# Natural Resources Systems Programme

## Research Highlights 1998 - 1999

*Poverty reduction through partnerships in natural resources research*

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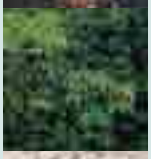
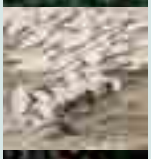
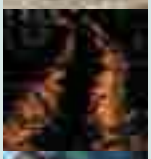
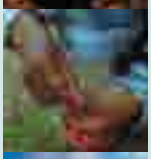
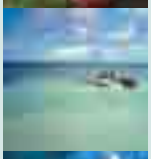

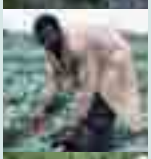





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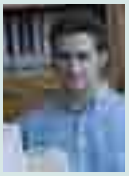


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# NRSP Research highlights

HIGHLIGHTS

**Poverty reduction through partnerships in natural resources research.**

Millions of people in less developed countries depend mainly on the use of natural resources for their livelihoods. They variously, either directly or as employees, engage in farming, livestock herding, fishing, food processing and trading and other agro-enterprises. For varying reasons, a common feature is that a large proportion of them are poor with limited assets and limited opportunities for improvement of their circumstances.

Because of their dependency on natural resources, ways by which people can maintain the productive potential of the natural resource base over a relatively long time frame are of tremendous importance. Already, in some areas, there is evidence that productive potential has declined arising from various factors such as population growth, use of inappropriate technologies and the impacts of land use change. This deterioration is a cause of global concern both for the sustainability of food supply and the degradation of the environment.

The Department for International Development (DFID) is the British Government department responsible for promoting development and the reduction of poverty. The central focus of the government's policy is a commitment to the internationally agreed target to halve by 2015 the proportion of people living in extreme poverty, together with associated targets of environmental protection, basic health care provision and universal access to primary education. To contribute to achieving this objective, DFID funds a group of programmes that covers various aspects of natural resources research.

One of these programmes is the Natural Resources Systems Programme (NRSP).

NRSP is a ten year programme, for which 1998-99 is its fourth year. It aims to deliver new knowledge that can enable poor people who are largely dependent on natural resources to improve their livelihoods. Research focuses on the integrated improvement of the management of natural resources (soil, water, vegetation and organic residues). It aims to find ways by which these new management strategies can improve the assets of the poor and thereby improve their livelihood security. The new knowledge that the programme generates is of varying types. It includes specific technologies for land care, better strategies for natural resource management and methods of transferring the knowledge to various clients ranging from poor individuals, households and communities to policy makers who are influential in various natural resource sectors.

**NRSP's strategy for conducting natural resources research emphasises the following:**

- Poverty focused, demand led to ensure that the research can achieve impact on specific groups of the poor.
- Use of a systems approach in both the design of research and in the way it is conducted.
- Research interventions that are based on an understanding of technical, social and institutional inter-relationships.
- Partnerships. UK-based researchers work in partnership with natural resources specialists overseas. An overseas institute may lead the project in some instances. In addition, participatory methods are used in order to involve both intermediate and ultimate beneficiaries from an early stage.

# HIGHLIGHTS

**The programme covers six production systems and articles for each system are included in this publication:**

**High potential production systems** are found in areas with favourable soils, climate and water resources. Such areas are relatively well developed, including irrigation schemes. They support some of the highest population densities in the world and have intensive use of land. Target countries are India, Bangladesh and Kenya. *Adding fish as a farm enterprise* (p6) introduces the challenges that poor farmers in India face when they try to diversify from livelihoods based mainly on rainfed agriculture to include fish farming.

**Hillsides production systems** are characterised by farming activities on steep slopes where difficult terrain results in poor accessibility, limited infrastructure and markedly impoverished communities. Use of these marginal lands has led to their degradation. Target areas include high altitude areas of Asia and Latin America. *Farming on steep slopes* (p3) highlights the problems facing hillside farmers in Bolivia who are seeking new low cost strategies to improve the condition of their lands.

*Millions of people in less developed countries mainly depend on the use of natural resources for their livelihoods. They variously, either directly or as employees, are farmers, livestock herders, fishers, and agro-enterpreneurs*

**Semi-arid production systems** occur in the tropical dry lands where agricultural activities and livelihoods are constrained by poor natural resources (principally infertile soils and low and erratic rainfall). *Living in dry areas* (p9) describes the challenges facing poor farmers in Zimbabwe who struggle to achieve production with insufficient farm power and inadequate weed control techniques.

**The forest agriculture interface** refers to areas that are in transition between primary forest and settled agricultural land use. Such areas are found in Brazil, Nepal and Ghana. *Community not committee forestry* (p18) brings out some key management issues concerning people who rely on forests to contribute to their livelihoods.

**The land water interface** refers to both coastal areas and inland aquatic systems such as floodplains. Priority areas include the Caribbean islands and Bangladesh. *Life on small islands* (p15) concerns the management of marine and coastal resources in Tobago. The main emphasis is on ways by which local people can reach agreement on how to manage them in economically and environmentally sustainable ways.

**The peri-urban interface** investigates the linkages between the rural and urban sectors. *Living in the shadow of a city* (p21) investigates some of the dynamics of this in the city area of Kumasi in Ghana.

In addition, some projects focus on **socio-economic methodologies**. This area of research aims to improve the understanding of how natural resources research can produce results that will effectively intervene in the poverty cycle. *Understanding gender relations* (p12) examines the differences in roles of men and women and new ways of analysing the changes that take place in these roles when new technologies are introduced. *Communicating the results* (p24) emphasises the need for every project to have a good communications strategy. It finds that stakeholder participation throughout the project cycle is a key to success.

# Farming on steep slopes

**"Every year our harvest is poorer because the soil on my farm is being washed down into the valley by the heavy rains. But at the same time my family continues to grow, I have more mouths to feed and I cannot make ends meet,"** *- a farmer in the fertile Zamorano valley in Honduras.*

This problem is not an isolated one. It is typical of the challenge facing vast numbers of farming families throughout the extensive hillside areas of Central America. They would like to stop the erosion but they do not know how and so they clear more pine forest off the hillsides to make more land available for their crops. If the erosion can be controlled, the land can be made more productive and the need to strip out more forest areas can be avoided.

Traditional soil conservation methods such as terracing are well known and are successfully used throughout the world but constructing and maintaining them can be expensive. An alternative and low cost approach, favoured by hillside farmers, is to employ natural, live barriers using planted or indigenous vegetation aligned along the land contours at regular intervals with the cultivated areas between them. The barriers trap the sediment by slowing the runoff water and so stop nutrient-rich topsoil from being washed down the hillside. They also encourage water to infiltrate into the soil for crops to use. Once the land has been stabilised, farmers are then more confident about investing in their farms to increase soil fertility using nitrogen-fixing legumes. These can be grown in association with basic grain crops and then incorporated in the soil to raise organic matter levels and so improve fertility.

This was the experience of a DFID funded research project based in Honduras in the early 90s. Building on this, a similar hillside project was established in the more challenging semi-arid regions of the inter-Andean valleys of Cochabamba and Santa Cruz in Bolivia. Working at altitudes up to 4000m, land slopes are commonly above 25% and can exceed 100% in places! Although the climate is semi-arid, rainfall can be intense, often exceeding 60mm/h for short periods and so water tends to runoff rather than infiltrate. All this leads to high rates of soil erosion, loss of valuable soil nutrients and organic matter, reduced soil depth and a limited available water capacity for crops.

## THE APPROACH

*Research can provide the knowledge and the technical innovations but these are of little use if farmers are unable or unwilling to use them*

If the challenges of feeding people using these traditional farming practices are to be met, the problems of erosion must be solved. But how do

farmers get access to new and innovative knowledge and technologies and how do they assess if it is appropriate for them? Research can provide the knowledge and the technical innovations but these are of little use if farmers are unable or, for whatever reason, unwilling to use them. The answer was sought through participative research. This attempts to combine the farmers' intimate knowledge of local agriculture and the social and economic environment in which they must work and live with the technical knowledge and experience of researchers. Eight communities were selected that covered a wide range of agro-ecological environments. Community visits and workshops quickly confirmed the main problems of serious soil losses. Farmers complained about how their hillside

*The outstanding winner on all fronts has been phalaris grass. This can form a closed barrier and an incipient terrace in two seasons*

plots, often less than 0.1ha in area, were becoming unprofitable through falling yields. Some were being forced to migrate to more productive areas in the tropics, or fell Bolivia's remaining forest reserves. There was an eagerness to embark on a programme of participatory research to study the value of live barriers and the use of leguminous crops and green manures. These ideas were new to local farmers. It is unlikely that they would have been considered had they not been brought to their notice by this research project.

## THE RESULTS

### Live barriers

Over the past 3 years more than 20 species of grasses and shrubs have been planted and evaluated at altitudes ranging from 1800 to 4000m. Their technical performance, in terms of growth rates, biomass production and erosion reduction, has been monitored. More importantly, the participatory evaluation of the species by farming families has revealed the priority that they place on the multi-purpose potential of the barrier material. The outstanding winner on all fronts has been phalaris grass (*Phalaris tuberoarundinacea*). This can form a closed barrier and an incipient terrace in two seasons. It remains green throughout the fierce dry season (April to November) and provides

forage for farm animals. It is of high nutritive value, it is produced in abundance and it stubbornly resists over-grazing. This is a critical issue as, in the past, farmers have often been forced to sell their work oxen because of a lack of fodder.

