SYNTHESIS STUDIES OF THE RENEWABLE NATURAL RESOURCES RESEARCH STRATEGY:

CAPACITY DEVELOPMENT

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Acronyms

AFGRP	Aquaculture and Fish Genetics Research Programme
AHP	Animal Health Programme
CBO	Community Based Organization
CGIAR	Consultative Group on International Agricultural Research
CPHP	Crop Post-Harvest Programme
CPP	Crop Protection Programme
CRD	Central Research department (of DFID)
DFID	Department for International Development
FAO	Food and Agriculture Organization
FFS	Farmer Field Schools
FMSP	Fisheries Management Science Programme
FRP	Forestry Research Programme
KARI	Kenya Agricultural Research Institute
LPP	Livestock Production Programme
M&E	Monitoring and Evaluation
NARO	National Agricultural Research Organization
NARS	National Agricultural Research System
NEPAD	New Partnership for African Development
NGO	Non-Governmental Organization
NR	Natural Resources
NRSP	Natural Resources Systems Programme
ODA	Overseas Development Administration
PAC	Programme Advisory Committee
PHFRP	Post-Harvest Fisheries Research Programme
PSP	Plant Sciences Programme
RNRRS	Renewable Natural Resources Research Strategy
SSA	Sub-Saharan Africa
TC	Technical Cooperation

Acknowledgments

Thanks are due to the Programme Managers of the ten NR research programmes and to their teams, who gave time willingly and generously to this study, despite being in the midst of a hectic final year of the RNRRS, and having a large number of these Synthesis Studies competing for their time.

Particular thanks are due to the CPHP team who led and hosted this study. Thanks also to Barry Pound for sharing thoughts and an early draft of the parallel study for DFID, which this study has found itself very much in agreement with.

Introduction

Background to the synthesis study

1 The completion of the eleven-year cycle of the RNRRS was an appropriate moment for DFID to commission a number of reviews and evaluations, including a series of cross-programme synthesis studies, of which this is one. Capacity development is a topic of direct relevance to natural resources research, whose importance was acknowledged at the inception of the RNRRS, and which has subsequently played a significant role in all of the research programmes, although perhaps not in ways that were entirely foreseen. At the threshold of another NR research funding cycle, there is again a recognition – perhaps even more acute – that capacity development issues will be central, together with a desire to provide a more consistent and realistic framework for their incorporation.

2. The context of agricultural research[3] is changing in a profound way. Not only are the scientific and technical issues becoming more complex, but so are the associated social, economic, policy and ethical issues. The private sector is becoming more important at a number of levels; the effect of increased globalization and the role of international trade; the growing participation of large companies as investors and research partners[4], and the realization that small-scale entrepreneurship underlies economic development. Added to this is persuasive evidence that agricultural research has to adopt new configurations if it is to engage with the wider issues of innovation and science policy which will lead to poverty impact.

3. The loss of skilled resources, or their migration elsewhere (the 'brain drain') is also of serious concern. HIV/AIDS is impacting several SSA countries severely, but also important is the lack of suitable incentive structures to retain skilled people in poorly-funded national research systems, together with perverse incentives which attract such skills into the international agencies.

4. These realisations are now evident in the policy and strategic statements of most official development agencies[5]. The building of research capacity in developing countries is a core aim of DFID's new Research Funding Framework (DFID, 2004) and it is reflected as one of the four pillars of the Strategy for Research on Sustainable Agriculture (DFID, 2005b). The Commission for Africa (2005) and NEPAD (see Clark 2005) make strong commitments to capacity development within their policy objectives.

The aim of the study

5. The study was asked to examine the capacity development experiences of the ten research programmes of the RNRRS with a view to:

- Providing a consolidated account of some eleven years' experience, drawing out common and contrasting lessons.
- Suggesting a framework for the future incorporation of capacity development concerns into research activities, giving some principles and criteria that would be of use to both

[3] Following DFID's own shorthand , the term "agricultural research" is taken to embrace a wide definition of the use and management of land, water and renewable natural resources, whether private or common access. See the clarification in the response to the SRSA consultation (DFID 2005a).

[4] By the mid-1990s, about one-third of the $33 billion global investment in agricultural research was private; but only some 5% of that was in developing countries.

[5] E.g. IFPRI 2005: "The cornerstones of IFPRI's work are research, policy communications, and capacity strengthening for policy and research."

DFID's Central Research Department (CRD) in framing new calls for research, and to prospective research programme and project managers in responding to these calls.

- Contributing to the international donor experience of capacity development in poverty-focused research.

6. A further declared policy aim of DFID is to widen the scope from research to innovation – that is, to embrace those processes that determine the successful practical uptake of knowledge as well as its generation. A parallel synthesis study (Rath & Barnett, 2005) addresses the questions surrounding an 'innovation systems' approach, but given the central importance of 'system capacity' to that approach, a complementary aim of this (capacity development) study is to help progress thinking on how capacity development might assist in the mainstreaming of an innovation and research-for-development approach.

Methodology.

7. Initial discussions were held with CRD and the CPHP in order to agree on key concepts and the precise aims of the study. Following the circulation of initial briefing and introductory material to the Programme Managers, the relevant written material was identified, mostly in the form of Annual Reports, evaluations, web-based material, and selected project documents. This material was reviewed to infer or interpolate how capacity development was interwoven into the fabric of much of the research programmes' activities recognizing that, for the large part of the lifetime of the RNRRS, it was done so without being able to relate it specifically to the formal research outputs.

8. The findings from the literature review provided a basis for informal but structured conversations with the programme managers and their teams. Programme staff were encouraged to reflect, not just on the lessons of the past, but also to suggest ways in which capacity development issues might be integrated into future research programming.

9. Two sets of quantitative data were requested from the programmes; the numbers of post-graduate students that had been supported by the programmes over the years, and the relative proportions of programme budgets spent overseas from year to year. However, several caveats attach to the analysis of that data. First, it is in both cases only partial information, reflecting the variation in level of response from the programmes, and their own ability to retrieve the information, especially for the earlier years. Second, there are definitional problems, and variations of interpretation from programme to programme. For example, post-graduate students might only be counted in one programme if they were actually engaged directly in project research; in some other cases, large numbers of post-graduate qualifications have been achieved by students as part of a wider outreach and capacitation programme. Financial data is also very mixed; particularly where funds may have been allocated to UK organizations (and hence accounted for as 'UK spend'), but actually disbursed overseas. The data is therefore only used to examine some very broad trends.

Two reminders

10. First, "capacity building" as a term is now largely replaced in the literature by "capacity development" (and sometimes by "capacity strengthening"), probably reflecting a wish to lose the patronising suggestion that development assistance is needed to >build capacity from scratch=, and to embrace the view that capacity development should strengthen and work with existing structures. Here, the terms are used interchangeably but "capacity development" is favoured.

