

Again however the Panel is not confident that this can be said to be universal – mainly because as previously noted the skills available in pedagogics and adult learning are so thinly spread across the CGIAR.

A closely related issue concerns the type of trainee to whom efforts should be directed. Here, again, the Panel would guard against generalizations. Deficient laboratory technicians may be a more important limiting factor than a shortage of well trained researchers, depending on the circumstances. However, their field experience did lead the Panel to three tentative conclusions. First, that interventions at the highest policy level are often an essential prerequisite to overall capacity strengthening and while these may not fall into the category of formal training, the payoff could be extremely high. The CGIAR commands the status and recognition necessary in many countries to perform such a role. Second, deficiencies in university education have major implications for capacity development at all levels, not least at the policy level and the level of candidate trainees. Major multiplier effects are foreseen not only by supporting the universities' own training activities directly but also, very importantly, by bringing them more actively into the research field (e.g. through collaborative research projects). Thirdly, the Panel understands that farmer training may be necessary in the course of developing methodologies, and also that, in the absence of effective extension systems, Centers are drawn into this area as the only means of ensuring that technologies reach the field. At present, given the state of Center data bases and the potential perverse effects of indicator systems, there is a need to be cautious in interpreting the apparent major increase in farmer training reported in Chapter 3. However a permanent shift of resources in this direction would be a cause for concern, even if financed from non-fungible additional resources, as it would not be unsustainable but may actually discourage local institutions from assuming their responsibilities in the longer term.

### **6.3 Coordination and economies of scale**

Coordination, both within Centers and between Centers is one predictor of efficiency. In Centers without a central training function there is usually no coordination of training as an activity and often no training strategy. In such cases it is difficult to speak of training priorities or the benefits of coordination. Researchers often spoke of the reintroduction or strengthening of training units as a means of increasing efficiency of training. However those who responded to the Questionnaire Survey were ambiguous in their views about TUs. Where TUs existed the majority of researchers (60%) wished them to be reinforced. However where TUs did not exist only 39% favoured their reintroduction. Discussions with researchers as part of Center fieldwork, suggest that they would be most supportive of particular types of training units or functions, better adapted to a research-led training offer, rather than some of the units now closed. It can be argued that Training Units have come to be regarded as the symbol of a commitment to training activity by a Center. If that is a reasonable interpretation then the main issue is the policy commitment of Centers to training and learning and appropriate organisational arrangements to realise that commitment. This implies the need to manage and coordinate rather than the re-introduction of 'training units' per se. Such coordination will need to cover not only training activities within the Centers, but also between other areas of capacity strengthening expertise (e.g. IT and communications) available in particular Centers.

The Panel encountered many ways in which costs were spread over a higher volume of activity in the course of field-visits to centers. For example:

- The collation in electronic form of training modules and materials to permit their re-use<sup>24</sup> (e.g. IRRI Knowledge Base)
- Translation of resource material – both electronic and hard copy – into other languages (e.g. CIAT Farmers handbooks)
- Disseminating methods, outputs and curricula developed in one region to other regions – which is additionally efficient where it involves cost sharing with partners (e.g. CIP’s dissemination of disease diagnostics material from Bolivia to East Africa.)

These approaches to scaling-up, globalising and circulating knowledge and techniques as widely as possible seem to be among the most consistently applied in the Centers visited as part of this study.

Efficient resource deployment seems to depend to a great extent on the networking and negotiation capacities of Centers to align donor and Center priorities; the coordination efforts of those responsible for training; and the strategic use of core funds. At present this appears to only occur in a minority of Centers in the CGIAR. Lack of coordination between Centers is reported as a problem in the delivery of training by both by researchers and those responsible for training (focal points and training officers). Coordination among Centers can be seen as one way in which Centers might become more efficient and achieve greater economies of scale and synergies. Researchers who answered questions on this topic reported little evidence of coordination at many different levels including: disciplinary, general and specific training themes or use of technologies to deliver training. Those responsible for training also agreed that Centers could cooperate more in training materials, training content and training delivery.

National and regional fieldwork undertaken by the Panel suggests considerable variation in the extent to which coordination occurs. Thus in Malawi the lack of coordination was specifically noted – as it was in other parts of Africa.

***Malawi: Integration needed for scaling-up***

*The move of each of the IARC’s into working through dissemination and scaling up methodologies for each of their crops and building the capacities to do so raises the problem that extension methodologies are not being developed within a farming systems context. Crop specific extension and scaling up methodologies make little sense once the work moves beyond the pilot stage. There would be value at this stage of the work in Malawi for the IARC’s to begin to integrate their work and the capacity building and training initiatives that flow from it*

*(Malawi Country Study)*

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<sup>24</sup> This was an efficiency measure previously identified by ISNAR in: Anderson, J.R., et al Impact of ISNAR 1997-2001.

On the other hand in Ecuador there appears to be more of a tradition of coordination.

#### ***Inter-center synergies in Ecuador***

*No evidence was found to suggest lack of coordination between centers in their training activities. In fact, several examples were cited of how their efforts had been complementary. CIMMYT's on-farm economic research, and associated training, in the 1980/90's, laid the foundation of what is now considered to be the on-farm research culture in the country. This was later developed and strengthened through CIAT's training and sustained collaboration in participative research, which is now a recognised feature of INIAP's overall agenda (Case study 3) and has been further built up and supported by CIP's collaborative work and training (e.g. in the FORTIPAPA project). A second example concerns product processing and producer-consumer chains, pioneered through CIAT's cassava processing research and associated training on the coast (Case study 2). It was strengthened through workshops run by ISNAR, and further developed through the CIP-led market chain potato network, PAPA ANDINA which has strong training/learning components. The producer-market-consumer chain concept is now well incorporated into INIAP's research policy for all crops. A third example relates to the collection, description, conservation and exploitation of native plant and forest species within INIAP, which has been supported through training and collaborative projects by IPGRI, CIP and CIAT. One feature of all these examples is that the Centers' policies and approaches to research and development are perceived to have been consistent and mutually supportive.*

*(Ecuador Country Study)*

#### **6.4 Specialisation and comparative advantage**

One suggested measure of efficiency is the extent to which Centers confine their training activities to those topics where they enjoy a comparative advantage.