### Leguminous cover-crops/green manures

More than a dozen legume species have been evaluated following hillside stabilisation with live-barriers. The best options were vetches

(*Vicia sativa, V. villosa*); tarwi (*Lupinus mutabilis*); garrotilla (*Medicago polymorpha*) and broadbean (*V. faba*). Farmers found that several management practices gave encouraging results in terms of increased crop yield:

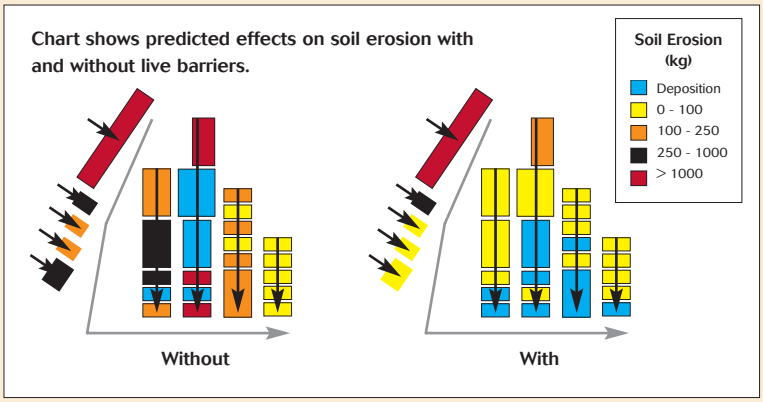
- Mixing legumes with annual cereals (maize, wheat and barley) and incorporating them after the cereal harvest.
- Rotating legumes with other crops, and incorporating them directly or after a first picking (in the case of tarwi and broadbean).
- Planting tarwi in degraded soils which are no longer worthwhile to crop.

### Predictive techniques

Field trials are not only time consuming but also expensive. There is often the question whether the results in one area are applicable in another with different rainfall, soils, land slopes, crops and farming practices. It can take several years to replicate trials and obtain results that can be more widely disseminated. In the meantime more farmers are losing their livelihoods. Modeling offers a way of speeding this up. A mathematical model which can predict the movement of water and sediment - known as the European Soil Erosion Model (EUROSEM) was applied to sample hillside plots to assess its usefulness. Inputs to the model include soil type, slope, infiltration, rainfall and crop types and the output is the potential erosion that can be expected with and without barriers. Although it was not possible to predict actual amounts of erosion, the model did prove useful in assessing the impact of conservation measures on a catchment in broad terms. Using such techniques it should be possible to evaluate what might happen at many different sites without having to go through many seasons of experimentation.

## THE FUTURE

In only three years, it is not possible to cover all relevant aspects of soil and water conservation in such a difficult environment. Questions remain, such as: how to integrate and improve irrigation practices on steeply sloping land? What are the longer term effects of legume cover crop management? What new species could be introduced and tested? What are the longer term costs and benefits associated with these practices?
But progress has been significant. Working with local NGOs, the results have already been made available to more than 250 hillside families and the pressure is on to meet the increasing demand from others. To support this dissemination several publications oriented to farmers and field technicians have been produced. Copies of these are available from the SRI at the address given below.




**R6621 Soil and Water Conservation Technologies, Bolivia.**

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# Adding fish as a farming enterprise

Can fish be a key to helping Indian farming families climb out of poverty? India has nearly 40% of the world's absolute poor and 30% of the population of the world's low-income countries. The Eastern Plateau states of Bihar, Orissa and West Bengal, in particular, are characterised by poverty and inequality, land alienation and seasonal migration. Some castes and tribes are amongst the poorest communities in India.

*Aquaculture may hold the potential for marginal farmers to diversify and improve their livelihoods*

Most farming families in the region rely on rainfed crops and livestock for their livelihoods. Some have access to water for small-scale irrigation. Lowland farmers have more reliable perennial supplies whereas upland farmers must rely on seasonal rains and tanks for storage.

Water in storage provides the opportunity for farmers to develop aquaculture to complement their traditional sources of income. Fish is highly valued and is a valuable source of protein for the family, yet it is surprising to find that aquaculture is not widespread among farming communities. Research suggests that aquaculture may hold the potential for marginal farmers to diversify and improve their livelihoods. But if the benefits are so clear and so obvious why are they not doing it?

Support for aquaculture in India is well developed. It comes mainly from the government Departments of Fisheries, research institutes and NGOs. These have traditionally promoted large-scale capital-intensive systems. High levels of inputs are required which aim to maximise production. Centralised hatcheries

are used to produce fry, which are sold on to produce fingerlings, which are then passed on to large production units to grow them on to maturity and harvest. Poly-culture is encouraged enabling a range of different fish to be grown in the same pond. Some occupy the bottom of the pond whereas some prefer to feed close to the water surface. By careful management all the available water can be used to maximum advantage. Production under these conditions can be up to 4-5tonnes/ha of water area. But the inputs to this approach to fish farming are also significant. Large perennial water bodies are needed and other water uses and users are usually excluded. Feed and other inputs must all be bought in.

## THE PROBLEM

This activity is well supported by research conducted on research stations but there are problems with developing and disseminating this technology to farmers. This constraint has

been widely recognised since the early 1990s. There is no tradition of fish farming among the poorer communities. Research has been technology based and has not addressed the main issue of how farmers can benefit from this knowledge. How can they incorporate aquaculture into their farms when they cannot afford the capital inputs and running costs of intensive systems or accept risks that such investments entail? Are there alternative strategies that require less input and less risk?

## THE PROCESS

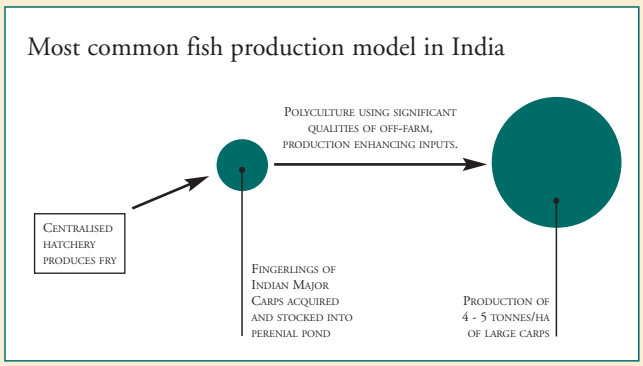
To investigate the possibilities of introducing aquaculture, a participatory approach was adopted recognising that farmers as well as each of the institutions involved in research and dissemination has a stake in aquaculture development and a role to play. This approach has enabled the research team to identify household priorities and experiences regarding options and approaches to take. Many important issues emerged from a stakeholder planning workshop. Some unexpected, such as the cultural issue of taking presents to family and friends when visiting. The usual practice is to take chicken even when a household can ill afford to do so. Fish was considered to be a very acceptable alternative.

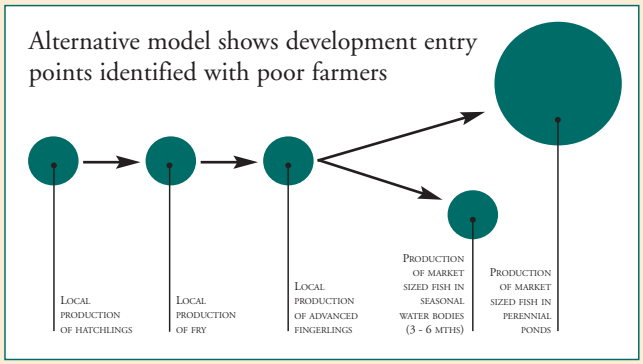
Common interest groups engaged in aquaculture from clusters of neighbouring villages were encouraged to meet together regularly as Matsya Anusandhan Sahayak Committees MASCs (farmer research support committees). They identify, implement and evaluate research to target the needs of small and marginal farmers following initial support and institutional strengthening from community organisers.

The challenge of moving from the intensive fish production model to one in which small farmers could participate is a complex one. No one farming family could cope with the whole process from producing hatchlings to market sized fish. Yet if the process was to be split up, who would be responsible for producing hatchlings and who would then take on the

*The challenge of moving from the intensive fish production model to one in which small farmers could participate is a complex one*

production of fry in a way that would allow others to grow the fish on to market size? A complex chain was needed with each link being dependent on its neighbours. Specific service components needed to be investigated to determine potential entry points for different groups. Can affordable functional hatcheries suitable for isolated communities be produced? Can groups of farmers produce fry and advanced fingerlings in temporary water bodies before the on-set of the rains? Can they produce market-sized fish in seasonal water bodies, which hold water for only 3-6 months of the year? In each case, is the technology accessible and attractive? Farmers know, for example, that larger fish survive better than small ones and so the risks




attending the production of fry and fingerlings are that much greater.