11. Second, it is going to be convenient in the discussions that follow to make a distinction between “organizations” and “institutions”. *Organizations* are physical bodies - companies, government departments, research institutes, NGOs, communities and so on. *Institutions* are the constraints that structure human behaviour. They can be both formal (e.g. rules, laws, constitutions) and informal (e.g. norms of behaviour, conventions, markets and self-imposed rules of conduct). Together they define the pattern of incentives, sanctions and pressures B the >rules of the game= in a society B within which the >players=, i.e. the formal organizations and individuals, play their roles and do their work.

Research, innovation and capacity development

Capacity development defined

12. Capacity development remains a term of enormous generality and vagueness, matched by an equally wide set of concepts and terminology, reflecting the varied sectors from which it has emerged over the last fifteen years or so, and a host of concepts are included under its general umbrella, including participation, organizational development, technical assistance, performance, institutional economics, empowerment, and many others. We restrict our scope to capacity development for research, with a poverty focus goal. Development, in general, is all about a society’s ability to fulfil its needs, but in capacity development it is the *types* of capacity that are emphasised:

CAPACITY DEVELOPMENT DOMAIN	EXAMPLES OF OUTPUTS IN THE DOMAINS	EXAMPLES OF IMPACTS
Individual capacity	$ Researchers and other workers trained by level/discipline	$ Improved management systems $ Enhanced research outputs $ Researchers networks improved
Organizational capacity	$ Equipment availed $ Infrastructure developed (management and systems) $ Strategic and policy capabilities developed $ Technology introduced	$ Enhanced research outputs $ Improved project and resource management systems (including information) $ Research needs more accurately identified
Institutional capacity	$ New/improved research approaches introduced $ New/improved management approaches adopted $ ‘Infrastructural’ changes e.g. to policy, incentive or market mechanisms	$ Researchers trained $ Improved research management systems $ Enhanced responsiveness to stakeholders
Network capacity	$ Partnerships, consortia built $ National/regional networks strengthened $ N-S partnerships between research institutes	$ Enhanced research outputs $ Enhanced responsiveness to stakeholders $ Transformed research management $ Durable networks established

13. If capacity development is to be applied across the whole system (see para. 15 below) that is engaged in delivering successful innovation, then the range of potential interventions needs to include those that are appropriate to public, private and community sector organizations – not just the traditional research institutes. And, despite the categorisation, capacity development must be viewed as an integrated activity. *'Capacity', therefore, has to be viewed as the ability of individuals, organizations, and the system not only to perform research, but also to transform research knowledge into successful pro-poor innovation.*

14. Capacity development has to embrace some notion of sustainability. Capacity not only needs to be established, it needs to be sustained and maintained over the long term, which often needs attention in the enabling environment, which sets the incentives and disincentives which are often crucial to the stability of capacity. This is a particularly important consideration when considering what capacity development can be achieved within the context of short-term project activities

Capacity building in the research-for-development agenda

15. The RNRRS has produced good research outputs, and where it has been complemented by attention to the uptake system, has led to instances of substantial impact. Impact has been limited in the cases where the 'old model' of research has dominated; that is a focus on the science processes with an assumption that dissemination is a separate exercise. An increasing concern for research to demonstrate poverty impact is leading to a new research paradigm based on innovation systems thinking (see Arnold and Bell 2001). There are many implications in this for capacity development. The field of engagement will be much wider, with more emphasis on multi-stakeholder, interdisciplinary and client-driven research agendas, and key capacities will relate more to the improved flow and utilisation of existing knowledge than to the generation of new research knowledge. In a system-wide approach, the non-research partners may be in the majority. For example, traditionally the job of passing on the results of agricultural research was given to the state extension services. Not only are these greatly reduced (most particularly in SSA) but there are also questions about the appropriateness of the traditional extension services model, with more market-oriented mechanisms now arising. In these emerging models, increased partnerships in the private sector and with community-based organizations and other NGOs is demanded.

16. An innovation systems view puts the role of 'blue-skies' or strategic research into perspective, where there is a speculation, perhaps unsupported by immediate evidence of demand, that a particular set of research outputs would be beneficial. Ultimately, the new knowledge has to be tested 'in the market place', but radically new technologies may require a new set of capacities to be built up. Example include the British Council LINKS programme, and the Rockefeller rice programme, which used a fellowship programme to exchange scientists between northern and southern institutes, and led to the building of capacity of some 400 scientists.

Capacity development and scaling up issues

17. Whilst an innovation systems approach may identify more of the important actors, attention will still need to be given to ensuring that any research project interventions do not just engage on a pilot or demonstration basis, but address wider scale uptake within that system.. Dissemination and uptake both involve scaling up, which can usefully be characterised as *horizontal* and *vertical* scaling.

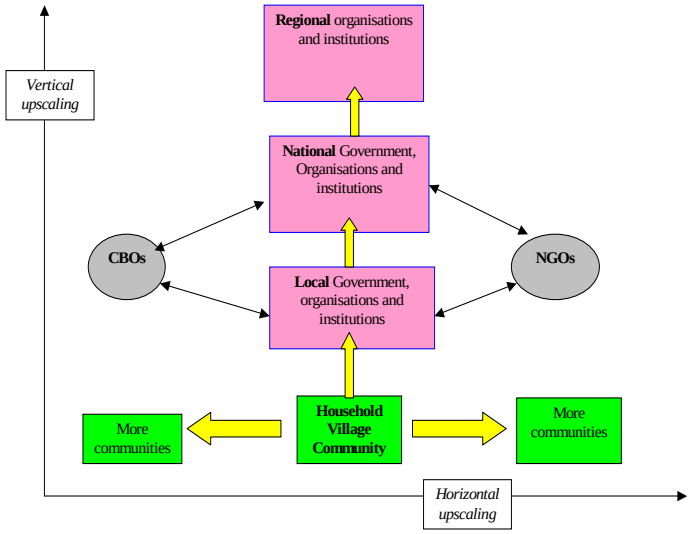
18. Horizontal scaling is a geographical spread and replication to more people and more communities involving expansion within the same stakeholder group. A full pathway might be:

farmer→family→village→community→district→region→national→international

(although 'shortcuts' are possible.) Vertical scaling up involves organizational spread in a process of expansion from grassroots to policymakers, donors, development institutions etc. The pathway can be top-down or bottom-up. The bottom-up uptake pathway might be:

local institutions→regional institutions→national institutions→international institutions

Again, the implication for capacity development is that the scale and variety of partner organizations, whose capacity to absorb and deliver is critical, is greatly increased. The capacity development tools and techniques that will be needed to support large scale horizontal dissemination to many farmer groups (for example) will be very different to the more focussed efforts need to engage with the institutional relationships in the vertical pathway. Horizontal scaling might require partnerships with organizations skilled in widespread community outreach and training, whilst vertical scaling might engage more in issues of policy change and decision-maker influencing. These implications, and much more, are comprehensively covered in the NRSP review (Gundel et. al., 2001).