In national fieldwork there was a consistent understanding of what CGIAR Centers had to offer:

- Integrated approach to solving problems of world importance (hunger, poverty, resource conservation), integrated across biological and sociological disciplines, and across 'upstream' and 'downstream' levels of science;
- Long-term experience in the production and utilization of the mandate crops in the social and physical environments where they are grown;
- Unique collections of germplasm and related institutional knowledge;
- Worldwide network of collaborators;
- Capacity to act as apolitical 'honest brokers' and facilitators internationally and inter-institutionally;
- Excellent research infrastructure, documentation and information facilities.

Those responding to the training officer/focal point questionnaire were also clear about their Center's comparative advantage. Thus the 'link to strategic research' and 'scientific and practical experience in mandated area' was highlighted. However it was acknowledged that in some instances training outside a Center's area of comparative advantage does take place.

For example:

- Occasional seminars on how to develop project proposals, given to network members as a way to strengthen the networks;
- Students/scholars from IT area get trained by IT experts, while working on topics 'core' for the Center;
- English course so that researchers can participate in the international scientific community;
- Experimental design, data collection, management, analysis;
- Scientific writing and Presentation skills.

Various explanations for these activities have been put forward:

- The absence of alternative suppliers – say in a particular region or country;
- Such training is integrated with other training as a relatively small element and it would be disruptive and expensive to insert another supplier for a particular module;
- It opens up useful networks for wider Center activities (e.g. research, dissemination, etc.);
- Difficulty obtaining English tutors who are familiar with the language of agricultural science, making it desirable that Centers at least 'source' language tutors even if they do not deploy their own scientists.

There appears to be an awareness of this issue and the related 'international public goods' criteria among those interviewed in this study. Some see greater cooperation among Centers as a way forward:

*'Training activities on agricultural policies and marketing though relevant is hard to approach from agroforestry standpoint. A coordinated CGIAR approach is better.'*

On the other hand some informants wished to emphasise the positive aspects of these non-core types of training:

- An unavoidable aspect of training where remedial elements often have to be added to core curricula to even out gaps in trainee knowledge.
- The importance – and benefit to CGIAR Centers - of improved partner ability to raise funds in a specialist funding market (hence fundraising).
- The equal importance of English as a language of scientific communication in an international scientific community.

*One of the trainings I have received was on scientific writing, including proposals. This Course gave me the opportunity to be more realistic in research. I can now exploit different aspects of my work to enhance my institution's image through publications, for instance. Furthermore, I can now prepare scientific proposals even if I have yet to learn in that field to be more efficient.*

Trainee Questionnaire, open ended responses

It would in any case appear from the data in Chapter 3 that the volume of such training activity is a very small part of the overall portfolio of training and learning that is on offer from CGIAR Centers. Thus, the whole Methods category accounted for 10.7% of group trainee days, and about one third of this was devoted to statistics and experimental design,

areas in which experts in the subject matter (e.g. crop or animal scientists) are recognised to be more effective teachers than experts in statistics. (Table 3.5 and Annex VII). Also, most of the English teaching has been carried out by a single Center (Annex VIII). The corresponding figure for individual trainees was far lower (3.2% total trainee days devoted to Methods, Table 3.6), indicating that they were exposed to a very minor degree to possibly 'non-core' subjects. A very similar picture is given at a country level, taking Ecuador as an example, where it was estimated that at the most 4% of all training offered by CIMMYT and CIAT was in areas not covered directly by their mandates and that might be considered better delivered by other providers (see Country report, Table 2).

On the other hand there appears to be an extent to which Centers are driven to compensate for inadequate trainee preparation by remedial inputs outside the scope of their mandate. Field work in several of the countries visited drew specific attention to the deficiencies of basic and university education, and to the effect which this had on the initial levels of preparation of training applicants. Accordingly, for 67% of respondents to the Researchers Questionnaire 'Selecting trainees more carefully' is seen as an important way to improve efficiency and effectiveness of a Center's training and learning.

This is elaborated by researchers in open ended questions:

The level of the trainees is too low, they need to get a higher degree or go to a better school first. It is not (Center X) job to provide general training on statistics, data entry

There is a lack of control over selection (quality) of persons trained [which] can create to a large supervision burden with little return.

In some training activities there is a tendency to incorporate students that do not fit within course requirements. Some are there for political or institutional reasons.

These problems were encountered in both Latin America and Sub Saharan Africa. The Panel would also draw attention here to another aspect of candidate selection, which affects efficiency. Evidence in Chapter 5 showed that NARS' satisfaction with training is strongly related to how far it has been put to use afterwards and, as shown in Chapter 7, lack of post-training resources has been a widespread limitation. The problem is recognised by the Centers, but some of those visited were not comfortable with the prospect of assuming a stronger role in imposing criteria for candidate acceptance. The situation has improved somewhat with the insertion of training into research projects and since NARS have more commonly had to pay for the training received. Nevertheless, the Panel believes that this issue should be discussed frankly between Centers and NARS, and that the latter would welcome norms designed to safeguard their own investment in training by ensuring adequate post-training opportunities for their candidates. Such discussions might also form part of more general discussions with other donors who might be encouraged thereby to align their funding initiatives for capacity strengthening to NARI and NARS with CGIAR training and research plans. This would enhance the efficiency of the overall training process from the Centers' point of view, and perhaps also help reduce the levels of trainee 'wastage' described in this report.

Problems of trainee quality highlight broader problems of NARS capacity. These include the state of Universities, government's policy commitment to agriculture, the funding available to NARIs for operational costs - and the limited ability of Centers or indeed the CGIAR as a whole to address this scale of problems. Although many of these problems will have to be addressed by others e.g. donors, governments and universities, this also highlights the limits to what individual Centers can achieve on their own. This harks back to questions of inter-Center coordination, discussed earlier.