A Research Co-ordination Committee drawn from the main stakeholder groups co-ordinates research across the project, analyses overall results and feeds these back to the individual MASCs. Where promising new ideas come forward to address identified constraints and are more appropriately developed and/or tested on-station, this is undertaken by suitably equipped stakeholder groups. Village-based open days and research station-based open days are held to share research results as appropriate, and an iterative process now exists for upgrading and refining promising recommendations and discarding or amending those that fail.

## THE OUTCOME

In the first season farmers groups in nine villages undertook 26 aquaculture trials. In initial MAS committee meetings, group brainstorming was used to identify the problems perceived/encountered by the farmers and specific researchable constraints were listed and prioritised. The results were evaluated by farmers in Farmer Network Meetings, and fed back to the Research Coordinating Committee. Their role was to consider the broader picture, co-ordinate research across the project, analyse overall results and feed this back to individual MAS committees.

Research project outputs include recommendations based on knowledge generated (based on the on-farm trials) and methodologies used relating to the farmer participatory research methodology. Part of the project aim is to disseminate both these types of information to researchers, development organisations and farmers.

Results to date include the evaluation of different species grown to fry, fingerling and marketable size stages in seasonal water bodies, and the testing of different fry transport methods and small-scale hatchery designs for the local production of fry. In-depth analyses of farmer adoption rates and impact of research are currently being undertaken. Preliminary data suggest that one year after the first trials, farmers are now independently (i.e. without project support) including aquaculture in their livelihood portfolio and they are experimenting with different aquaculture systems, based on the knowledge gained from the project trials.

**R6759 Integration of Aquaculture into the Farming System in the Eastern Plateau of India.**

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# Living in dry areas

Smallholders who live in the tropical drylands have to cope with two realities of their natural environment: they live in a dry place and their rainfall is unreliable. Although they receive between 250mm and 1000mm of rainfall each year, it unfortunately comes in one or two short seasons barely long enough to grow a crop. For the rest of the year there is little or no rain. Domestic animals lose weight and in drier years can starve. They may have to be watered from wells, consuming much labour. So rainfed farming consists of short periods of intense and exhausting work separated by long periods of inactivity.

Rainfall variability introduces risk into most life-supporting activities and the impact of variability increases with aridity. While this can be measured in probabilities, enabling an assessment of risk and returns from agriculture to be made, no one can predict the timing or intensity of droughts.

## MANAGING THE RAIN

Various agronomic practices have long been established to help mitigate the effects of drought and it is well known that land preparation and planting methods largely determine the success of crop establishment, the intensity of weed growth in the crop and the resources that farmers must invest to achieve good yields.

Conservation tillage is an approach to land preparation that reduces soil disturbance at the planting time and so avoids turning the soil and drying it out unnecessarily. Residues left on the soil surface also conserve soil water and increase the organic matter in the soil, which

*Smallholders who live in the tropical drylands are unable to escape from two fundamental realities: they live in a dry place and their rainfall is unreliable*

in turns improves soil structure, infiltration and water retention. Reduced tillage also significantly reduces the power needed for cultivations at a time when power on the farm is at a premium. But it does create problems of establishing crops and controlling weeds. Wealthier farmers can solve such problems by using higher levels of seeding to compensate for poor crop establishment and a combination of herbicides and in-season tillage techniques to get rid of the weeds. But these options are not available to poorer farmers. They do not have the resources to buy the extra seed and herbicides and may not have the resources for mechanical weeding.

## IN ZIMBABWE

In Zimbabwe over 80% of farmers live in the tropical drylands where they have small land holdings and farm infertile sandy soils. Although the wet season lasts from October to

April, rainfall is unreliable, particularly at the start of the rainy season and there can be mid-season dry spells in January and February. Since 1980 there have been seven bad droughts that have dramatically reduced livestock numbers and weakened what remains. Farmers rely on animals for ploughing and the peak demand for this comes early in the wet season when animals are at their weakest. Those farmers without animals must either till and plant by hand or wait until animals become available after others have finished their ploughing. They then can either hire the animals or barter their labour in exchange. The outcome is usually late planting with resulting low yields. Reduced tillage would help to solve this problem but how can this be introduced and what about crop establishment and the weeds?

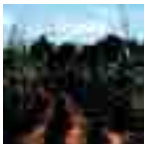
Recent work by Silsoe Research Institute in UK and the Department of Research and Specialist Services in Zimbabwe has focussed on this problem. Experimental work began after consultations with farmers about their soil and water conservation problems and methods of cultivation, which best fitted their circumstances. A Participatory Rural Appraisal was conducted among the local farming community and this resulted in an on-farm research programme run jointly by farmers, researchers and extension staff.

## CROP ESTABLISHMENT AND WEEDING

All the farmers use hybrid maize seed and this is often the only cash expenditure they incur.

The importance of good germination is therefore of vital importance to avoid the cost of additional seed for gap-filling and replanting. Three methods of cultivation were tested: traditional hand planting; use of 'Rip lines' - a 25cm deep planting slot cut using an animal drawn tine and opening up furrows with a mouldboard plough and covering seeds with hand hoes or with feet. Weeding options tried included hand weeding with hoes; the use of ox drawn cultivators working between the crop rows and using the mouldboard plough as a weeder to turn the soil and cover the weeds.

Results over four seasons of on-farm trials showed that reduced tillage methods can be used successfully without any loss of yield when compared with more traditional cultivation practices.



This demonstrated the benefits of reduced tillage as a means of saving on farm power demand. When compared with hand planting methods, reduced tillage produced maize yield increases of between 20% and 300%. Weeding practices did not have any significant effect on overall grain yield. But hand planted plots were observed to be much weedier and when these were not cleared properly this did contribute to the recorded low yields.

Wealthier farmers usually need little encouragement to take up such advantageous practices but poorer farmers have fewer options open to them. Rip lines do mean more labour resources for hand weeding soon after crop emergence and as this is considered to be women's work it can increase their workload. At two places where trials were undertaken, the use of draught animals attracted the attention of the men but other labour intensive technologies were left more to the women.

This work has made it clear to everyone, farmers, extension staff and researchers, that

there was not one set of rules that everyone should follow and the most appropriate techniques depended on the physical, social and economic circumstances of each farm. The use of Rip lines, for example, was taken up readily, particularly by those who could afford to buy the new tools. But as expected this increased the weed infestation on some farms, and so additional resources where needed to cope with this later in the season.

One of the important outcomes of the work has been that farmers are now beginning to experiment for themselves. Many are now conducting their own trials to see what techniques work best for them. This involves putting two options side by side in the same field so that soil and water conditions are the same and so any differences arising from the different techniques are self-evident. Simple budgeting procedures have been developed and tested so that farmers can assess the economic value of new farming practices for comparison with their more traditional methods.

## PREDICTIVE TECHNIQUES

Because of the complexity of the different farming situations, modelling may offer a way of speeding up the process of evaluating options rather than waiting several seasons for field trials to be carried out. Most crop models to date have failed to relate crop responses to management interventions but attempts were made to modify the PARCH-THIRST crop growth model, originally developed at Newcastle University, to include a weed management routine, which simulates the effect of weed competition for soil water on crop performance. Results so far are encouraging researchers to continue the development of this approach.

## WIDER OUTCOMES

The shared nature of the research experience has encouraged the formation of Farmer Groups so that the process of cooperation and development of new ideas can continue. Researchers too have shown an increased willingness to move their research off the stations and onto the farms and so now work more directly with farmers. A more regional spin off from the research has been the establishment of a new network – Africa Conservation Tillage Network particularly for the countries of southern Africa.

*Reduced tillage methods reduce the farm power needs without loss of yield. But it means more weeding which can increase women's workload*

But the challenge of providing farming systems which truly benefit the poor still remains. The technology is there and proven but if farmers cannot get timely access to animal power for cultivation and weed control or reap the benefit of herbicide use then the low yields and the weeding and the drudgery this creates, particularly for women, will continue. Research beyond the technological issues is needed to develop ways in which these benefits can be used to improve livelihoods.

**R7085 Promotion of Practical Approaches to Soil and Water Conservation for Smallholder Farmers in Semi-Arid Africa.**

**With contribution from R7093 The Relevance of Nigerian Farmers' Responses to Dry Land Farming Systems in India and Southern Africa.**

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# Understanding gender relations

**Guidelines for the development of gender sensitive interventions by agricultural researchers. Available from Christine Okali, see address at the end of this article.**

Gender is often confused with sex but they are different. Sex is concerned only with the biological differences between men and women and these are fixed and unchangeable. Gender is about social relationships, not just between men and women but also between men and between women. These are shaped through the history of social relations and so the gender differences between men and women can and do change. They change over time and between cultures. While most people happily break society down into men, women, husbands and wives, few would go much further and consider the implications of differences reflected in marital status or education. A man may be adored by his mother, scorned by his teenage daughter, cherished by his sister, loved by his wife and respected by the community. In each situation, his gender relations will be different.

*Gender is about social relationships, not just between men and women but also between men and between women*

So why is it important to understand gender relations and how they change? How can they be analysed? and what have they got to do with natural resources research? These and similar questions have been a familiar response to the introduction of this 'new' approach to gender analysis.