Horizontal and vertical upscaling (after J. Ellis-Jones, Silsoe Research Institute).

3 The framework for capacity development in the Programmes

DFID's role.

19. DFID's guidance to Programme Managers on the way in which capacity development should be addressed within the RNRRS changed significantly over the years, reflecting the evolving policy environment. The RNRRS strategy paper (ODA, 1994) – the 'Yellow Brick' - was concerned that research funds for generic technologies and strategic research should not be diverted into location-specific issues. There was a linked assumption that "ODA geographic departments and the developing countries themselves are expected to fund and support the

necessary location-specific adaptive research and the uptake and application of results, including any institutional strengthening which may be indicated" as would other programmes such as TC training and those of the British Council. This was formally expressed as a principle which specifically ruled out capacity building: "RNRRS funds should support basic, strategic and adaptive research. Research programmes should not fund training, technology transfer by extension or institutional development."

20. The Guidance Notes for Programme Managers (ODA, 1996) relaxed the position somewhat, by saying that Programme Managers "may support research of a basic, strategic, applied or adaptive nature", but still repeating that adaptive research assumed the presence of target institutions "which can financially support the necessary transfer of successful technology through training and extension with end users", adding that "development projects, NGOs and private sector organizations may also have suitable capability to take forward the outputs of adaptive research".

21. The DFID 'poverty reduction' White Paper (DFID, 1997) required research programmes to address poverty reduction more directly and explicitly. Programmes responded to this, enshrining changes in strategy and approach within revised logframes at contract renewal (1999), and by building in activities to support the 'enabling environment'; that is, the institutional and social context into which research outputs were launched, previously left unattended in the 'assumptions' column of the logframes. However, the research funding budgets were not of the scale that would allow serious impacts at this level.

22. The re-issued Guidance Notes for Programme Managers (DFID, 2000) allowed limited capacity building: It recognised the value of long-term collaborative arrangements with developing country institutions, and "Where choices of alternative institutions are limited, it is legitimate to direct some effort to capacity building for the delivery of developmental impact....". But limited in the sense that "(Institutional strengthening) outputs must be relevant to the purposes of the project and be cost effective". And ""Institutional strengthening activities might include the provision of support to improve ability for the design and implementation of research, the donation of project equipment, certain types of training, participation of staff...in international development meetings, improvement in communications, support for relevant publications."

23. Training was limited to ad-hoc short-term training for specific scientific techniques related to project implementation. "It is unlikely that research funding would be justified for the registration, tuition and residential costs associated with graduate or post-graduate qualifications." Not only was it felt that research funds would be impossibly stretched if they were to bear serious capacity development costs, but there was also a recognition that scientists might be diverted away from the areas in which they were specialised.

24. The LTS evaluation (DFID, 2005c) describes the 'Yellow Brick' strategy of 1994 as a research programme envisaged to support field RNR projects and programmes undertaken by DFID, and goes on to suggest that the consequences of the loss of this 'natural constituency' through successive policy changes was not fully internalised within DFID. The evidence of this study is that even from the outset, the 'natural constituency' never provided any real route for the uptake nor indeed any help in the definition of research needs. Indeed, many programme managers described attitudes of indifference or antipathy in the geographic programmes to the uptake of research outputs, and the few instances of cooperation stand alone as isolated examples of individual encouragement and support within a more general and systemic dysfunction.

25. Many projects and programmes demonstrate an understanding of a wider context for research; the importance of participation by multiple stakeholders and the need to consider the

enabling environment. However, this insight could not be translated, by programmes, let alone by individual projects, into integrated capacity development initiatives. Not surprisingly, the capacity development that did go on was fragmented, less than optimal, and always with the feeling that it had to be somewhat 'under the counter'. Programmes adopted a pragmatic approach and engaged in capacity development activities in ways that best complemented their programme strategies; as a result, the formal level of compliance with DFID guidelines was interpreted somewhat flexibly. One programme adopted a rigid ban on post-graduate support, whilst another programme fostered long-term partnership arrangements that effectively bypassed the open-tender calls process. Such issues were often vigorously debated with the Programme Advisory Committees (PACs). What is surprising is the extent of capacity development that *did* get undertaken, as many of the research programmes saw it as essential to the execution of their research programmes, and also as an essential component of sustainable uptake. Some of the capacity development was deliberate and explicit, but much went on that was perhaps not explicitly recognised as such – notably the development of partnerships, organizational capacities and networks.

The contract research model.

26. Capacity development in the research and innovation system is a long-term process. Not only does the scientific case need to be researched for new technical approaches to natural resource development, but a sufficiently convincing demonstration on the ground needs to be established to form a basis for persuading users to adopt an innovation. Embedding innovation into a national system then requires new competencies and capacities to be established at many levels, from farmer to policy maker, and for the lessons to be reinforced over time. It is not surprising, therefore, that within the RNRRS the best examples of significant uptake linked to durable policy change arise from coordinated and interlinked sets of activities that have been pursued over pretty much the entire lifetime of the RNRRS (and in many cases pre-dating it).

27. This evident need for continuity of effort can be seen to be at odds with some of the features of the contract research model as it has been applied within the RNRRS; the requirement for open, non-exclusive tendering, the periodic re-definition of broad research themes in new calls, the need to respond to expressed need, and the two to three year project duration[6]. The LTS evaluation, similarly, concludes that the rarity of projects such as the INNOVA initiative, which expressly set out to develop local capability, "would suggest that the RNRRS contract model is not particularly suitable for making a sustainable impact on the capacity of southern research institutions in terms of establishing long-term linkages to local and international research networks, or building deep institutional competence (beyond that of individual researchers in specific research themes or discipline areas".

28. The customer-contractor model, whereby research organizations become contractors and are expected to maintain their own capacity from overheads on contracts, and to be able to expand or contract according to demand, has been the dominant model, but is inherently unlikely to promote long-term capacity maintenance.

4 Evidence and experience from the Programmes

Individual capacity

29. The most common formal individual capacity development has been the acquisition of post-graduate qualifications by project team members, mostly PhD, MSc or MPhil qualifications.

6 Project duration is a rather separate issue; a competitive tendering model need not necessarily imply short-term projects; but in the case of the RNRRS, 2 to 3 year projects have been the norm. See later, especially Para 57.