Discussions of where the Centers' comparative advantage for training lies, raises issues about whether other institutions are deemed to have comparable or superior capacity in what have hitherto been regarded as Centers' own 'core' areas. Clearly, the Centers' advantage changes as their research evolves, and other suppliers acquire new strengths. In this context, the 'devolution' of training activities to other suppliers, including the stronger NARS, is frequently called for. The Panel did not come across examples where this seems to have worked successfully. Rather, they were impressed by the case at Egerton College, Kenya, where despite extraordinary preparations by CIMMYT, collaborating donors and the College itself, the numbers of candidates for the production course have dwindled badly in recent years, not for lack of demand but for lack of funding. The causes are probably complex, as is the general issue of how far the stronger developing country institutions can successfully take on the support of weaker neighbours, or would be welcomed for doing so. In any case, the main onus would seem to be on the NARS themselves to ensure that their trainees are sent to the institutions most suited to their needs. Previous distortions which arose when training costs were covered completely by the Centers should now be largely removed. The most promising future strategy for efficient sharing of responsibilities would seem to be through the multipartite training partnerships, already in operation, where northern and southern institutions are linked with the Centers, and the work load shared efficiently according to the distinctive competence of each one.

## 6.5 Conclusions

The pre-requisites for the efficient management and delivery of training and learning are not in place in most Centers. It is therefore difficult to assess overall efficiency. There are many examples of 'good practice' but these are unevenly distributed. The most important deficits are inadequate pedagogic and coordination resources within most Centers and the absence of systematic financial and monitoring data. However it should be emphasised that the true efficiency of training and learning is its contribution to the effectiveness and take-up of research – rather than considering training in isolation.

Investment by the CGIAR in training and learning through formal and informal means continues to be high. Most training of whatever type is delivered by researchers many of whom although enthusiastic teachers, have limited pedagogic experience, whilst skills in teaching and learning, curriculum development and trainee follow-up have become scarce in most CGIAR Centers. Given the close integration of training and research it is inevitable that training and learning will continue to be an important and resource intensive activity in the CGIAR. In the past TUs have also contributed to planning and coordinating Center wide training activities, as well as to the retrieval and adaptation for widespread dissemination of

training materials. At present this does not happen consistently or widely enough in most Centers. The Panel takes the view that given the scale of resources deployed there is a need for more consistent coordination, backstopping, advice and support in all Centers.

The lack of coordination between Centers is also a problem especially in Africa. Synergies could be achieved if there was more inter-Center cooperation – but this would also depend on policies and resources within Centers (or in decentralized country programs) to be able to manage this effectively.

As previously noted (see Chapter 5 conclusions) the Panel does not favour the reintroduction of traditional TUs, it does take the view that both coordination and pedagogic support are needed in all Centers. This could be organised in various ways and will need to reflect the specific mandates of Centers and their decentralised in-country activities.

In some areas Centers have evidently adopted efficient practices. This would apply to the way training ‘products’ are usually turned into generalizable, ‘global’ goods thus achieving economies of scale in their production and use. There is also evidence that in response to changing funding levels and NARS needs and priorities, Centers have re-allocated resources between types of training, countries and themes. However given the unevenness in joint planning and needs analysis with NARS the Panel is not confident that these reallocations are always planned in the most strategic fashion. There is also room for clear exchanges with the NARS on the issue of candidate selection and likely subsequent deployment, to ensure that they not only come with suitable pre-training preparation was also with adequate possibilities of putting their training to use afterwards.

In general the Panel is confident that the overwhelming part of training and learning is covered by Center mandates – ‘they do what they do best’. Exceptions can usually be justified in terms of particular circumstances. However there is a proportion of non-research related training activity, for which this is not so, for example where Centers try to cover resource shortages in NARS out of project funds that cannot be sustained or where trainees without adequate preparation are selected. These instances point to more generic capacity issues than Centers and their training programs can address single handed and raise questions not only of coordination among Centers but also of coordination with other stakeholders, especially governments, donors and universities.

## 7 EFFECTIVENESS: OUTCOMES AND IMPACTS OF TRAINING AND LEARNING

This chapter begins by clarifying the way the Panel defined effectiveness and linked notions of outcome and impact. It then discusses aggregate responses from questionnaire data and important regional differences in context or 'scenario'. Country studies are then discussed allowing for a more detailed consideration of key issues - including: CGIAR investment in capacity strengthening in NARI; continuity in CGIAR interventions within the 'project' mode of funding; the apparent preconditions for success; and the sustainability of outcomes and impacts. This is followed by overall conclusions.

### 7.1 Understanding 'effectiveness', outcomes and impacts

As in other parts of this study, the Panel faced choices of definition with regards to effectiveness and the related concepts of outputs, outcomes and impacts. In general the Panel has followed conventional definitions. Effectiveness is usually defined in terms of the achievement of objectives; and outputs, outcomes and impacts are intended to capture the shorter, medium and longer term aspects of results. However the nature of this domain still leaves open scope for different or specific interpretations. In particular the Panel considered:

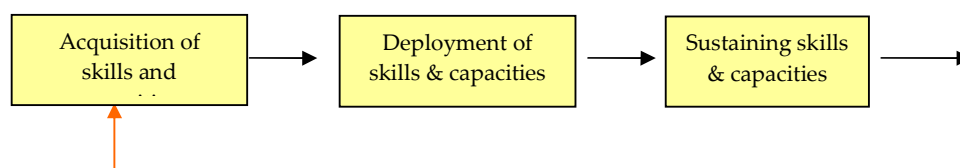
- The parameters of 'effectiveness' in capacity strengthening;
- Criteria for judging outcomes and impacts;
- What sustainability means; and,
- Effects of the wider context.

#### *The parameters of 'effectiveness' in capacity strengthening*

Capacity resulting from training and learning is frequently understood within CGIAR as individual skilling or education, largely within a human capital framework. The Panel starting from a capacity strengthening standpoint has adopted a broader view. Thus it has examined how far acquired skills and capacities are actually used as well as acquired. It has also looked beyond individual advancement, focusing where possible on organisational benefits and the benefits of networks and inter-organisational linkage – and how far these have been sustained.