Natural resources based research has, in the past, paid little attention to gender and has focussed on increasing productivity and producing drudgery-reducing technology at low cost. An understanding that women play an important role in the management of natural resources is now well accepted but ways of introducing this into the research agenda is not so well understood. Involving women in outreach trials has been one approach but running trials on farms and even encouraging women to manage them does not automatically translate into benefits for everyone. To plan research that is more relevant to women and to assess the implications of research for women, it is necessary to push the basic understanding of gender beyond a simplistic analysis of different gender tasks, resources and decision-making to look at the dynamic nature of gender relations.

There are three key elements of gender analysis:

- Gender relations are constantly changing. Women and men constantly change their strategies, negotiate and bargain to achieve their co-operative and separate interests.
- Gender relations are part of wider social relations. Women and their activities cannot be considered to take place in a social vacuum.
- The meaning of what men and women do and say changes. This depends on the context within which they are doing and saying it and also on their individual and joint interests and strategies.

Where the interaction is between women and men, this process results in changing gender relations.

The development of a new agricultural technology is a typical example of an intervention designed to improve production and reduce effort on the farm. But such changes inevitably affect how people behave and this contributes to changes in social relations both in and beyond the family. If such change is not anticipated, then predictions about the outcome are not only liable to be inaccurate but there is also a risk that planned livelihood benefits for the most needy will be lost.

## A NEW APPROACH

But recognising the importance of analysing changing gender relations is one thing, developing a means of doing it is another. Some strategies, such as bargaining within the household are difficult to identify, and gender relations - indeed all social relations - are subject to local custom and might be specific to particular activities, for instance around livestock management. What is clear is that successful analysis has to be a focussed and detailed empirical examination of a specific context around a particular intervention in a particular situation.

Unfortunately for those who are used to handbooks on experimentation, there is no standard data set that must be collected for monitoring changing gender relations. This new approach avoids the danger of stereotyping by offering sets of generic questions to guide an enquiry. It proposes a method of tailoring these to the local context and to the planned research activity or intervention. This approach has been piloted in Zimbabwe and Tanzania by

*The intended outcomes were realistic research and responsible intervention*

incorporating it into a range of existing programmes, looking at goat production, crop storage, dairy development and rural livelihood enhancement.

In Zimbabwe a research programme had been running for two years looking at grain store construction and the problems of pest control. To introduce the ideas of gender relations, the first task was to assemble background information, both technical and social. This was gleaned from primary information that had already been gathered by project staff and then enhanced through interviews with members of selected households.

The next step was to decide upon units of

analysis by identifying locally significant differences. It was decided that categorising by marriage arrangement type was the most appropriate and so for case studies, households in the categories of nuclear monogamous, extended monogamous and polygamous were sought. Specific research questions were then drawn up so that local gender relations could be examined as well as changes in those relations related to crop storage and management.

The three principal areas of questioning were:

- What roles do men and women have in grain and store management and mid-season sales?
- What are the strategies within households for grain and store management?
- What bargaining goes on between men and women in the area of stored grain management and sales?

Information was gathered during repeated visits to the selected households. Participants were visited both together and separately, and in the latter case, a male researcher interviewed the husband while a female researcher interviewed the wife. Care was taken to ensure that as full a picture as possible was gained. Establishing a rapport with participants and local knowledge gave clear advantages when gathering sensitive, detailed information.

## THE OUTCOME

The impact of a more technically based project might typically be gauged by levels of uptake of an introduced technology or of improvements such as reduced pest damage. With this project, however, such an assessment would not be appropriate. Here, the intended outcomes were realistic research and responsible intervention, which can come about by a better understanding of the processes of social change. This is not to say that these outcomes need be less tangible than reduced infestation of stored grain. One group of beneficiaries was the researchers and practitioners themselves. The approach successfully engaged their interest and enabled them to pursue questions of direct relevance to their work. As one researcher put it "…it gives insights into the factors surrounding technology uptake in communities and may give a better indication of the uptake pathways for project outputs. This is important if projects are to have a sustainable impact on communities."

In the Tanzanian case, the approach enabled practitioners to address a mismatch in their programme. Originally it was assumed there was a direct relationship between increased dairy production and an improvement in household income and nutrition. But women experienced increased workload and only a limited increase in income and improved nutrition. Even when women were targeted, benefits were still found to be poorly distributed. An analysis of changing gender relations led to a new project objective – 'enabling members of the household dairy enterprise achieve more acceptable benefit distribution themselves'. This led to a change in research focus and subsequent research activities where organised around this new objective.

## ACCESS TO THE APPROACH

This approach does not easily lend itself to the provision of a standard checklist of questions, nor a tools-oriented type of handbook. Nor is standardised training appropriate. It is deliberately generic and must remain so for it to work properly. However, a booklet is in preparation which provides guidelines that can be followed but varying degrees of support in applying the approach is likely to be necessary.

**R7039 Analysing Changing Gender Relations for Monitoring and Evaluation in the Renewable Natural Resources Sector.**

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# Life on small islands

## THE PROBLEM

Small islands have special problems. They tend to be isolated, have high rates of migration and a limited skills base. Communities tend to concentrate around the coastal fringe where their social, economic and cultural activities are focused, as well their physical infrastructure for waste disposal and storm protection. Economic growth frequently leads to land clearance for building and agricultural intensification. This can result in severe soil erosion, which contributes to declining coastal resource quality, particularly where there are coral reef systems. Stakeholders who rely on fishing and coastal tourism for their livelihoods often bear the costs of such resource degradation.

Tobago, in the Caribbean, is a typical small island economy. It is a peripheral economy in the two-island state of Trinidad and Tobago - the so-called 'second island' problem. It is more dependent on tourism and agriculture than the national economy in general. The intensive use of its marine and coastal resources for tourism and for commercial and subsistence use ensures that the major resource conflicts in Tobago are played out in the land water interface.

Tourism is a growing industry in Tobago. More tourists means improved livelihoods not just for the hoteliers but also for local traders, boat owners, divers, restaurateurs and growers. But it also means more sewage effluent and more mangrove clearance for buildings. Sewage, which is mostly discharged untreated, pollutes coastal waters as does the sediment from soil erosion resulting from poor agricultural practices and land clearance activities. This damages the coastal ecosystem – the mangroves, the sea grasses and the coral reefs - on which the tourism depends.

*'Anything that happens on a small island ends up in the sea and affects everyone'* VILLAGE COUNCIL MEMBER

Buccoo Reef Marine Park is central to the island's tourist trade and is located close to two centres of population, Buccoo Reef and Bon Accord Lagoon Complex. This is a protected area and comprises a large reef system with an extensive shallow reef lagoon bordered by a fringing mangrove wetland covering an area of some 300ha. In 1995 the Institute of Marine Affairs, based in Trinidad, developed a management plan for the Park. But it was not greeted with enthusiasm. The plan did not take account of the views of those most affected by it and there was no participation from them in setting it up.

Both the Tobago House of Assembly (THA) and local stakeholders felt that if the plans for implementing a sustainable coastal resource use

*'We recognise that development should always put people first….isn't that sustainable development? Sustainable development …I like those words'*

VILLAGE COUNCIL MEMBER

strategy were to succeed then it was vital that they contributed to it. So with the help of the University of East Anglia in UK, they embarked on a research project to develop and promote sustainable resource use strategies that had the consensus of those most affected by the developments. Together they set about analysing the conflicts and trade-offs between different uses and users of marine protected areas. This was an important analytical tool, which provided the forum for participation, and if it proved successful, could be of immense help to other small island developing states and coastal regions with similar development problems.

The main questions to be answered were - How can the competing demands for economic development be reconciled with needs to conserve the environment? Are these two objectives compatible or not? Interestingly there is increasing evidence from around the world that excluding local people from protected areas and resources, does not bring about better conservation. Greater involvement of local communities in managing the environment is more likely to result in long term positive outcomes - but how can this be done? Finally what mechanisms and institutions can facilitate this involvement?

## TRADE-OFF ANALYSIS

### The approach

Trade-off analysis was developed to help people address the problems of managing potential conflict. At Buccoo Reef Marine Park it was used to engage with local stakeholders in order to understand and analyse the conflicts that might come from various development options, and propose a means of finding trade-offs between the different uses and users of the Park.

Trade-off analysis was used in three main stages. The first stage was stakeholder analysis, which revealed the critical interest groups that are important to or influential over the management of the Park. The second was the development of a multi-criteria analysis model to assess the impact of various management options. This involved setting up a number of development options in consultation with stakeholders; defining key criteria of economic, social and ecological change; quantifying the impact of the development options on each of the criteria; deriving weights for each criteria by asking the stakeholder groups about their priorities and then using the model generated as the basis for stakeholder participation in decision making.

Four options were tested ranging from limited tourism to expansive tourism with and without complementary environmental management.

Although the model showed that the expansive tourism option dramatically increased local job opportunities and economic revenues, the ecology suffered even when combined with environmental management. The mangroves were predicted to decline in area, sea grass would also decline and coral viability could fall to poor levels, well below the internationally accepted minimum level of 20% coral cover.

