by Watts et al (2003) are reiterated here as key recommendations to DFID:
  - Develop a supportive external environment: donors/managers need to encourage and reward transparent and self critical learning and change.
  - Foster a culture of learning and change: promoting values, beliefs, norms and traditions that positively influence behaviour and performance. Support and facilitate critical review and reflection
  - Reorient management systems: to encourage and celebrate risk taking, innovation and learning
  - Develop and enhance individual awareness, knowledge and capabilities: training to develop new process-oriented skills

Recommendation 9: Foster organisational incentives and a culture of learning within institutions involved in the new strategy

6. Conclusion

184.   Over the eleven years of the RNRRS the relevance of poverty reduction as an explicit and expected goal of research projects and programmes has become significantly more important. As such there has also been increasing interest in the processes surrounding not only the creation of new knowledge and technologies but also of effectively transforming them into developmental outcomes and impact. This has become a key focus of the research process itself.

185.   It is increasingly recognised that greater impact from research implies stronger interaction and exchange between many actors and institutions who play different roles in the development and promotion of innovations. There is now a move away from research management aimed at narrowly defined impacts on poor people, towards building an innovation system which leads to this end – a National Systems of Innovation (NSI) approach.

186.   DFID's new Strategy for Research on Sustainable Agriculture (2006-2016) aims to build on this approach, strongly informed by lessons from the RNRRS (particularly the Crop Post Harvest Programme) by contextualising agricultural technology and development research within innovation systems. There are significant implications for institutional relationships within the new strategy, implying less clearly defined projects and more coalitions or task networks based around developmental problems.

187.   For monitoring and evaluation, this means that whilst reporting for accountability purposes will continue to play an important role, there will be an increased need to encourage learning processes within and between those involved in research coalitions and networks. This requires not only a range of tools and methodologies to guide more effective practice, but also capacity building to ensure there are appropriate skills within institutions. Critically, there also needs to be strong institutional incentives for honest, reflective learning and sharing. Much progress has been made with respect to thinking about the implications of institutional learning, and these valuable lessons should be built into future frameworks and systems for M&E and lesson learning.

188.   Evaluations of RNRRS have also illustrated the importance of attention from an early stage to assessment of impact, or perhaps more appropriately, monitoring of progress towards impact. This should allow for establishing baselines and for developing coordinated and harmonised methods and processes. Whilst impact assessment has been largely outside the remit of this report, some critical issues relating to clarity of responsibility and timely planning of impact assessment have been raised.

189.   This synthesis has illustrated that there have been a number of innovative and creative approaches to monitoring and evaluation developed during the course of the RNRRS. Furthermore, it has drawn important lessons relating to how M&E was conceptualised and developed by DFID. It is encouraging to see that these lessons are being captured, but critical that both lessons and innovations are shared widely and incorporated into activities within the new research strategy.

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Annex 1. Terms of Reference for the Study

The Animal Health Programme will commission a synthesis study that will analyse selected projects from all of the RNRRS programmes to assemble, develop and promote new knowledge on how monitoring and evaluation of research can be used to improve pro-poor impacts, in order to formulate research questions and guide policy priorities within or outside DFID.
The draft report of the synthesis study should be completed by mid December 2005.

Activities:

a. Select projects for analysis from across the RNRRS programmes. The projects will be selected in conjunction with RNRRS programme managers and will be those that either as a primary objective or through a less direct route sought to develop new knowledge and methods for monitoring and evaluation.

b. Search, record and synthesise new knowledge from the selected projects. Priority areas for focus will be: a) evidence of uptake of research outputs; b) effectiveness of research responsiveness to M&E findings; c) strategies for monitoring of evidence of impact; and d) potential for scaling up of M&E practices.

c. Follow up on interesting leads from documentary evidence through interviews with project leaders, including one or two overseas interviews if necessary.

d. Using existing reviews of the literature on monitoring and evaluation of natural resources research for development, compare the findings from sampled RNRRS projects.

e. Identify and communicate to key stakeholders the main lessons, development messages and challenges. This will include presentations to the Animal Health Programme, to DFID staff and written presentations for subsequent use e.g. by the eco-regional research funding platforms to be set up under the new sustainable agriculture strategy.

Outputs:

f. A body of knowledge synthesised from RNRRS projects that is relevant specifically to DFID's principle interest in how monitoring and evaluation can be used to improve pro-poor impacts of research.

g. Implications for DFID's future research and development policy identified.

h. Knowledge gaps identified, and research questions formulated with respect to how monitoring and evaluation of natural resources research can better achieve pro-poor impacts.

i. Communication effected with stakeholders within constraint imposed by time. This will aim to come in line with other RNRRS Synthesis communications strategies, but will broadly include the following:
    - A detailed analytical report
    - A summary report highlighting key implications of findings suitable for wider circulation
    - A short policy brief based on the summary report

- Presentation to DFID stakeholders

64

CROP PROTECTION PROGRAMME   Tomato Leaf Curl Virus Disease (ToLCVD) Research fi Timeline of Project Impacts