Effectiveness in terms of capacity strengthening has been regarded as a 3 stage process:

**Figure 7.1 Effectiveness of capacity strengthening**



The feedback loop in the above figure is important because it highlights the consequences of not sustaining skills and capacities once acquired. Instead of building on previous training investments, a Center can find itself simply replacing and gap filling the basic skill set of a new generation of scientists. This is explored in this chapter in terms of different regional contexts or 'scenarios'. It is only possible to judge the effectiveness of Center training by



recognising that contexts differ and shape what is possible to expect from apparently similar inputs.

*Criteria for judging outcomes and impacts: synergies and trade-offs*

Capacity is intended for a purpose. Both Centers and NARS expect that enhanced capacity will encourage research that improves agricultural performance and raises the income of farmers, whilst usually increasing national income and competitiveness and often reducing risks of environmental depredation. Outcomes and ‘impacts’ have therefore been assessed at several levels: individual, institutional and in terms of wider agricultural and socio-economic goals. The Panel has similarly tried to keep in mind two sets of (presumably) linked criteria: the benefits to NARS, farmers and Countries and the benefits for Center research, its take-up and further development. Even if not all training and learning will fully and equally exemplify both sets of criteria, the synergies and trade-offs of each have been kept in mind.

*Defining ‘sustainability’*

Outcomes and impacts highlight the dimension of sustainability or duration. Especially in a project funded setting ‘success’ can easily be treated as a snapshot at the end of a project cycle, irrespective of what happens subsequently. As has already been noted one of the possible downsides of funding training and other capacity strengthening actions out of project funds is that outcomes and results are not sustainable. However the meaning of sustainability is not always straightforward. It can be interpreted as continuity of what has been achieved, but it can also be interpreted as a more diverse set of outcomes left behind by a particular project in which training or learning measures were an important part. The Panel has chosen to take this more diversified interpretation of sustainability – including follow-on and spin-off outcomes as well as end of project results. The findings of case-studies in particular support this stance.

*Effects of the wider ‘context’*

Fieldwork and data-gathering in the NARES emphasises the reality that the CGIAR is always operating within a wider context. For example a Center is only one actor among many in developing countries. Objectives, purposes and intentions related to NARES capacity are shared among many stakeholders and little can be achieved without stakeholders working together. Outcomes and impacts are therefore not the result of what Centers do alone. Although the Panel has selected cases and countries where the CGIAR has invested heavily in training and learning or where training and learning appeared to be critical inputs, fieldwork has demonstrated that it is often wiser to speak of the ‘contribution’ that Centers have made rather than to seek to attribute results to Centers alone. This is especially so in much NRM/systems research, where there are many collaborators and the issue is not so much outcome/impact at the personal or institutional level, as what they have achieved between all of those involved. Second the wider context focuses attention on a wider set of contextual factors that make ‘success’ more likely. These include not only stakeholders but also previous investments, government policies, donor priorities, local leadership, university quality, international competition and public sector reform – to name just a few.

## 7.2 Regional 'scenarios' and aggregate responses

In general the three regions within which the Panel has concentrated its NARS-specific efforts appear to exemplify quite different contexts or 'scenarios'. These might be characterised as:

- *Unstable*: Some countries in Latin America and SSA have been subject to considerable political, and institutional, instability which has affected the deployment and sustainability of CGIAR investments in training as well as the possibility of establishing and sustaining partnerships. Even when individual skills exist, NARS capacity is unevenly distributed and fragile.
- *Under-resourced*: Sub Saharan Africa has been affected by poverty, structural-adjustment policies, limiting public investment, limited private sector resources and the consequences of Malaria and HIV/AIDS. There is some similarity here with conditions in parts of LAC – represented by Bolivia in this study. CGIAR Centers have often found themselves replacing previous training investments and existing skills have often been under-utilised. In some countries NARES are often too under-resourced to define their own priorities or support partnerships.
- *Rapidly developing*: In Asia and in this study notably in the Greater Mekong Basin sub-region there has been – and continues to be – rapid development in the agricultural sector and in the application of agricultural research. NARS capacity has strengthened and national institutes, universities and the private sector have taken over many research and training functions previously the province of the CGIAR. Partnerships with CGIAR Centers are strong and research agendas are self determined.

These scenarios are not completely self-contained. Structural adjustment policies have affected Latin America as well as Africa – and there is considerable overlap between the conditions in poorer LAC and SSA countries. Nonetheless it is also true that in LAC there were within living memory stronger NARS than now exist, whereas in parts of SSA this has not been so. The consequences of these 'scenarios' are easily masked by aggregate survey results, but become clearer in more detailed case-studies. However there are a number of aggregate indicators of these different scenarios. These include:

- *Institutional stability*: in Bolivia there is no national agricultural research institute since IBTA was abolished in 1998. In Ecuador the Ministry of Agriculture and Livestock's extension service was closed some 15 years ago and INIAP has faced funding and institutional problems (see Ecuador and Bolivia Country Overviews). Malawi with acute resource constraints has also faced great institutional difficulties.
- *Agricultural GDP R&D levels* are often low: Ecuador 0.26%; Malawi 0.75%; Thailand 1.40%.
- *Labour turnover*, the potential 'wastage' of skills varies across NARS and NARI, as the following suggest: Kasasart University - moderate<sup>25</sup>; Thai Department of Agriculture –

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<sup>25</sup> Figures, available in case study reports, are based on different sub-sets of staff, different periods of time and different ways of measuring turnover. These are therefore estimates backed up by reasonably sound indicative data.

low; Bolivia PROINPA – low; Ecuador INIAP – high; Cuu Long Rice Research (Vietnam) – low.

At an aggregate level respondents to the ex-trainee Questionnaire Survey are overwhelmingly positive about the benefits that have followed from CGIAR training. Many positive outcomes at a personal level and institutional level, though not all, were rated as ‘important’ or ‘very important’ results of training received. The same was true of questions pertaining to wider CGIAR Goals, which were all rated as important or very important in enabling respondents to contribute to broader CGIAR objectives.