The third stage involved working closely with the different stakeholders. A series of meetings were convened with each of the stakeholder groups to discuss their priorities for development. These enabled people to articulate their concerns about the resources, explore their perception of conflicts in a non-threatening environment, and build a rapport among themselves and with the research team. Stakeholder groups included fishers, local communities, businesses such as reef tour and water sports operators, recreational users, and technical personnel from various departments of the Tobago House of Assembly. Although significant numbers were in favour of economic growth, overwhelmingly the consensus for was for maintaining the health of their eco-system.

Finally a consensus-building workshop brought together the stakeholder groups to find trade-offs between the various uses of the marine park and to prioritise management actions. People were also asked to address very specific questions such as 'what can I and my group do?' as well as 'what can the government do?'

Comments on what can be done immediately focused on avoiding direct physical damage to the reef from boats, jet skis and oil spills whereas the medium term priority was wastewater treatment. Long term concerns where about educating everyone in the community about their environment, starting with children in school, and ensuring that stakeholders continued to play a role in the planning and management process. One economic planner commented that 'once stakeholders participate in decisions, 75% of the work is done.'

One result of the project has been the formation of the Buccoo Reef Stakeholder Group, which brings together people who were previously in direct conflict about the use of resources. They are continuing to work with local Government to develop a co-management strategy for the Park.

## WIDER APPLICATION

Trade-off analysis has clearly demonstrated that it is possible to successfully incorporate stakeholder views and values into a rigorous planning framework, which makes sense to politicians, regulators and planners. The ability to bring together participatory approaches with more technical decision-support tools, such as multi-criteria analysis, is a significant achievement.

The research is being extended in the Caribbean, examining the opportunities and constraints to institutionalising stakeholder approaches to natural resource management. The approach has also been widely disseminated regionally and internationally. It is being adapted for use in other ecosystems and countries. An example is its use in forest resources management in Canada.

**R6919 Evaluating Trade-offs Between Uses and Users of Marine Protected Areas in the Caribbean.**

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# Community not committee forestry

Farmers and the landless poor living in the mid-hills of Nepal depend heavily on the forest for their livelihoods. The forests contain conifers and hardwoods and produce a wealth of products. Timber and poles are cut for house construction, fencing and agricultural implements such as plough shares; fuel wood is collected for cooking and heating, charcoal is produced by local blacksmiths, resin is tapped for distilling into turpentine and leaves are collected for animal fodder and bedding. Protecting the forests was traditionally the responsibility of local feudal tenure-holders but in 1957 the Government nationalised the forests, in order to control and manage them centrally. In practice it has had little capacity to do this. Relations between local people who use the forest for their livelihood and Forest Department officials became strained and the forests deteriorated due to a lack of effective regulation. There were growing concerns about the sustainability of forest resources due to unregulated over-extraction and illicit felling. Nepali foresters recognised that the realistic way of solving these problems was to allow forest users themselves to take over the management responsibility for their local forests. This was the beginning of the concept of community forestry. Gradually legalisation followed and in 1993 the Forestry Act formalised community forestry practice in Nepal and precipitated the handover of forest management to Forest User Groups (FUGs) on a wide scale across the mid-hills region.

## A GOOD IDEA BUT?

The idea of communities taking over forest management may have seemed strange to those who had been used to the government doing this job. But it came at a time when forest users were increasingly concerned about the deterioration of their forests and felt a need to take over the responsibility for local control, forest protection and use regulation.
Setting up such Forest User Groups (FUGs) was not without its difficulties. Initially

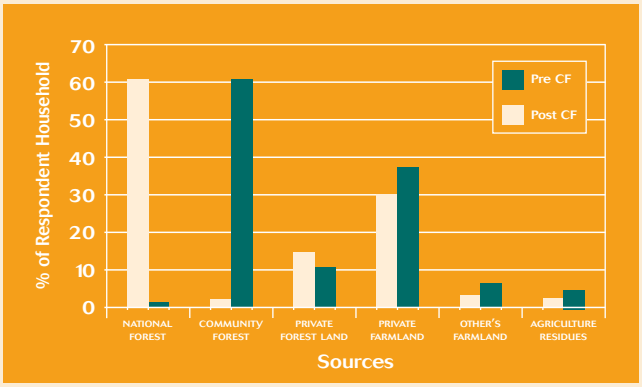
approaches made by the Department of Forestry (DoF) were to traditional village leaders, rather than to the entire community of forest users. The result was often elitist 'committee-forestry', the outcome of which was poor and undemocratic decision-making, bias in benefit sharing, and neglect of the needs of poorer sections of the community. In some cases genuine forest users were excluded from FUGs. Examples from the research sites include groups of blacksmiths who rely heavily on the local forest for charcoal, and fuelwood sellers who depend daily on collecting fuelwood to sell in bazaars. In practice they were obliged to break the FUG rules in order to continue their livelihoods. Even successfully functioning Groups complained that the DoF staff had formed the

Groups too quickly to pass on a proper understanding of community forest concepts, roles and practices. The inevitable result of this was a poor level of understanding of the principles of community forestry amongst the general body of users, and weak decision-making.

## THE RESEARCH AND ITS OUTCOME

Research undertaken by the University of Leeds in collaboration with the Nepal-UK Community Forestry Project has suggested that there are ways in which this situation can be significantly improved. The project was designed to develop an improved understanding of common property issues and tenure rights among Forest User Groups. It was aimed primarily at forest users themselves and the agencies supporting them. An important aspect of the work was the Participatory Action Research approach, which aimed to share the learning process with local forest users, so that the project could be of direct benefit to them.
The forestry part of community forestry is recognised as an unambiguous success. All sites showed a reversal from the deterioration they had been suffering prior to its introduction. Before the formation of FUGs unregulated felling and extraction of timber and open grazing were widespread problems. This has now largely been brought under control and the transfer of ownership to FUGs has spread a sense of ownership amongst users.
However, the community aspect of community forestry is so far more ambiguous in outcome. The livelihood benefits to households in the villages are mixed both within and between villages. The rich are less dependent on forest products as they have other sources of income. But poor households have little private access to trees and so are heavily dependent for fuelwood, animal fodder and leaf-litter for composting. On formation, one of the first steps that many Groups took was to restrict access to the forest to allow a period of regeneration, and this quickly impacted on the poor. In one case it reduced the amount of fodder available and therefore the ability to keep livestock. One farmer who used to keep 15 goats, for example, had to reduce his flock to only 4 goats. In general though, the majority of households reported that the introduction of community forestry had not significantly changed the availability of fodder, grazing and bedding resources from the forest. But a number of farmers, particularly those from poorer households, did report a decrease in the additions of organic matter to their land. This was a result of less leaf fodder and bedding being available.
Virtually all the members of the community, irrespective of wealth, use fuel wood from the forest, and changes in its availability are central issues of community forestry's impact on households. In some FUGs where there are

small forests, and where users are highly dependent on them, intensive management of fuel wood has developed and although quantities are limited, harvesting is on a sustainable basis and the productivity of the forest is increasing. In larger forests, with more diverse groups of users, regulations are often




**Changes in sources of supply of fuel wood**

imposed which are inappropriate for poorer households, particularly restricting fuel wood selling. In these cases there is less satisfaction among poorer landless households. This reflects their more marginal involvement in and influence on decision-making and this is a critical issue, which must be put right in the future.

Another important finding of the research has been that virtually all the FUGs have weak decision-making processes and no formal planning or resource management systems. Women too are largely outside the process.

A key output from the research has been a Micro-Action-Planning methodology, based on Participatory Action Research (PAR), to assist communities to assess for themselves the community forest process, and to plan its future development, in a way that includes all the users. This process was tested on all the FUGs and was found to be of great value. They all developed action plans during the first phase of fieldwork and after one year, over two thirds of points were implemented. The Micro Action-Plans are crucial to ensure support to FUGs (from DoF and other agencies) is on a focused and needs basis.

Key indicators of FUG processes were identified with the communities, to assess how well the process is succeeding. A sophisticated and diverse list of key process indicators was identified through participatory exercises with users, which reflect the key needs and constraints of FUGs. Indicators such as active forest management, hamlet level interaction, women to be included in the FUG functioning where all given a high priority by users. Small ethnically homogenous User Groups, highly dependent on forest resources for regular fuelwood performed most effectively according to their chosen indicators. As might be expected, larger ethnically diverse and spatially diffuse Groups managing large forests have been less successful. This is due to the greater difficulties in coordinating decision-making, which can lead by default to 'committee' forestry. But on the whole the indicators did show that community forestry in Nepal is a positive and dynamic process that has achieved a great deal.

**R6778 Community Forestry: Sustainability and Impacts on Common and Private Resources, Nepal.**

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# Living in the shadow of a city

Everyone in the developing world knows that there is wealth in the towns and cities and the result has been the relentless urban drift over the past 30 years and more. But can the cities continue to absorb people as they currently do and what problems does this create? Traditionally, poverty has always been thought of as a rural phenomenon but now it is an urban one as well with over half the world's poor living in cities. As the activities of urban areas come into contact with those of their rural surroundings, an interface is created with distinct features that affect natural resources and the livelihoods of those who depend on them. Change is the nature of this interface. Livelihoods cease to be entirely based on rural activities and begin to incorporate opportunities for non-farm income sources. Farmlands, grazing areas, and forests are managed differently to supply urban markets for building land, for foods and for energy, while pollution and wastes and labour demands in the city alter the ways that rural life works. While this is a source of gain for some, including those urban poor who may find affordable housing outside the built-up area of a city, it can also be a threat to others by bringing greater poverty to those who were once beyond the reach of the city.