A large proportion of these have been gained by overseas staff at UK universities, often working in UK research institutes with more or less of a field work component, but with some universities offering a 'split site' arrangement. Reasonably complete data is available on the number of post-graduate qualifications gained, and some 102 PhDs and 60 MSc/MPhil degrees are recorded, with another 160 MSc resulting from extension training in AFGRP alone. The real total is likely to be a little higher.

30. There are differences in the significance attached to the value of individual training between the programmes, with the university-managed programmes (perhaps not surprisingly) being the stronger advocates. One or two programmes were content to follow the letter of DFID's prohibition of the use of research funds to pay for direct costs of graduate or post-graduate training, but those who did use post-graduate researchers circumvented the 'letter of the law' by a variety of means: paying them research assistant salaries, getting a co-donor to pay fees, or paying a partner organization to free up funds so that they may engage the researchers.

31. The programmes that supported post-graduates saw it primarily as the best way to get a specific research job done in terms of both cost effectiveness as well as imparting wider developmental skills, although it may not always have been the speediest way to obtain results. In the words of one respondent: "For many decades it has been widely accepted in developed countries that the 'research assistant', usually a PhD student, is the workhorse of developed country research systems, with more experienced staff either too busy or too expensive to spend much time at the lab bench or in the field."

32. Second, beyond the value of the post-graduate research for its own sake, programme managers felt strongly that the training in the research method, a reliance on evidence-based conclusions and intellectual rigour, was of longer term value, and represented a real development of capacity. This may be true, but the enhancement of the national pool of scientifically trained workers is a collateral benefit to national science and technology capacity, and was not set out as a primary output for the research programme.

33. Thirdly, some programmes argue that even if post-graduates do move on from their institutes, they are seldom lost to the sector, some going on to occupy important and influential positions, and remaining in contact through professional networks. Evidence on this is mixed; some post graduates certainly do stay 'in the network', but in an unpredictable variety of roles; others emigrate or otherwise move on, particularly from unstable countries (such as Nepal). The CPP performed a tracker study of the period 1985-2003; international students (i.e. non-GB and non-EU) gained 53 out of 78 PhD's (68%); and of them 91% are still active in the agriculture sector, but only 17% of them remain in developing countries.

34. In a system-wide view of research and innovation, research scientists are not the only group whose capacity may need developing. There are many examples to be found throughout the NR programmes where selective capacity development has been necessary to both develop and disseminate research outputs. Often these may be end users; typically smallholder farmers, but traders, manufacturers and other small enterprises figure frequently.

35. In project-based dissemination activities, it can sometimes be difficult to distinguish between training in specific skills and techniques and cases where the development of more general capacity has occurred. Capacity development may be considered to be an significant outcome when we see such characteristics as:

- It is not simply new knowledge that is being imparted, but an ability to use that knowledge in practice, and to incorporate it into decision making;

- The skills developed can be used in a number of applications, not just relating to the specific topic being disseminated;
- There is some attempt to address the long term sustainability of the skills, such as through the training of trainers and the establishment of a knowledge resource.

Farmer-level capacity development in the AHP
Development of FFS methodology for small-ruminant producers in The Gambia.

Work on Farmer Field Schools (FFS) began in 2001, and since then they have been shown to be highly effective tools for helping farmers to acquire livestock production and animal health knowledge. The FFS >learning by doing= approach was originally developed in the 1980s to introduce rice farmers in Asia to the benefits of integrated pest management. Since then the approach has spread geographically and has also been used in a wide range of other farming systems, but had not previously been applied to livestock. As a result of AHP activities, a wide range of organizations are now investing in livestock-focussed FFS, targeting a wide range of livestock species, both within Africa and further afield.

A collaborative programme in the International Trypanotolerance Centre and the Gambian Ministry of Agriculture, Department of Livestock Services, led to the establishment of four small ruminant FFSs in the Central River Division of the Gambia in 2004. Most of the small ruminants are owned by women, who also form the majority of the FFS members. Almost all the participants are illiterate, so development of a common recording system based on symbols and pictures was required. A pictorial training manual with guidelines for improved small-ruminant production in The Gambia was also produced as reference material. The FFS developed group action plans around the main areas of concern and intervention: housing small ruminants and its relationship to diseases (ectoparasites and footrot), *peste des petits ruminants* (PPR) and dry-season food shortages. In 2005, a training-of-trainers course will be held to refresh the >dormant= FFS facilitators, the number of FFS sites will be increased in Central River Division and interventions will expand to the Western Division.
(From AHP Annual Report 2004-2005)

Organizational capacity

36. Whilst selected individuals may have their skills and capacity enhanced through their involvement in research projects, attention is less often given to the organization-level capacities of partner organizations. Indeed, projects commonly place demands on already weak or over-stretched organizations, with little recompense in terms of capacity development. Initiatives to develop the capacity of individuals can be rendered ineffective by lack of attention to the organizational setting. Whilst it may have been seen to be beyond the remit of short-term research projects to engage in organizational capacity building, there have been notable examples where specific skill sets have been identified as being important for the research partnership to function effectively, especially where deliberate attempts have been made to devolve project management skills to southern partners. Organizational capacity includes infrastructural facilities, management skills and processes, and strategic and relational competencies. Most, but certainly

not all, of the programme-related support has been to management skills and processes, typically in the areas of:

- Needs assessment
- Proposal writing
- Project development (including stakeholder, gender, environmental analyses)
- Project management
- Financial management
- Monitoring and evaluation
- Institutional analysis

The CPP, for example, has strengthened data management capacity within Uganda's NARO system and has developed knowledge management capacity among decentralised knowledge providers in East Africa. The CPHP has provided a range of programme and project development support facilities – training in participative needs assessment, needs assessment consultations, proposal writing, the provision of 'starter packs' for new research partners, and specialist advisory support and training. These have extended well beyond traditional research institute partners.

Organizational capacity development:
Training in proposal writing skills in the Tanzanian NARS

A training programme on research proposals writing skills comprising of five proposal writing workshops and one training of trainers workshop was implemented by a partnership between the Department for Research and Development (DRD) of the Ministry of Agriculture and Food Security, Government of Tanzania, Sokoine University of Agriculture and the DFID East Africa Coordination Office for Natural Resources Research and Development. Between 2001 and 2003 a total of 135 researchers including 33 females benefited from the workshops, 12 of whom also participated in the Training of Trainers workshops (TOTWs) so as to serve as trainers of scientists who did not benefit from the course or in other zones. The programme objective was to empower researchers to write grant winning proposals in a competitive environment and to sustain this capability through the use of TOTW trainees.