**Table 7.1 Trainee survey: questions 8, 9 and 10**

<b>Results in terms of personal, institutional and broader goals</b>	
	<i>Important/Very Important (%)</i>
<i>Which of the following resulted from your training at personal level?</i>	
Taking on new tasks with higher responsibility	64
Increased ability in research priority setting and problem orientation	73
More research output (innovations, publications) from your work	58
Increased participation in collaborative research activities	63
Encouraged to undertake further training and education	43
Increased skills in project planning & fund raising	49
<i>How important was your training in enabling you to contribute to changes at the level of your institution?</i>	
Incorporation into research networks	45
Improved priority setting	56
New inter institutional linkages	49
Better access to information	55
Funding new projects	41
Better access to information	56
<i>How important was your CGIAR learning experience to enable you to contribute to the following broader objectives</i>	
New scientific knowledge	75
New attitudes and technologies	78
Farmers/consumers benefited	62

It is noteworthy, however, that trainees did *not* see as an important result of training ‘finding a new job outside of your country’ although such trainees may well not have responded to this survey. It can be argued that respondents to questionnaires were likely to be positively disposed towards the training and learning they had experienced, however other sources of information (e.g. NARS interviews) confirm these responses as representative of those CGIAR alumni who have remained within their national agricultural research system. For many ex-trainees the outcomes of training are seen as positive, key events in their professional lives and a door opening to an international research career.

Nonetheless there are important regional differences which further illustrate the different scenarios encountered. Trainee respondents were divided into those who were consistently (over many items) positive in their responses when rating outcomes and those who were either negative or at least not positive. This was done for assessments of personal outcomes,

institutional outcomes and in terms of outcomes about contributing to broader CGIAR goals (new scientific knowledge, farmers benefited etc). The results are summarised below.

**Table 7.2 Trainee perceptions of training outcomes**

	Personal Benefit (%)*		Institutional Capacity (%)		Wider Goals (%)	
	Negatives	Positives	Negatives	Positives	Negatives	Positives
<b>APO (N = 78)</b>	37	63	32	68	35	65
<b>LAC (N = 159)</b>	39	61	48	52	31	69
<b>SSA (N = 108)</b>	60	39	56	44	49	51
<b>Other (N =10)</b>	30	70	30	70	40	60
<b>Significance Chi Square</b>	.002 level		.007 level		.023	

\*All percentages are of regional responses

The results show a hierarchy of judged effectiveness with APO coming ahead of LAC which is in turn ahead of SSA in both personal and institutional benefits, even in terms of contribution to wider goals SSA lags behind the other two regions. These results are statistically significant.

‘Tracking-studies’ were undertaken at institutional level and country levels as part of NARS fieldwork. One stream of activity was directed at NARI in order to establish what input CGIAR trainees had made both at leadership levels and more generally. In terms of leadership:

- In Ecuador INIAP, the national institution responsible for agricultural research and extension has had approximately 400 training ‘inputs’ from CGIAR Centers. INIAP’s Director General, 6 of the institute’s 10 Directors, 17 of 28 Heads of Program, and 13 Heads of Department/Units are CGIAR trainees.
- In Bolivia PROINPA<sup>26</sup>, the General Manager and 7 of the 9 Heads of Units/Regions/Scientific Programs are CGIAR alumni.
- In Vietnam, VASI (Vietnam Agricultural Science Institute) 48 out of the complement of approximately 480 scientists have been trained by CGIAR. Of these 18 are in senior positions including the Deputy Director General, the Vice Directors for Plant Genetic Resources, Root Crops and Hybrid Rice, Acting Director Legume R&D and the Head of Biotechnology.
- In Thailand, Department of Agriculture, (Ministry of Agriculture) 48 staff were trained by the CGIAR. Of those with degrees or postgraduate degrees (33 individuals) 24 remain with the department, many as Heads of Departments or Deputy Directors of research areas.

<sup>26</sup> PROINPA Foundation is a Bolivian non-profit organization oriented to promote technology innovation and the conservation, use, management, and development of genetic resources

Similar findings as to the leadership roles of Center trainees have been cited in other studies of training outcomes<sup>27</sup>.

National context is extremely important for sustainability however, as was suggested earlier. In Thailand a relatively stable and rapidly developing country with a well developed NARS, 249 out of 541 names from a list of CGIAR ex-trainees (1995-2000) were tracked. Of these:

- 148 were found to be still working in the same field in the same organisation;
- 40 were found to have retired or died whilst in the same organisation.

Thus 75% of those tracked had remained in employment in the organisation where they were based when trained.

The picture is not uniformly positive however:

- In Bolivia which has undergone political and institutional instability over the last decade, many of those trained by Centers are no longer working in agricultural research – for example 12 of the 18 scientists trained by CIAT in one research station are no longer in post and over a third of those trained in participatory research in Bolivia are reported to be no longer utilising their skills.
- In many SSA countries (exemplified most obviously in this study's NARS by Malawi) the combined effects of poverty and structural adjustment policies have constrained the ability of governments to invest in agricultural research. Together with the effects of HIV/AIDS this has undermined both the deployment of acquired skills and capacities and their sustainability.

The aggregate results are somewhere between these positive and negative examples. Among ex-trainees responding to the Questionnaire Survey, 55.7% reported that they continued to work in the same organisation as before. This result would obviously be biased upwards because fewer of those who had left would have been contacted.

It was previously noted that dissatisfaction with training is greatest among those ex-trainees who report they have had too few opportunities to use the knowledge and skills what they have acquired. This was probed further in the Trainees Questionnaire Survey. The most prominent explanations for the non use of skills were resource related. Of those responding:

- 19.5% referred to lack of operational resources;
- 21.9% referred to lack of resources to support networking with relevant scientific community;
- 19.6% referred to lack of facilities and equipment (e.g., computers, lab facilities).

Further analysis indicates a regional effect here also: resource problems are most likely in SSA and (to a lesser extent) LAC than in Asia. Statistically there are significant differences between regions in terms of using what has been learned with 'no problems'. This is more likely to be the case in Asia and Latin America than in SSA.

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<sup>27</sup> See for example Richmond et al.1998, In depth review of IPGRI's Documentation and Information on Training Activities; and Raab et al.1999, The Impact of IRRI's Training Program: A different perspective.

### 7.3 Partners, training and 'results'

A particular and important result of training is the ongoing professional links that are established between NARS scientists and CGIAR centers. Ex-trainees were asked about the kind of contacts maintained with Centers where they had obtained training and education.