## IN KUMASI, GHANA

In 1997 a research project was set up to examine the effects of the growth of Kumasi in Ghana on the natural resource production systems at the interface between urban and rural communities. The initial aim was to improve production in the face of urban pressures but this was redirected to aim at improving the livelihoods of the poor through better management of natural resources. The effects of urbanisation on the control and access to those resources became a focus. The impact on agriculture was a key issue and linked to this was the potential for using organic wastes to improve soil fertility. The role that modern satellite data and geographical information systems could play in helping to improve and speed up the planning and decision making processes was also examined.

## THE PROBLEM AREAS

Four main problem areas were identified:

- **Who controls land development?** Traditional Chiefs are still the most important players in their villages and they are the major driving force in the urbanisation process. They are also the main beneficiaries. Urban land development has led to a transfer of resources from poor to rich.
- **Agricultural system changes** Farms, particularly those run by women, are being lost to residential development. The productivity of the land remaining has

declined, and there is limited scope for agricultural intensification. Farming is also perceived as unattractive and unprofitable and there is a lack of knowledge about local urban agriculture.

- **Environmental management**
  This is poor and uncoordinated, particularly the management of solid wastes and sewage effluent.
- **Planning deficiencies**
  Although changes are taking place rapidly, there is no strategic regional planning and development planning at the village level is either weak or non-existent. The whole process is handicapped by a lack of information and inadequate simple base maps. There is also very little community participation in the planning process.

## CHARACTERISING THE CHANGES

To characterise the demographic and socio-economic changes, household surveys were undertaken in four villages ranging from the rural to the urban in character. The table shows some of the results (below).

The transition from farming to more city-based work is well marked by changes in occupation, the loss in the number of farms and the lack of compensation for those farmers who are dispossessed of their land.

But many people, even in the urban village, tend to hang on until the last possible moment to the dwindling and increasingly insecure land available for agriculture. This can lead to pressure to intensify production on the remaining plots, but the situation militates against this because of the insecurity of tenure. So much of the remaining farmland is still under traditional "bush fallow" cropping systems, but without the bush fallow. This is clearly unsustainable. In order to assess the potential for intensification, reviews were undertaken of soil ameliorants that are available within the peri-urban system. Trials at research stations and on farms showed that vegetable production systems using poultry manure are favourable from an agronomic and economic point of view and the use of such manures are acceptable to the farmers. The use of cover crops was also investigated on farms and has aroused interest. In addition, studies by local university students were commissioned to characterise natural-resource-based livelihoods in the centre of Kumasi, so as to assess how they have survived in the present fully urbanised situation.

Other keys issues emerging from the surveys include:

- Food crop farmers are stuck in a cycle of declining production and a lack of capital to move to other occupations.
- Low density housing leads to high costs of providing services such as water and electricity.
- Waste disposal lags well behind other services giving rise to pollution problems. While 52% of sampled peri-urban villages had electricity and 36% had piped water, only 8% had waste collection systems.
- There are few job opportunities for those without capital or skills training.

| VILLAGE NAME | Apatrapa | Aburaso | Duase | Swedru |
|---|---|---|---|---|
| | Urban | Peri-urban | Peri-urban | Rural |
| People with farming as main occupation | 30% | 30% | 34% | 82% |
| No of farms lost to urbanisation | 228 | 106 | 19 | 11 |
| Farms on temporarily borrowed land | 35% | 14% | 1% | <1% |
| No of farmers given compensation | 7% | 9% | 0 | 0 |

## A LACK OF INFORMATION

Planning is often hampered by a lack of information. But data is time consuming to collect and to interpret into useful information.

In the meantime everything is changing and rapidly becomes out of date. To try and overcome this problem, the project team experimented with the use of modern information technologies such as remote sensing, geographical information systems (GIS) and global positioning systems (GPS) to augment field surveys combined with traditional participatory and rapid rural assessment methods.

Maps help to locate and quantify problems and put the issues 'on the table'. The extent of farm and housing plots and disputed boundaries are there for all to see irrespective of age, sex and literacy. Very high-resolution satellite images can now provide such maps on which individual houses and farms are easily identified.

Opportunities have opened up for the poor, women and tenants to indicate their views and to bring their indigenous knowledge into village-level planning, which previously was not the case. In the village of Swedru, just to the north of Kumasi, most villagers quickly related to the new information and where able to interpret it easily. It offered villagers a new and revealing perspective of their environment, which was used to stimulate and encourage participation in the development of their own village. One head of family, Mr Mensah (see above) found the maps so useful that a copy was left with him at his request. The maps are now helping communities and researchers to examine other issues such as the conflicts surrounding a watercourse conveying untreated sewage from a broken treatment plant. It passes through an area of traditional valley bottom agriculture and although farmers are producing good quality tomatoes and lettuces the risks to human health are enormous and widespread when produce is sold in the city markets. The land is owned by the local chief but farmed by the local villagers. The local university is responsible for the sewage treatment and has claims on the land as well. Clearly there are many

**Mr Mensah's house**

tangled issues to sort out but mapping the area and introducing effective methods of communication such as 'listen and encourage' is a good start point. Getting the local chiefs' into discussion groups at community workshops and creating an informal atmosphere for frank discussions is another step in the right direction.

**R6799 Kumasi Natural Resources Management, Ghana.**

**R6880 Development of Improved Methods of Collecting, Storing, Accessing and Managing Natural Resource Information, Ghana.**

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# Communicating the results

**The key to a good communications strategy is stakeholder participation throughout the project cycle.**

There is no doubt that research in developing countries has contributed significantly to the knowledge and understanding of natural resources. But there are doubts about how this information is passed on to farmers and others who need it and just how successful it has been in helping them to sustain and improve their livelihoods. Extension services are meant to do this job but too often they only benefit a small and educated minority and state agencies are often concerned with increasing productivity, rather than the sustainable use of natural resources.

It is well recognised that farmers need a good, varied, supply of information and the skills to interpret and use it. Natural resources research is now focusing on what people need and projects are designed to involve them at every stage of the process. But to do this properly, projects need to have a good communications strategy, planned from the beginning and based on an understanding of who needs to communicate with whom. It means that researchers need to talk and listen to the full range of stakeholders from the very start of a project and at every step of the way until it is completed.

## WHAT MAKES A GOOD STRATEGY?

The elements of a good communications strategy are:

- Well defined target groups and their information needs.
- A clear framework for identifying, recording, monitoring and assessing the effectiveness of uptake pathways.
- A clear statement of who is responsible for dissemination, and how far that responsibility extends.
- Communication expertise amongst project staff and ideas of how to link into local expertise.
- Good relations between project leaders and collaborators.
- The building up of local networks and activities to support them.
- A mechanism for programmes and projects to exchange experience.
- Resources for carrying out communication activities.

## BUT IS IT HAPPENING?

The idea of a communications strategy is a well accepted one but is it being put into practice on projects and if so is it successful? Six natural resources research projects currently underway in Ghana, India and Bolivia were visited to find out. Just what are their strengths,

weaknesses, opportunities, and the challenges they face in communicating and disseminating the results?

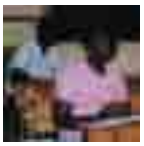
All aspects of the projects from the pre-concept note to the final workshop were investigated from the view point of how accessible was the research team to programme and project personnel and the wide range of stakeholders with whom they worked. This was not just about the availability of people, but an examination of formal and informal communications in which individual and group discussions, emails, phone calls and workshops all play a part. Individual discussions with professionals and stakeholders allowed people to talk not just about how well the project was going but also about the things that had gone wrong. Interestingly, people wanted to publicise the failures as well as the successes so that others could learn from their experiences.

**PROJECTS CAN IMPROVE THEIR COMMUNICATIONS BY:**

- Including an inception phase to investigate communication issues with stakeholder groups and negotiate a strategy which meets their needs and capacities.
- Establishing good collaborative links and build them up over time to provide the pathways for dissemination.
- Establishing good working relationships between project staff and collaborators.
- Using local skills to help build capacity and ensure sustainability.
- Building up of local networks and activities to support them.
- Attempting to match dissemination to different needs.

**In India a local NGO was commissioned to produce songs and dramas to promote useful exotic tree species. They have been successfully building on a well-established local tradition of live drama and song for some time.**

A forestry project in India, for example, with a long history of research had the improvement of information dissemination as its main objective. Initiatives were established to provide rapid and easy access to research results, including publication of newsletters, publication of research highlights and internet discussion groups. Networks, already established under previous projects were to be strengthened further, with the UK agency taking less of a coordinating role and regional managers becoming more prominent. Although many pathways were established and used successfully there was no systematic appraisal made of the means of information dissemination either before or during project implementation.