All 45 respondents except one wrote at least one proposal since the workshops, 157 proposals were written and submitted and 49% of them got funding including at least 24 proposals which got external funding. The top ten ranking proposals were funded to the tune of US$2.7 million. This funding is critical because it complements government funding most of which pays for overheads and emoluments with very little funding projects directly. Winning grants also enables researchers to collaborate with international researchers and thus keep themselves updated through this interaction.

(From Mlangwa, 2005)

Institutional capacity

37. Institutional capacity relates to the ways in which individuals and organizations work with each other within the national system, through formal or informal means. Appropriate levels of individual and organizational capacity are necessary, but not sufficient, conditions for the development of 'institutional capacity'. As well as requiring specific competencies from researchers and research institutes, other parts of the 'system' may need to be developed – for example, government departments may need to adapt in order to relate directly to farmers or farmer groups – and this may require changes to culture, policies, and incentives as well as the acquisition of new skills.

38. Institutional capacity constraints can become apparent when considering scaling up of research outputs, especially in the 'vertical' dimension. The PSP dissemination strategy (PSP, 2001) shows a particularly well-developed approach.

Institutional capacity development:
Participatory farmer methods for varietal selection and breeding

The Plant Sciences Programme has maintained a long-term support for an innovatory approach to breeding and selection, whereby farmers breed, test and multiply crop varieties. This is in sharp distinction to the 'official' system for testing, certifying and releasing new varieties, which is entirely in the hands of the plant breeding stations and the local Ministry of Agriculture. New and 'improved' varieties are only released to farmers at the end of this process; and the farmers' view of what constitutes breed 'improvement' may not always coincide with that of the plant breeder, leading to obvious uncertainties in the level of uptake. It is also a lengthy process - without considering the administrative delays, it takes at least 12 to 13 years to get a new variety to submission to the National Seed Board for release. Farmer participatory selection and breeding offers the attraction that varieties are developed that meet farmers' needs, with a consequently higher assurance of uptake, and five to six years faster than the formal system.

Two significant capacity problems needed to be addressed in the course of this work; the first being to develop the capacity of farmers themselves to conduct scientifically rigorous and documented field trials; the second was to persuade and train the government departments concerned to understand, accept, and ultimately enshrine in a revised seed regulatory framework, the fact that on-farm data was as valid as formal on-station trial data. This process has been successfully concluded in Nepal, and is being replicated in India, Bangladesh and Ghana through the development of a strong international network which facilitated the transfer of germplasm and ideas between partners. It underlines the points that capacity development often needs to be undertaken at different levels in the agricultural system simultaneously, and that it takes persistent effort over extended periods of time – ten years in this case.

(Extracted from Joshi et.al. 2005.)

39. There are many examples of projects working at the institutional level, perhaps to effect changes in the 'enabling environment' through policy impact, or to change market relationships with private sector partners. The 'soft' transactional skills that are needed to develop partnerships and effect change may have been acquired during such projects, but they can also be the aim of targeted capacity development interventions.

Institutional capacity development:
The Innova project – revitalizing a national innovation system

The Bolivian smallholder potato farming system has always been characterized by difficult and varied geography, soils and climate. The remoteness and fragmentation of the producers has also resulted in poor access to markets. The diverse farming systems that have evolved in response have made it difficult to introduce technical improvements developed in the national research organizations or elsewhere, compounding the problem by making smallholder farmers increasingly sceptical of agricultural research. As one farmer put it, "How many times have you people come to ask us what we need? And then you go away and we never get anything!".

The problem was compounded by a difficult policy and institutional environment. A reorganization of the Bolivian national agricultural research system shifted the emphasis away from new research towards the implementation of existing knowledge. This proved to be a case of 'throwing the baby out with the bathwater', since what the Innova project has proved to be important is that a judicious mix of existing and new technology is needed to fuel innovation, and to respond to explicit demand (something farmers specifically ask for) as well as implicit demand (when farmers either do not fully understand a problem or else cannot imagine a solution that is new to them).

The Innova project has taken a holistic and multi-disciplinary approach to the problem, seeking to pool the knowledge of different organizations, emphasizing the validation and dissemination of existing technologies, creating a better match between farmers' needs and the supply of technologies, and helping build new markets. Whilst the project is mainly an object lesson in understanding the strengths and weaknesses of a national innovation system as it stands, and designing responses that fit that diagnosis, it also contains important capacity development lessons.

First, a system-wide diagnosis enabled capacity to be strengthened where it was critically needed, not just in the formal research system, but at the farmer level, by training community members to take part in surveys, trials, evaluations, market analysis and dissemination activities – the 'participatory market chain' approach. Second, in a situation where national institutions were weak, it focused on building the power of networks, and by bringing together organizations that traditionally did not interact, made their combined effectiveness more than the sum of the parts. Third, it catalysed institutional change in terms of modified relationships, levels of trust, ways of working and perceived hierarchical position. And throughout, its approach to capacity building has been extremely practical – to 'show' as well as 'tell'.

(Taken from project literature, Innova, 2005)

40. Many programmes came to recognise, often implicitly in their approach to project implementation, that adaptive research and a requirement for immediate impact meant engaging with a wider set of stakeholders beyond their traditional research institute partners. More than just widening the range of organizations, it meant understanding the linkages and interactions

between them, and the relationship to infrastructural constraints and the 'enabling environment' more widely. The CPHP perhaps pursued this most explicitly, using the 'national systems of innovation' thinking to underpin its analysis and strategy. In 2002 the programme adopted a >Partnerships for Innovation= approach to improve quality and sustainability of research partnerships, and to enhance the relevance and impact of research. Central to it was the creation of project coalitions between stakeholder representatives (research institutes, governments, NGO, smallholder representatives, private sector etc). Projects were managed through coalition teams. This made wide demands, requiring capacity development in a number of skill areas and an integrated suite of initiatives, including:

- A 'Starter pack' for new partners, including guidelines for proposal preparation and project cycle management
- In-country proposal writing courses
- Face-to-face support for southern partners in implementing enhanced project management systems
- post graduate training
- institutional analysis
- stakeholder analysis
- gender analysis
- empowering southern organizations through more equitable research partnerships
- Call for projects with an 'institutional research hypothesis'.
- The support of a Partnerships and Institutions Adviser
- Development of *institutional* (as distinct from organizational) M&E tools
- A global evaluation project to extract researchable lessons from the initiative
- Web-based communication tools and open-access monitoring and accountability

The existing regional structure of the CPHP with local capacity and strong linkages was critical to the Programme's ability to deliver the initiative[7].