**Table 7.3 Type of contacts with CGIAR centers and scientists**

Ongoing contacts maintained with Center (N=251)		
Maintained ongoing professional links with one or more Center scientist	209	(52.1%)
Undertaken collaborative research with the Center	131	(32.7%)
Undertaken a further course with this or another international Center	61	(15.2%)

The overlap between 'trainees' and 'partners' is evident when talking to CGIAR Center-based researchers and senior managers. For some indeed the purpose of training and education is to recruit partners whilst for many researchers trainees are recruited from the ranks of those who are already partners. This is borne out by responses to the Partners Survey, which confirms the high proportion of partners who undertake training or obtain degrees in the course of collaboration with the CGIAR. An equally striking feature of the partners' responses is the importance they attribute to informal training within a partnership.

It is reasonable to assume that the growth in informal training and learning within Centers is associated with the growth in partnerships and networks often themselves involving upscaling, 'adaptive' research and multiplier effects that engage with extension and education systems as well as with policy actors. The importance attributed to informal training is also consistent with other evaluations undertaken for centers. For example an impact study of ILRI's graduate fellows program (previously cited) reported that 'working with others' was considered by far the most important source of scientific knowledge for trainees.

Partners capable of participating in collaborative research are one of the most important 'legacies' of CGIAR training and learning activities. The goodwill towards Centers that result from this relationship is striking in countries visited. Ex-trainees – especially because of the senior positions they often occupy are willing to open up research opportunities, insert Center priorities into their own professional circles and perform a host of collegiate roles – from meeting visiting scientists at airports to being positively disposed to joint funding applications. A note of caution, however, is in order. The reduction in degree training in some countries (e.g. Vietnam and Thailand) and associated funding opportunities since 1995 means that in some countries CGIAR alumni are ageing and often approaching retirement. It was widely recognised that the CGIAR no longer offers 'free' training nor subsidies or grants to the NARS to anything like the extent it once did. One partner even anticipated having to pay for germplasm in the future. As a result the CGIAR may no longer be looked upon as frequently as the obvious partners for collaborative research, and some evidence was found in the field studies that in some instances Centers are now perceived more as competitors for funding than as partners. This may have consequences for the future resources available to the CGIAR for networking and collaborative research, and ultimately

for its capacity to leverage large scale research, from what is often a relatively modest research budget.

Partner organisations include universities, NARI, regional and sub-regional bodies, NGOs/CSOs, agricultural extension and farmers’ organisations. Capacity strengthening can therefore take many different forms. Partner respondents were asked to identify the main changes that resulted in their organisation from training and education.

**Table 7.4 Partner survey: question 14**

<b>Main changes for partners’ organisations (N=148) percentage (%) responses</b>			
	<b>no change</b>	<b>some change</b>	<b>great change</b>
New organisational skills and competencies have been acquired	10.4	54.5	35.1
New priorities have been formulated	20.6	48.1	31.3
Organization’s resources are now allocated differently	42.9	48.7	8.4
Enhanced role in networks	11.7	52.3	35.9
Enhanced inter-institutional linkages	6.1	52.3	41.7

It is noteworthy that although changes at an intermediate level (‘some change’) are reported in all categories, the strongest changes appear to be in relation to networks – enhanced inter-institutional linkages – and the weakest in the extent to which there have been changes in how partner organisations’ resources are allocated.

Partners were also asked to identify ‘the main changes for the take-up and outcomes of research’. Here also changes were reported under all the main categories offered:

- New research networks have been established;
- Knowledge and techniques are now more widely available;
- Knowledge that was not previously applied is now being applied;
- Knowledge has been adapted to specific settings, farm systems and eco-regions;
- Farmers and farmer organisations now understand more about uses of research;
- New research priorities have been identified by scientists/ researchers that take into account a multi-stakeholder perspective;
- Scientists/ researchers now better understand the problems of application/ implementation;
- New courses and/or curricula have been established;
- New research-friendly policies, regulations and standards have been established;
- Existing networks are more effective.

Again caution is needed in accepting such consistently positive data without qualifications but at the same time these results are in agreement with other sources such as case study material and interviews in NARI.

The difficulty in interpreting these responses stems from the difficulties distinguishing training and research inputs in terms of their relative effects. An explicit question was therefore asked to attempt to disentangle reported effects, i.e.: ‘How important is training for

sustaining the outcomes from this project and enhancing outcomes from subsequent projects?’

**Table 7.5 Partner survey: question 21**

<b>Relative importance of training (N=140)</b>	
Most outcomes are not possible without associated training activities	62 (36.5%)
Most outcomes can be attributed to collaborative research	69 (40.6%)
Difficult to disentangle training/learning from research outcomes	39 (22.9%)

This table suggests that at the very least in the view of a sample of partners, training makes a significant contribution to the positive outcomes that partner organisations experience. Again the conclusion that training makes a contribution to Center outcomes and impacts has been addressed in other studies. However this appears to be the only study that has asked partners to make this judgement for themselves.

#### **7.4 Country overviews and case studies**

Country overviews in seven countries together with specific studies allow for a more complex and multidimensional representation of the outcomes and impacts of CGIAR training and learning. Cases incorporate different elements of the NARS including:

- **NARI:** E.g. Cuu Long Delta Rice Institute Vietnam; INIAP and FORTIPAPA Ecuador; IRAD Cameroon; PROINPA Bolivia; Department of Agricultural Extension Thailand.
- **Universities:** E.g. Egerton University Kenya; Universidad Autonoma Gabriel Rene Moreno Bolivia; University of Dschang Cameroon; Chiang Mai University Thailand.
- **Local authorities and other public authorities:** E.g. 9 districts within Tien Giang Province Vietnam; Royal Forest Department Thailand.
- **Networks:** E.g. CIAT’s International Tropical Pastures network; IRRI’s Irrigated Rice Research Consortium.
- **Farmers & extension organisations:** E.g. Department of Agricultural Extension Thailand; Extension Services in Mekong Delta Vietnam; Local research committees (CIALs) Ecuador; Union of producer/processor associations Ecuador.