TOMATO LEAF CURL

RESEARCH AND DEVELOPMENT ADVANCES	CROP/DISEASE FACTORS	TRADE/LIVELIHOOD ISSUES
Pre-1980 • ToLCVD control based primarily on insecticides (Sastry et al. 1974) • Epidemiology of disease studied from 1978 (Sastry et al. 1978)	**Pre-1980** • ToLCVD first reported in India on tomato (Vasudeva & Sam Raj 1948) • ToLCVD reported to cause economic losses in India (Sastry & Singh 1973) • B. tabaci biotype B first documented in the USA, 1986	

1980   **1980**

• Wide host range described for ToLCVD and Bemesia tabaci in India (Saikia & Muniyappa 1989) • Nylon netting for tomato nurseries tested to prevent entry of viruliferous B. tabaci		• 1.2 million t of tomatoes lost in India due to whitefly-transmitted viruses – estimated cost US$53 million

1990   **1990**

• Muniyappa et al. are first to purify, characterise and to determine the molecular (epitope) variability of tomato leaf curl geminivirus, 1991 • DFID CPP research initiated on ToLCV management in southern India, 1996 • CGIAR launches a research task force on whiteflies • ToLCVD-resistant lines and biocontrol options for B. tabaci identified • Model to compare IPM practices developed • Use of netting and physical barriers assessed • 10 inbred F, ToLCVD-resistant lines with acceptable horticultural characteristics produced, 1999	• B. tabaci biotype B causes U$500 million in crop losses in 1991 in the USA (Perring et al. 1993) **START OF DFID CROP PROTECTION PROGRAMME** • B. tabaci populations low in India (2–4 adults per plant), ToLCVD incidence moderate to high (40–100%) (Ramappa et al. 1998) • Severe epidemic of ToLCVD in South India leads to 100% crop losses in Kolar District, 1999 • B. tabaci populations found to have increased 1000-fold in Karnataka State, South India • ToLCVD identified in Karnataka	• Over 5 million t of tomatoes produced in India across 0.32 million ha. Typical yield of 20 t/ha is less than half that in Europe, Australia or North America • Breakdown of disease tolerance in hybrid variety, Avanish II, leads to total crop loss in Kolar District, Karnataka, 1999

1995   **1995**

2000   **2000**

• B. tabaci biotype B identified in Karnataka (Banks et al. 2001) • Standardisation of squash silver leaf technique for biotype B identification • Distribution of begomoviruses affecting tomato in India surveyed (Chowda Reddy et al. 2005) • Release of new ToLCVD-resistant tomato varieties in India • Capacity built in molecular diagnostics at the university (UASB) • New public–private partnership licensing agreements negotiated for the first time within the university allowing massive scaling up of seed sales	• B. tabaci biotype B spreads throughout Karnataka; populations increase to 1000s of adults per plant, 2003 • 100% ToLCVD infection rates in young tomato plants cause complete yield loss and financial hardship • Biotype B found in western India, Gujarat (Chowda Reddy 2004) • New whitefly-transmitted virus disease epidemics cause losses in Jatropha, mungbean, okra and squash	• Tomato growers' incomes reduced by more than 30% as a consequence of ToLCVD epidemics • Large-scale adoption of nylon netting in commercial tomato nurseries • Kolar District farmers participate in CPP-funded trials of open-pollinated ToLCVD lines, 2001 • Sale of breeder seed by university to commercial vegetable seed companies • Sale of ToLCV-resistant tomato seeds to farmers through National Seed Project and Agricultural Technology Information Centre of UASB

2005   **2005**

DFID CPP R&D PROJECTS

1996   Sustainable management of ToLCVD and B. tabaci in India (Phase I), 1996–99
2000   B. tabaci and ToLCVD management (Phase II), 1999–02
       CGIAR Tropical Whitefly Project (Phase II), 2001–04
2003   Promotion and impact assessment of ToLCVD-resistant tomatoes (Phase III) 2003–05, extended to 2006
2005   CGIAR Tropical Whitefly Project (Phase III), 2006–09 (post RNRRS)

CGIAR: Consultative Group on International Agricultural Research
IPM: Integrated pest management
OP: open-pollinated
RNRRS: Renewable Natural Resources Research Strategy
UASB: University of Agricultural Sciences, Bangalore

AGGREGATE RESEARCH IMPACTS

2003   Release of three OP tomato varieties with ToLCVD resistance
       11 seed companies buy into use of ToLCVD-resistant varieties and begin breeding F, hybrids
2005   Farmers increase profits >10-fold by growing the ToLCVD-resistant varieties compared to pre-existing ToLCVD-susceptible OP varieties
       Pesticide use reduced by 40–50% per growing season, lower farm input costs and rising household incomes, using resistant varieties
       Requests for seeds of resistant material from 13 countries in 3 continents
       Seed companies begin multi-locational trials of promising ToLCVD-resistant hybrids with potential future benefits to hundreds of thousands of Indian tomato growers
       Website on 'Sustainable management of tomato leaf curl virus disease and whitefly on tomato in India' designed

Annex 2. Impact Pathway timeline for Tomato Leaf Curl Virus Research, CPP.