Network capacity

41. Networks are characterised by common professional interests rather than organizational affiliations, and are nourished by personal contact, high levels of trust and informality. Undoubtedly, increased access to the internet (for common resources and web-based messaging tools) greatly facilitates the operation of networks, but face-to-face contact at conferences and workshops is highly valued. Despite the evidence that networks are a powerful vehicle for exchanging knowledge and ideas, they receive little formal recognition in development strategy – budget allocations to 'networking' are often viewed askance, as being somewhat unfocussed an ineffectual. Researchers seem in no doubt of the power of professional networks, however, and many projects have strengthened and created alliances between researchers in developing countries. The LTS evaluation concludes that "these relationships constitute an important informal mechanism for strengthening researchers' capacity".

42. Networks operate at all levels from local to international, and can include:
- International research system (CGIAR members for example)
- UK research and science institutes
- National and international overseas institutes, (FAO, KARI)
- NGOs, both international, local and CBO
- Other DFID research programmes

[7] This, and much else, is being examined in a major evaluation of the CPHP's Partnerships for Innovation initiative by Andrew Barnett, due to report in early 2006.

- Professional and informal networks (e.g. INIBAP)

43. Knowledge networks are especially valuable in countries where formal structures are weak. There are regional differences in this picture; SSA suffers both from under-funded and weakened government agencies and a skill shortage exacerbated by brain drain, HIV/AIDS, intermittent finance and security issues. India, with adequate public and private finance in the research sector, still suffers from poorly functioning institutional linkages resulting from an over-bureaucratic system. Attempts to overcome these deficiencies by strengthening particular organizations or individuals within them are usually limited and piecemeal, and consequently turn out to be of very limited value.

44. There are numerous examples within the programmes of professional networks being strengthened through such activities as the formation of network groups, exchange visits, project workshops, learning events. The PSP in particular has defined a research model ("an institute without walls") that explicitly recognises the importance of national and international network linkages with flexible partnerships, as distinct from a more conventional formal set of research partnerships (Stirling et. al., 2005). The CPHP's Southern Africa regional Office produces *The Harvester*, a widely-circulated network publication, and the LPP's livestock agencies' annual forum is supported by a Pfizer-sponsored portal.

45. The effectiveness of networks is being greatly enhanced as ICT facilities become increasingly accessible in developing countries, but simple accessibility to information needs to be complemented by improved knowledge management techniques. Most of the programmes have been taking active steps to ensure that their legacy of technical and managerial knowledge is archived, and curated, and some (such as the CPP, FRP, CPHP) have done so in the context of an explicit knowledge management strategy.

Partnerships and devolution

46. Over the lifetime of the RNRRS there has been a clear and steady trend towards the involvement of a greater number and variety of overseas partners, and a corresponding devolution of an increasing share of research management responsibilities to them. This can be attributed to many factors; a growing recognition by programmes of the effectiveness of participative approaches, particularly in delivering adaptive research; the driving force of DFID's emphasis of the poverty impact agenda; and a progressive liberalisation of the formal contractual requirements amongst others.

47. Many research partnerships with southern organizations were established early on in (or even pre-date) the RNRRS, and most researchers needed no convincing of their value. But DFID's early rules (such as the requirement that project managers had to be UK-based organizations) did not make it easy to hand over responsibility. And even when the rules were relaxed, the need to support high levels of UK overhead fostered reluctance to devolve budgets overseas. Nevertheless, the trends have been clear. Over the years, more of the research budgets have been spent overseas, with more partners, and with a larger share of the management responsibilities. The CPHP, for instance, set a target indicators of 75% for the proportion of projects that it wanted to see managed by local partners, backed by a strategy to develop the capacity of potential partners such that they could compete equally in the project selection process.

48. Whilst there is no necessary link between programme expenditure and capacity development, most of the programmes were able to confirm that increased overseas expenditure involved increased flows of funds to overseas partners, and in turn this reflected increased

devolved responsibility, sometimes requiring additional training. The actual data on financial flows to overseas partners is fragmentary and inconsistent from programme to programme. The trend in all cases, however, is a marked increase in direct support to overseas partners especially in the latter half of the RNRRS. A very rough estimate would be that the proportion of programme funds spent overseas might typically have been 30% in 2000-01, rising to 60% in 2004-05. There is no apparent relationship with the overall size of the programme budget, but the university-based programmes disburse somewhat less overseas. Some programmes also report on the number of partners associated with their projects; the CPHP, for example, cites the number of partners rising from 51 in 1998-99 to 174 in 2004-05.

49. Technical and managerial capacity development requires a sound base of training material to support it. All of the programmes have produced copious quantities of such material at both project and programme level. Taking one isolated example, the FMSP has, through a series of linked projects, developed a comprehensive suite of software, tools and techniques for sustainable fisheries stock management by local partners.

50. Good capacity development recognises that it is essentially an assisted self-learning exercise that accepts that uncertainties exist, and incorporates learning into the research process. This has been fully integrated, for example, into the FMSP strategy through its long-running 'Adaptive Learning Approach' which has been fully documented together with a set of training materials (see Garaway and Arthur, 2004).

51. The building of sustainable research capacity through a partnership approach requires a willingness not only to explore uncertainties jointly, but to devolve responsibility and control to public and private sector partners. Several of the Programmes have recognised that this partnership development can be greatly facilitated by some form of local presence that is well rooted in the local institutional networks. The CPHP has probably explored this most fully, through its four Regional Offices, each with a Regional Coordinator and small local team. Not only do they support programme development, strategic planning and project support, but aspects of the governance function have also been devolved. These CPHP Regional Offices have, as one of their strategic outputs, the building of capacity of regional R&D organizations and workers to access resources from DFID and elsewhere.

Conclusions: Success factors and lessons

52. By their nature, conclusions and their attendant recommendations are difficult to assign to different actors, and equally it is difficult to distinguish between principles and criteria. Most of the issues require a complementary approach of high-level strategic decisions, programme-level responsibilities, and project-level requirements.

Main points.

53. The central dilemma remains; serious capacity development is a long-term, extensive and expensive specialist undertaking; but so is research, and whilst the translation of research into effective innovation will require more attention to capacity development, it must not be at the expense of compromising research quality. But to cast them as a pair of mutually exclusive options is to ignore some of the realities and potentially fruitful middle ground. Research cannot be separated from capacity development, and research cannot be conducted without building capabilities. If successful innovation is the goal, rather than simply the creation of good research knowledge, then experience tells us that attention has got to be given as much to the demand side – where capacities are generally weak – as to the supply side.

54. Individual post graduate support is worthwhile if justified as a cost-effective means of completing planned research activities. The research project design should not be compromised in order to accommodate academic requirements, and it would probably be best not to support fees and other tuition costs directly, but for the project to pay a research assistance salary reflecting the real inputs being made to the project.