A summary table of cases and their characteristics is annexed to this report (See Annex IX). Cases were not selected solely to demonstrate success, but rather the conditions that lead or do not lead to outcomes and impacts.

The following general messages are supported by these Country based studies:

- In many of the traditional projects where training is significant, i.e., germplasm+new variety development+participatory breeding+extension work with farmers – there are significant and measurable increases in productivity, production, income and other benefits to farmers.
- Similarly positive results can be demonstrated in IPM and NRM type initiatives where training and learning woven into the systematic use of research findings, further research, controlled experiments, farm-based trials and farmer participatory extension



work can lead to cost reductions, effective strategies for managing plant disease and improvements in living standards for poor farmers.

- The volumes of training in NARI have been large scale and effective. Many leadership roles are occupied by CGIAR alumni. Past investments by Centers in training in NARI can be shown to have led to enhanced capacity to undertake research, changing the role and relationship of the CGIAR Center to that of colleague and peer – making joint applications to funders rather than providing funding - and opening up new research opportunities for both Center and NARI.
- Many apparently 'local' or 'national' training and learning projects build on Center experience elsewhere transferring and adapting previous innovations and setting up methods and models that are themselves transferred and adapted – e.g. between LAC and Asia in Cassava production or across Asia in the case of a rice drum-seeder.
- Training investments in Universities include examples of effective and less effective capacity strengthening. Different levels of success can be understood partly in terms of factors that have little to do with the quality of Center inputs, including national education policy, university leadership and funding availability. Changes in teaching style/methods and changing methods of selecting students can be especially difficult to achieve – more so than defining new curricula. How funds and training resources are invested is also important if vulnerable (i.e. non sustainable) 'enclaves' are not to be created.
- The CGIAR evidently faces distinctive problems in Sub-Saharan Africa, where in some countries past investments in capacity have not been sustained and NARS are weak. Whilst these problems are not within the CGIAR's sole mandate, it is seen by national/regional stakeholders as having a role, together with others. There seems to be relatively little integration of efforts among the various implicated actors – and often little coordination between CGIAR Centers themselves.
- Sustaining training inputs over extended periods of time seems to be important for continuity and sustainability. Many successful interventions can be traced back 10 or 15 years, to earlier networks, programs or initiatives. Changes in funding and in national or local or institutional policies can undermine apparently successful initiatives.
- One capacity result that can be found in a number of cases is policy learning by a NARI (INIAP in Ecuador, MARD in Vietnam) - 'this is seen as the model of for achieving sustainable agriculture in Vietnam' - or government ministry (Ministry of Natural resources and Environment Thailand).
- Decisions about priorities in a country or region are made for reasons and according to criteria that relate to the mandates, resources and priorities of particular Centers with little system-wide overview that might suggest handover to or mobilisation of another Center. (For example there may no longer be a need to enhance capacity in plant breeding or NRM but policy and economic or market issues may still be considered urgent.)
- The shift to in-country training and learning has increased the importance of informal and innovative teaching and learning methods. There appear to be few resources available to support or develop or systematise innovative learning approaches.
- There is a strong commitment in many Centers to training, capacity development, working with national stakeholders and piloting innovation at a national and regional level. In the words of one senior Center manager: 'Global public goods rest on the capacities of countries to access and utilize them, otherwise they are not global public

goods.’ At the same time there are many results of CGIAR innovation that begin their life as mainly relevant to a particular national or regional setting and through dissemination and adaptation usually involving training and participatory approaches become ‘global’ at the next stage.

### *What country studies confirmed and challenged*

Field visits to NARS generally came after much preparatory work. It therefore provided an opportunity to cross-check ideas and sometimes propositions that emerged from Center visits, early questionnaire returns, pilot investigations and reviews of documentary sources.

Many initial impressions were confirmed by these case studies. For example:

- The difficulty of disentangling training from research. Three configurations were evident: 1) training in order to prepare to undertake research (This would apply to most of the NARI strengthening examples – e.g. Bolivia case 1 Participatory research in PROINPA or VASI see Vietnam national report); 2) training in order to use available research knowledge or adapt what is known to local circumstances (See Ecuador Case 2 Cassava processing); 3) training as part of an ongoing research project (See Thailand Case 1 Participatory mapping).
- The growth of in-country training and learning. The panel encountered training activities of which there was little detail available in HQ and certainly the volume and types of training and learning were unknown. The reduction in HQ located training courses was also noted by interviewees. (See Thailand Case 2 Integrated Cassava Cropping.)
- There was a stand-alone character of some project based and associated training and learning in-country. Training and informal learning events were entirely the responsibility of dedicated researchers. There was an absence of pedagogic backup, even though in some cases there might be a ‘framework’ or ‘guidelines’ available.
- The prevalence of informal learning and mixes of different training types tailored to particular problems and projects. (See for example Bolivia Case 2 Bean production and Case 1 Participatory research.) Starting from training types conveys very little of the way a mix of different training and learning modes interact and reinforce each other in situ.
- How relatively small beginnings – often when a key individual attends a conference or training course – can lead to major changes in capacity and priorities. (See for example Bolivia Case 2 Bean Production; and Vietnam Case 3, Enhancing gender equality.)
- The weakness of NARS in some countries and the consequence of not having needs-analyses and clear priorities coming from the NARS. (See for example Ecuador Case 1 and Malawi and Cameroon national reports). In circumstances where the NARS voice is weak, the availability of external research funds backing up Center priorities start to become pre-eminent in determining research with knock-on effects for capacity strengthening, which are usually asymmetrical – more likely to involve teaching in didactic mode than peer learning.
- The very different kinds of relationships that evolve once a NARS begins to achieve a degree of capacity and resource. Under these circumstances there is an increased importance of networks, peer learning and collaboration among ‘professional equals’<sup>28</sup>.

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<sup>28</sup> This and other examples of what happens among weaker NARS are consistent with the framework for diversified framework for training and learning described in Chapter 2 (section 2.3).

(See for example Thailand national report re. Kasetsart University and Vietnam national report re. VASI).