Another project was investigating the rapid changes that accompany urban growth around a major city in Ghana and the pressure this puts on access to and use of natural resources. People living in peri-urban areas who were mainly dependent on natural resources for their livelihoods, have to cope with growing urbanisation and adjust their livelihood strategies accordingly. In the early stages of the project, a workshop was held for all those involved but presentations took little account of dissemination issues. One working group did discuss the means of ensuring the uptake of research results and identified possible approaches. But the remaining working groups did not address the issue despite this being an

**In Bolivia booklets have been produced locally in Santa Cruz on agro-forestry crops, cover crops and participatory research methods. They are aimed at extension workers and farmers with limited reading skills. Copies were hand-delivered to all participating farmers.**

aim of the exercise. Nor was thought given to who would be responsible for dissemination, and where the funding for it would come from. These issues, although not part of the research group's immediate remit will clearly need to be addressed.

All the projects visited were using some elements of the recommended strategy. Unfortunately none of them were using all of them together and so dissemination of information is rather unco-ordinated.

## WHAT SHOULD BE DONE?

Clearly project staff need support. Advice is needed on communications and how to develop a good strategy. Information is also needed on best practice and about materials, communication technologies and people who can advise on communications. A good communications strategy needs a 'driver' and the arguments strongly favour this being a communication expert, either employed full-time on a project or brought in from outside as and when needed.

Best Practice Guidelines are one of the outputs of this research. They focus on putting in place a communication strategy from the design stage of a project. But they will only help if the pre-requisites are in place, namely a project which is demand-led, participatory, has an understanding of those with whom it wants to communicate, has a strong and active working relationship with collaborators, has its own dissemination capacity and a good track record of two-way communication with intermediate/end users.

### BEST PRACTICE GUIDELINES

**Improved Communication Strategies for the Promotion and Dissemination of Renewable Natural Resources Research Outputs. Socio-economic Methodologies for Natural Resources Research** available from Natural Resources Institute, Chatham, UK.

- Practical advice on the steps establishing a communications strategy
- A reference guide to communication technologies
- A bibliography of practical materials
- A directory of organisations and communications specialists.

**R7037 Improving Communications for the Promotion and Dissemination of NR Research Outputs to Intermediate and End Users.**

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## LIST OF NRSP PROJECTS

### Forest Agriculture Interface

**Purpose 1** - *Land use planning and management improved*

**R6778** Community Forestry: Sustainability and Impacts on Common and Private Resources, Nepal
**John Soussan**
University of Leeds,
Natural Resources Institute, Nepal-UK Community Forestry Project, Pakribas Agricultural Centre
Start date: 01-01-97 End date: 31-12-99

**R6787** Effective Local Management of Forests: Learning from Self-Initiated Management Organisations, India
**Czech Conroy**
Natural Resources Institute, Vasundhara, Society for Promotion of Wastelands Development,
Orrisa Forest Dept
Start date: 01-01-97 End date: 31-04-99

**Purpose 2** - *Sustainability of commodity production systems on land previously under natural forest improved*

**R6517** Agroforestry Options, Ghana
**Roy Fawcett**
Institute of Ecology and Resource Management, University of Edinburgh, University of Science and Technology (UST) Kumasi Ghana
Start date: 01-01-96 End date: 30-07-98

**R6789** Development and Promotion of Improved Techniques of Water and Soil Fertility Management for the Sustainable Production of Crops in the Humid Forest Belt, Ghana
**David Jackson, Liz Kiff**
Natural Resources Institute, University of Science and Technology (UST) Kumasi Ghana, Soils Research Institute and Crops Research Institute, Ghana
Start date: 01-01-97 End date: 31-12-99

**Purpose 3** - *Productivity of forest systems optimised and sustainable*

**R6382** Sustainable Agriculture in Forest Margins, Bolivia
**Barry Pound**
Natural Resources Institute, Centro de Investigacion de Agricultura Tropical (CIAT), Bolivia
Start date: 01-08-95 End date: 31-03-99

**R6675** Modelling the Sustainability of Frontier Farming at the Forest Fringe,Brazil
**Katrina Brown**
Overseas Development Group, University of East Anglia, Laboratorio Socio-agronomico do Tocantins Maraba
Start date: 01-09-96 End date: 31-08-99

**R7056** Nutrient Sourcing and Soil Organic Matter Dynamics in Mixed-Species Fallows, Kenya
**Ken Giller, George Cadisch**
Wye College, Kenya Forestry Reasearch Institute, International Centre for Research on Agroforestry (ICRAF) Kenya
Start date: 01-12-97 End date: 30-11-00

### High Potential

**Purpose 1** - *Production of systems commodities increased through optimisation of inputs and outputs.*

**R6748** Participatory Crop Improvement in High Potential Production Systems, India and Nepal
**John Witcombe**
Centre for Arid Zone Studies, University of Wales, Krishak Bharati Cooperative Ltd (KRIBHCO), Western India Rainfed Farming Project, Overseas Development Institute UK, Local Initiatives in Biodiversity Research & Development Nepal, Steve Jones Associates UK
Start date: 01-10-96 End date: 30-09-99

**R6755** Sustainable Local Water Resources Management in Bangladesh: Meeting Needs and Resolving Conflicts
**John Soussan**
University of Leeds, Bangladesh Centre for Advanced Studies, Bangladesh
Start date: 01-10-96 End date: 30-10-99

**R6759** Integration of Aquaculture into the Farming System in the Eastern Plateau of India
**Graham Haylor**
Institute of Aquaculture, University of Stirling, KRIBHCO, East India Rainfed Farming Project, Indian Council for Agricultural Research (ICAR)
Start date: 01-11-96 End date: 31-10-00

**R6760** A Systems Approach to Sustainable Insect Pest Management in Irrigated Cotton in India
**Derek Russell**
Pest Management Department, Natural Resources Institute, IARCRothamstead, Punjab Agricultural University
Start date: 01-10-96 End date: 31-03-99

**Purpose 2** - *Soil fertility maintained or enhanced*

**R6731** Manure Management - Collection, Storage and Composting Strategies to Enhance Fertiliser Quality
**Jon Tanner**
International Livestock Research Institute, Kenya, Kenya Agricultural Research Institute (KARI) Kenya, Henry Doubleday Research Association UK
Start date: 01-09-96 End date: 31-08-99

**R6750** Modelling Soil Organic Matter Transformations and Nitrogen Availability
**John Gaunt, Jon Arah**
Institute of Arable Crop Research (IACR) Rothamsted, ITE Edinburgh, IRRI, Philippines
Start date: 01-11-96 End date: 31-10-99

**R6751** Soil Fertility and Organic Matter Dynamics in Floodplain Rice Ecosystems, Bangladesh
**Jon Rother**
Natural Resources Institute, Institute of Arable Crop Research (IACR) Rothamsted, PROSHIKA, University of Dhaka
Start date: 01-11-96 End date: 30-11-99

**R7180** Bangladesh Cultivation Power Options
**Martin Adam**
Natural Resources Institute, Bangladesh Agricultural University
Start date: 01-06-98 End date: 30-06-00

### Hillsides

**Purpose 1** - *Soil erosion and deforestation processes controlled.*

**R5681** Conservation Technologies for Small Hillside Farms, Honduras
**Brian Sims**
Silsoe Research Institute, Escuela Agricola Panamericana (EPA) Honduras
Start date: 01-03-96 End date: 31-08-98

**R6525** Economic and Environmental Assessment of Soil Erosion and Conservation, Sri Lanka
**Michael Stocking,**
**Rebecca Clark**
University of East Anglia, Environment and Forest Conservation Division, Mahaweli Authority of Sri Lanka
Start date: 01-04-96 End date: 31-06-99

## LIST OF NRSP PROJECTS

**R6621** Soil and Water Conservation Technologies, Bolivia
**Brian Sims**
Silsoe Research Institute, Cranfield University, Universidad Mayor de San Simon (UMSS),
Centro de Investigacion de Agricultura Tropical (CIAT) Bolivia
Start date: 01-08-96 End date: 31-09-99

**R6638** Participatory Improvement of Soil and Water Conservation Practices in Temperate Valleys, Bolivia
**Anna Lawrence**
University of Reading, Centro de Investigacion de Agricultura Tropical (CIAT), Bolivia
Start date: 01-07-96 End date: 31-09-99

**Purpose 2** - *Sustainability of commodity production systems improved through enhanced soil fertility*

**R6447** Environmental Adaptability of Tropical and Sub-tropical legume Species as Hillside Cover Crops, Nepal, Bolivia and Uganda
**Rod Summerfield**
University of Reading, National Agricultural Research Council (Lumle and Pakhribas) Nepal, National Agricultural Research Organisation (NARO) Uganda
Start date: 01-01-96 End date: 31-03-99

**R6757** Soil Fertility Management for Sustainable Hillside Farming Systems, Nepal
**Peter Gregory**
University of Reading, National Agricultural Research Council (Lumle and Pakhribas) Nepal
Start date: 01-11-96 End date: 01-12-99

**Purposes 1 and 2**

**R7313** Hillsides Conference: Poverty, Rural Livelihoods and Land Husbandry in Hillside Environments
**Jim Ellis-Jones**
Silsoe Research Institute, collaborating institutions listed in the above projects
Start date: 01-12-98 End date: 30-03-99