55. Individual post-graduate support is probably not effective capacity development unless it is linked to a wider organizational or network development strategy consistent with the aims of the research programme. Larger scale support of individual capacity building could be contemplated under some specific conditions, for example:

- Where it can be demonstrated that innovation in a complete sector or sub-sector is constrained by a lack of particular skills,
- Where the research programme is of sufficient size and duration to support the deployment and training of a large cadre of researchers,
- Where the retention as well as the training of individuals is addressed in an integrated manner, including attention to incentives etc.

New mechanisms (and current best practice) should be investigated to maximise the use of in-country trainees (rather than UK-based researchers gaining experience of research in developing countries) and to maximise the incentives to stay within the national system (example Rockefeller training of biotechnologists in Africa) such as in-country post-doctoral fellowships.

56. The exclusion of capacity development initiatives for a long time in the RNRRS has arguably reduced the amount of individual development undertaken, but it has most certainly constrained the amount of organizational support that has been given. Nevertheless, some strong partnerships have been made and maintained with developing country organizations, and over the years, the number and range of these partnerships has expanded beyond traditional pairings with host country research institutes. In some cases, organization development has gone beyond scientific training to include project management skills, proposal writing and so on. Such support to partner research organizations should continue to be possible under future research programming models, where well-identified constraints to the successful execution of the research can be addressed.

57. However, it is difficult to see the justification for extending research budgets to encompass general and non-specific research capacity building within traditional research institutes, since although an undoubted national good, it would divert both the resources and objectives of a research programme, and in any case would probably be difficult to implement in a direct budgetary support environment. Rather, limited support would be more effective if directly targeted at improving capabilities for successful innovation – wherever they may be. So a more productive option would be to widen the definition of partner organizations to consider all of the stakeholders within an identified innovation system (national or sectoral). Through such an analysis, capacity development initiatives may respond more directly to the needs of the in-country research systems, helping avoid any temptation to 'set the agenda' through prescriptive capacity development schemes.[8]

[8] Some commentators (e.g. Pound and Adolph 2005) feel that the innovations systems approach is in itself prescriptive, rather than (as suggested here) a neutral tool for analysing the realities of the institutional patterns within a country. Clearly, no approach should be promoted as being a unique solution, nor should it lead to pre-defined responses.

58. Good research and good capacity development both take time. The thorough pursuit of a research agenda, especially when it needs to be validated by adaptive work demonstrating its potential to impact poverty, needs the ten-year horizon rather than the confines of a two or three year project. (And when accounting for start-up and completion end-effects, as well as the vagaries of crop seasons, two or three year projects reduce down in reality to very few months of active research engagement.) All commentators agree that capacity development also requires such a long-term (if not longer) approach. So the concept of building capacity for research as part of active research programmes argues for the retention of (at least) the ten year perspective. There are good arguments for the two to three year project however, and they include considerations of accountability, realistic planning and budgeting time frames, the ability to be responsive and to integrate 'new' knowledge and new partnerships as the project evolves.

59. These are not mutually incompatible considerations. It is possible to conceive of long-term research priorities being pursued resolutely over an extended time scale, with appropriate levels of capacity development being factored in, but explored through a succession of shorter-term, focussed projects or project phases that benefit from disciplined project management approaches. It is this combination of long-term programme strategy and short term effective project management that distinguishes the most successful of the research programmes, and those which demonstrate the best evidence of having created a durable change to systems and capacities in-country. In general, this has often been achieved in spite of, rather than because of, the prevailing contract research model, and provides strong support for the careful distinction of programme-level and project-level management.

60. Some programmes have arrangements for in-country support, with the CPHP's network of regional offices representing the most fully developed model. This local presence is of great assistance in capacity development; by making informed assessments of local capacity and by being able to source local skills in response. South-south capacity development exchanges, between researchers and other professionals, have proved to be very effective, and are easily facilitated by local offices. The CPHP, for example, supported programme steering groups in East and Southern Africa, where national systems were weak, to create a forum for aligning national needs with programme priorities. The neutral convening power of the Programme enabled existing inter-organization barriers to be overcome, and the groups proved to be of great value, only being superseded when the programme developed full regional representation.

61. The new DFID research strategy emphasises the need to develop sustainable capacity in a country's innovation system, as well as to deliver specific technical outputs. This argues for a much better coordination of the research programme with DFID and other bilateral, and multilateral, programmes than has been achieved in the past. The need to integrate research (knowledge generation) with the broader, more inter-disciplinary issues of capacity building for implementation was well recognised in the "Yellow Brick". Whilst the expectations for bilateral and international alignment and integration proved to be optimistic, a new research programme should re-visit the issue in order to define a strategy for managing these interactions.

62. DFID has already commissioned a review of capacity development initiatives (Young and Kannemeyer 2001), which illustrates the wide variety of bilateral, multilateral and private organizations and networks which exist. It is a fast-changing scene, with each initiative having its own distinctive pattern of specialisations and geographic focus, with some donors (the Scandinavian and Canadian agencies for example) directing increasing amounts of funding to research capacity development rather than to specific research activities.

A framework for capacity development

Integration with an innovation systems approach

63. The implication of an innovation systems approach being brought into the mainstream is that the research outputs are not just technical, which would require a limited set of capacities to be acquired by technology users in a restricted range of organizations, but also methodological, process, policy and institutional outputs. The consequent range and nature of the capacities that will be needed to embed these innovations into a society are consequently much increased. *The focus becomes that of an integrated approach to systems capacity building.*

64. Better ways are needed to help diagnose capacity problems. Technically-focussed research programmes tend to be clear about the technical solutions that can be supplied, but less clear about the nature of the capacity problems that partner organizations may be facing. The use of a systems of innovation lens to identify critical capacity nodes, and assess their robustness, and apply judicious support at these points. A systems approach means that some substance can be given to an integrated notion of capacity development. The opportunities and constraints for maintaining and sustaining, as well as developing, capacity can be identified. The role of other sectoral stakeholders, critically the private commercial sector, can be identified.

65. Research programmes, whether they be strategic or adaptive and applied, require a parallel understanding of the institutional system within which research outputs will be taken up, and the likely way in which the poor will benefit. This understanding may be initially sketchy (for strategic research) or more detailed (in the case of adaptive research), but it will be a dynamic picture, which will need to be updated over time and as the implications of research outputs are progressively explored. An innovation systems framework offers a rational tool for mapping the national system, identifying stakeholders and their institutional relationships, assessing their capacities, and identifying gaps and weaknesses for creating, adapting, packaging, trading, disseminating and using knowledge.

66. The scope and range of the innovation systems mapping will depend upon the nature and scale of the research activity. The geography may be district, national or regional – perhaps even international – in range, and the scope may be multi-sectoral, sectoral, or sub-sectoral. A number of other tools are available for this and related diagnostic activities, such as actor-linkage matrices and stakeholder analyses.

67. The capacity of project and programme management organizations themselves will need to include a competence in innovation systems mapping and capacity development needs analysis, and research projects will need to allocate sufficient resources throughout their lifetime to undertake it.

68. Capacity development activities should be explicitly aimed at securing the long-term sustainable uptake of research knowledge into practical innovation through its integration into the institutional system.

69. Research projects and programmes should have explicit strategies for identifying capacity development needs and addressing them included within their design and budgets. Research projects should have explicit capacity development outcomes written in to their logframe outputs.

70. Resource allocations will need to reflect these extended and extensive engagements with a wider institutional setting for research. Not only will this need to be built in to project budget

structures, but experience has shown that more pre-financing of the preparatory phases will be needed. Larger projects (in scope and duration) will be better able to bear such increased costs, which should be correctly seen as investment costs rather than transaction costs.

The nature of capacity development initiatives

71. Projects (as currently defined) may be able to support existing capacity and develop new capacity, but they cannot do much to maintain or support capacity once the project is over. Programmes, with funding over a longer timescale, may be able to support and maintain capacity over a longer period and might even bring partners up to a level where they can attract sufficient income to achieve a measure of sustainability.

A number of suggestions have been put forward[9] including:

- Establish a facility to help sustain former projects and trainees, perhaps via maintaining links with previous UK partners or some sort of twinning arrangement A relatively small operational fund, managed by persons with knowledge of previous projects and experience of what can and should be realistically maintained, could make a lot of difference in terms of keeping things running and maintaining links and partnerships

- Continue to allow projects to include capacity building (including training, equipment and facilities) but strictly where appropriate to the needs of the project, and with explicit consideration of "exit strategies" whereby it can be expected (or at least realistically argued) that the capacity will be maintained.

- DFID should expect its remaining regional or geographically-based RNRRS advisers to be able to provide research programmes and/or projects with at the very least an opinion on the sustainability of any local capacity building and any ways to improve it, such as linking with other donor initiatives, and programmes/projects should build this consultation into the project cycle

72. Capacity development activities would benefit from a clear separation of project and programme management responsibilities. A programme-level overview is needed in order to coordinate the longer-term aspects of capacity development beyond the shorter-term project horizon.

73. Similarly, any move to larger, longer project interventions would be more supportive of capacity development initiatives both in terms of time frame and the ability to lever participation in bilateral and multilateral donor programmes. The process of capacity development is inherently unpredictable depends critically on constant learning and adaptation to be effective. Flexible, evolutionary project frameworks will also assist capacity development programmes to be responsive and adaptive.

74. Capacity development initiatives should be aware of, and where possible integrated with, existing national or sectoral initiatives by host governments or donors.

75. The use of individual scientists in research activities through linked post-graduate courses may well continue to be justified as a useful and cost-effective means of undertaking research with committed staff, who will undoubtedly gain valuable skills and qualifications. Whether this becomes useful capacity development – in the sense of securing long-term capability in the

9 We are indebted to Simon Eden-Green, who provided many useful contributions in personal communication.

national innovation system – is a somewhat different question. It would probably only be the case if individual skills development took place within the context of a wider initiative to address skills development within key organizations or the development of institutional networks, together with attention to the factors that would address the incentives and motivation of staff to stay within those organizations.

76. Individual capacity development should not be attempted without also looking at the organizational setting for the individual(s), and where appropriate integrating organization-level capacity development.

77. Technical and institutional change go hand-in-hand and cannot be addressed independently, so institutional capacity development should be integrated into active research projects.

78. Enhanced capabilities cannot be generated or delivered from the outside; they must be learned by doing and acquired deliberately over time. Capacity development is an on-going process, and assistance should be given to create learning opportunities and processes for individuals within their organizations.

79. Some form of overall support will need to be provided in order to capture and share best practices, and to provide specialist expertise. Very different skill sets will be needed to be introduced to traditional research partners. It will need a decentralised approach but with central coordination, and should include a mechanism for continuously synthesising needs across projects, programmes and regions, a means to design interventions at the appropriate level, based on this synthesised demand, and support for the production of suitable training resources – perhaps an appropriate function for the Research-into-Use Facility. South-south capacity development partnerships can be particularly effective.

80. The monitoring and evaluation of any capacity development initiative is essential to ensure that it is meeting its intended objectives, and requires specialist tools and approaches. More than that, M&E can play an active role in organizational capacity development by fostering learning from experience, and a self-assessment approach as a shared activity with partners can help engage staff and stakeholders in assessing needs and in a learning process.

Sustainability and maintenance of capacity

81. Incentives and disincentives are important. In the longer term, the answer to the brain-drain has to be through changes in the systems, status and comparative rewards that developing countries offer their trainees rather than reducing higher education opportunities. Most donors and development agencies (including the CGIARs), who currently share some of the blame for enticing away developing country scientists, could support initiatives to ensure that the trainees that they support remain in the local NARS.

82. Capacity development programmes need to be designed with adequate stakeholder involvement to ensure that they accurately reflect local needs and constraints, and are sensitive to the cultures and operating conditions. Partnerships should be balanced, with a real commitment to shared decision-making and eventual local autonomy.

83. Support to capacity development initiatives should extend over the long term, certainly beyond the time frame of conventional project activity.

Researchable topics

84 The development of innovations systems mapping tools for particular application to the NR sectors of developing countries. Innovations systems approaches were initially developed to explain the functioning of innovation within developed economies, and their application to natural resource sectors in developing countries is embryonic, as is the use of other tools and approaches allied to it, for appraising and monitoring…. Many existing capacity development tools have been developed for individual or organizational application, rather than for institutional networks. Assessment and evaluation tools need similar development. The whole area is subject to rapid expansion of interest and understanding, and it would be an appropriate task for the new Research Into Use Facility to evaluate and disseminate examples of best practice in this area.

85. Incentive structures. More needs to be understood about the way in which incentive structures work at the moment, in terms of the ways in which reward systems work for individuals who gain skills, and to devise new alternatives which would encourage people to remain 'in the system' rather than to move abroad or to international agencies. Incentives should also work to reward successful innovation, rather than the acquisition of research skills and post-graduate qualifications and publications records.

86. Private sector capacity. Relatively little is known about the critical skills needed within the private sector to encourage innovation, and the ways in which the sector can be encouraged to acquire them. In this context, the private sector includes both the agro-industries themselves, together with related processing and manufacturing activities, as well as knowledge and business management providers, and ranges form the large-scale (including international and national enterprises) to the small, medium and informal sectors.

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