### Land Water Interface

**Purpose 1** - *Land use planning, resource utilisation, and coping strategies optimised in coastal zone ecosystems*

**R6783** Ecological and Social Impacts in Planning Marine-Reserves, Caribbean
**Nicholas Polunin**
University of Newcastle, University of West Indies, Marine Park Authorities, Government Fisheries Authorities Jamaica, Barbados, Belize and Cayman Islands
Start date: 01-09-96 End date: 31-03-99

**R6919** Evaluating Trade-offs between Uses and Users of Marine Protected Areas, Caribbean
**Katrina Brown, Neil Adger**
Overseas Development Group, University of East Anglia, University of West Indies, Buccoo Reef Marine Park, Government of Trinidad and Tobago Ministry of Agriculture Land and Fish
Start date: 01-04-97 End date: 31-07-99

**R7111** Review of Currently Available Information on Pollution of Coastal Waters by Sediments and Agro-chemicals - Identification of Sources and Transport Mechanisms, and Influence of Land Use Management in the Watershed, Caribbean
**Chris Ninnes**
British Geological Survey, Marine Resource Assessment Group Ltd
Start date: 05-01-97 End date: 31-08-98

**Purpose 2** - *Land use planning, resource utilisation, and coping strategies optimised in floodplain systems.*

**R6744** Indigenous Knowledge and Natural Resources Research on Floodplains, Bangladesh
**Paul Sillitoe**
University of Durham
Start date: 01-10-96 End date: 30-11-99

**R6756** Investigation of Livelihood Strategies and Resource Use Patterns in Floodplain Production Systems, Bangladesh
**Julian Barr**
Centre for Land Use and Water Resources Research, University of Newcastle, University of Rajshahi, Bangladesh Agricultural Univeristy, Bangladesh Rice Research Institute
Start date: 01-11-96 End date: 31-11-99

**R7245** Integrated Lagoon Management, Ghana
**Einir Young, Gina Porter**
Centre for Arid Zone Studies, University of Wales, Water Research Insitute UK, University of Ghana, Environment Protection Agency, Game and Wildlife Dept Ghana
Start date: 01-08-98 End date: 30-08-01

### Peri-Urban Interface

**Purpose 1**- *Management of peri-urban resources optimised through improved productivity, control of environmental degradation and energy efficiency.*

**R6880** Development of Improved Methods of Collecting, Storing, Accessing and Managing Natural Resources Information, Ghana.
**Giles D'Souza**
Geographic Data Support Ltd, Cranfield University, Bath Spa University College, University of Science and Technology (UST) Kumasi Ghana
Start date: 01-01-97 End date: 31-03-00

**R7244** Energy Constraints in Production Systems in Peri-Urban Areas, India and Ghana
**Daniel Start**
Intermediate Technology Consultants Ltd, EDA and TIDE India, Kite and CEDEP, Ghana
Start date: 01-10-98 End date: 31-05-99

**R7269** Valuation of Peri-Urban Natural Resource Productivity, India
**Fiona Nunan**
School of Public Policy, University of Birmingham, IIED, Karnatak University India, University of Science and Technology (UST) Kumasi, Ghana
Start date: 01-10-98 End date: 30-06-99

**Purpose 2** - *Crop production intensified on a sustainable basis*
**and purpose 3** - *Productive potential increased by greater use of waste materials and recycling of resources*

**R7099** Improved Utilisation of Urban Waste by Near-Urban Farmers in the Hubli-Dharwad City-Region, India
**Fiona Nunan**
School of Public Policy, University of Birmingham, University of Wales, University of Agricultural Sciences Dharwad India
Start date: 01-01-98 End date: 31-12-99

## LIST OF NRSP PROJECTS

### Purposes 1,2 and 3

**R6799** Kumasi Natural Resources Management, Ghana
**Barry Blake**
Natural Resources Institute, University of Science and Technology (UST) Kumasi, Soil Research Insitute, and Crop Research Insitute Ghana, University of Nottingham
Start date: 01-01-97 End date: 31-03-00

**R7330** Peri-Urban Natural Resources Management at the Watershed Level, Ghana
**Duncan McGregor**
CEDAR, Royal Holloway, University of London, Natural Resources Institute, University of Science and Technology (UST) Kumasi , Ghana Water and Sewage Corporation, Centre for Development of People, Ghana Organic Agriculture Network, Kumasi Environmental proection Agency Ghana
Start date: 01-01-99 End date: 31-01-02

### Semi-arid

**Purpose 1** - *Commodity production increased through improved conservation and use of water resources*

**R4840** Conservation Tillage Management for Marginal Smallholder Systems
**Stephen Twomlow**
Silsoe Research Institute, Agritex, Cotton Training Centre, Harare Zimbabwe
Start date: 01-04-95 End date: 31-03-99

**R6758** Development of Improved Cropping Systems Incorporating Rainwater Harvesting and Conservation
**John Gowing**
Centre for Land Use and Water Resources Research, University of Newcastle upon Tyne, Sokoine University of Agriculture, Selian and Ukiriguru Agricultural Research Institutes Tanzania
Start date: 01-10-96 End date: 30-09-99

**R7085** Promotion of Practical Approaches to Soil and Water Conservation for Smallholder Farmers in Semi-arid Africa
**Stephen Twomlow**
Silsoe Research Institute
Start date: 19-01-98 End date: 30-12-98

**Purpose 1 (as above) and Purpose 2** - *Risk reduction strategies enhanced through optimisation of land use and cropping patterns.*

**R7093** The Relevance of Nigerian Farmers' Responses to Dryland Farming Systems in India and Southern Africa
**Bill Adams**
Department of Geography, University of Cambridge, University of Durham, a wide range of institutes in India, Malawi and Zimbabwe
Start date: 01-02-98 End date: 31-12-98

**R7304** Micro-Catchment Management and Common Property Resources, Zimbabwe
**Bruce Campbell**
Institute of Environmental Studies, University of Zimbabwe, CARE, IT Zimbabwe
Start date: 01-12-98 End date: 31-12-01

**Purpose 3** - *Productivity increased and sustainability enhanced in tsetse-infested areas*

**R7150** A Synthesis of Two Case Studies of Common Property Resource Management where Tourism, Wildlife and Pastoralism Interac, Kenya
**Viv Lewis**
ITDG, IT Kenya
Start date: 01-03-98 End date: 30-03-99

### Socio-Economic Methodologies

**Purpose 1** - *Design, delivery and impact of RNR research improved through the implementation of new socio-economic methods*

**R6525** Economic and Environmental Assessment of Soil Erosion and Conservation, Sri Lanka
**Michael Stocking, Rebecca Clark**
University of East Anglia, Environment and Forest Conservation Division, Mahaweli Authority of Sri Lanka
Start date: 01-06-96 End date: 30-06-99

**R6547** Participatory Monitoring and Output Assessment of Sustainable Agriculture in Brazil
**Irene Guijt**
International Institute for Environment & Development, NGOs AS-PTA, CTA-ZM
Start date: 01-01-96 End date: 31-09-99

**R6730** The Development of Farm Management Type Methods for Improved Needs Analysis
**Peter Dorward, David Shepherd**
University of Reading, DR&SS Agritex CARE Zimbabwe, CPHP projects Ghana
Start date: 01-09-96 End date: 31-08-99

**R6744** Indigenous Knowledge and Natural Resources Research, Bangladesh Floodplains
**Paul Sillitoe**
University of Durham, University of Rajshahi, Bangladesh Agricultural University
**Start date: 01-11-96 End date: 31-10-99**

**R6800** The Development of Best Practices
**Alan Marter**
Natural Resources Institute
Start date: 01-01-97 End date: 31-03-99

**R7033** Methodological Framework Integrating Qualitative and Quantitative Approaches for Socio-Economic Survey Work
**Ulrich Kleih and Ian Wilson**
Natural Resources Institute, University of Reading
Start date: 01-10-97 End date: 31-05-00

**R7037** - Improving Communication Strategies for the Promotion and Dissemination of NR Research Outputs to Intermediate and End Users
**Patricia Norrish**
AERRD, University of Reading
Start date: 01-10-97 End date: 31-10-98

**R7039** Analysing Changing Gender Relations for Monitoring and Evaluation in the Renewable Natural Resources Sector
**Christine Okali, Catherine Locke**
Overseas Development Group, University of East Anglia, CPHP DR&SS Zimbabwe, SHDPP Tanzania
Start date: 16-10-97 End date: 16-05-99

**R7055** Issues and Methods in the Joint Application of GIS and Participatory Enquiry in Natural Resources Research
**Julian Quan**
Natural Resources Institute
Start date: 06-12-97 End date: 05-05-99

**R7098** Developing a Framework to Assess the Poverty Impact of Natural Resources Research
John Farrington
Overseas Development Institute
Start date: 02-02-98 End date: 30-04-98

**R7214** Development Indicators, Research Cycle Management and Sustained Improvement in Livelihoods of the Rural Poor: Lessons from the Eastern India Rainfed Farming Project
**Stuart Corbridge, Alan Rew**
Cambridge University, CDS, Swansea
Start date: 01-10-98 End date: 30-06-01

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