On the other hand some propositions were challenged and there were many new lessons coming from cases of NARS including of NARS partners and specific projects. New understandings emerged for example with regard to:

- The scale of CGIAR investment in capacity strengthening;
- Continuity and the long term nature of many interventions;
- Preconditions for success beyond the control of Centers;
- Sustainability of outcomes.

#### *Scale of CGIAR investments in capacity strengthening*

The Panel encountered many NARI in which the scale and persistence of CGIAR investments in capacity strengthening was strong. These activities fell into three main categories:

##### *Capacity strengthening at or near start up*

- For example IRRI's commitment to Cuu Long Rice Research Institute in the Mekong Delta in the 1980s and early 1990s; and its more recent work with the emergent NARI (NAFRI) in Laos would be examples where a Center has made a critical difference and influenced research agendas, ways of working and openness to international research networks at a critical stage.

##### *Specific capacity interventions*

- For example CIAT project to develop Monitoring and Evaluation capacity in KARI Kenya (Kenya Case 1) and CIAT's investments in participatory research in LAC – see Bolivia Case 2 and Ecuador Case 2. The contribution of several Centers to the stabilisation of Bunda College in Malawi, within an otherwise very fragile NARS.

##### *Crisis interventions*

- In some cases Centers have taken a leadership role when a NARS was in crisis or close to collapse. The best documented example is PROINPA Foundation – see Bolivia case 3 – where CIP played a fundamental role in leadership, training and learning over an extended period, with cooperation from ISNAR at the early stages.

The scale of these investments and their strategic importance cannot be overstated. It is arguable that in some cases they went beyond the research mandates of the Centers concerned and focussed mainly on the capacity needs of the NARS. However in the Panel's view these interventions can be justified because they have created or preserved an infrastructure capable of undertaking future research and sustained partners in key countries with which Centers can subsequently expand their collaborative research.

#### *Continuity and the long term nature of many interventions*

From an HQ perspective it can seem that projects are short term and hence liable to undermine long term capacity building by reason of their funding. On the ground this appears *not* to have been the case in many instances. Exceptionally projects can be long term when donors have a long term perspective – this would be the case with Swiss Development

Corporation's commitment to projects in both Latin America and SSA and Rockefeller Foundation's long term commitment to CGIAR cooperation in SSA. Projects can also be 'follow-ons' from predecessor projects (the case with ICRAF projects in Thailand). In part this degree of continuity can be explained by some donor policies; in part it can be explained by the kind of project profile that appeals to any donor which includes a baseline of experience, data and personnel.

In addition the continuity that the Panel encountered can also be explained by the personal longevity in region of key individuals whose personal networks and detailed on-the-ground knowledge enables them to successfully leverage project funding. This was the case for CIAT and ICRAF in the greater Mekong Basin countries. This raises the question about how the Centers maintain and re-create these kinds of strong local and regional networks in the future.

#### *Preconditions for success beyond the control of Centers*

As was noted previously the factors for success and failure are often outside the control of a Center. Preconditions for success noted in cases include:

- Long term reform in NARI that prepared the ground for a particular intervention (e.g. KARI case in Kenya);
- National or institutional leadership responsive and able to work in partnership (e.g. PROINPA in Bolivia);
- A commitment to participatory methods that is written in to the Constitution in Thailand making it necessary to follow participatory practice – including training and learning - with farmers in all agricultural research and extension work in that country;
- Strong and committed partners whether Universities, NGOs or governments, able to support Centers, attract funds or take-over what has been initiated (See for example Universities in Thailand and various NARI in Vietnam).

Whilst these success factors are outside Centers' control they do suggest criteria for future investments in capacity strengthening and training and learning. On the other hand there are also factors that have undermined Centers' investments that are also outside their control. The most obvious example of this among this study's cases is Ecuador Case 2 (Cassava Processing) which involved a major effort by CIAT in post harvest technologies and processing and which failed after a period of apparent great success. In this case market competition (from Thailand), funding withdrawal, natural disasters all reinforced quality problems and virtually destroyed 17 processor associations and the industry they supported. On the other hand as is noted below the temporary success of this project has not entirely disappeared.

#### *Sustainability of outcomes*

Despite the continuity of many projects and the continued commitment of many donors and stakeholders it remains true that some projects end often for good reasons - they were intended to support a specific research project which was completed. It is also the case that other projects fail in terms of their initial objectives or expectations. This raises legitimate questions about the contribution that these interventions make to capacity strengthening whether at individual, institutional or broader levels.

Evidence suggests that it is too narrow a view of sustainability, to conceive it solely as continuity in the same form of a specific initiative or project. From NARS based cases it is possible to identify a variety of ways in which training and learning investments linked with research and other capacity strengthening activities have been sustained. These include:

- *Policy leverage*: where the project ends but lessons learned are taken up at a policy level and influence policy innovation. (See case of ILRI smallholders project in Kenya and Agroforestry in Thailand);
- *Institutionalisation*: where an institution becomes established and transforms itself by taking on new mandates and roles. (See PROINPA in Bolivia);
- *'Spill over'*: Where a single person who received training, mentoring and support can become the initiator of a significant institutional change process (See Gender equality in CLRRI);
- *Replication*: where training and learning and joint research enables a partner to replicate a similar project on its own (See Universities in Thailand);
- *Empowerment*: where the experience of involvement in an initiative even if its initial success is not sustained can enthuse and empower individuals – perhaps to work in the agricultural sector or to embark on longer term education and become initiators or leaders in subsequent agricultural innovations. (See Cassava processing – APPY's – in Ecuador.

On this basis the outcomes and impacts of Center efforts to undertake research and training in ways that strengthens capacity in the NARS can be shown to have a far greater impact than might at first occur.

## 7.5 Conclusions

The Panel has found strong and consistent evidence of the effectiveness of CGIAR investments in training and learning - often but not always linked closely with research – in strengthening capacity in the NARS. Country based studies in 7 countries and across LAC, APO and SSA have confirmed impacts for individuals and institutions. The scale of investments in NARI has been considerable as have been the results. Many of the leaders of national research in agriculture are Center graduates and the agricultural research agendas of NARI, government ministries and other NARS partners have been shaped by Center inputs. In particular CGIAR centers have contributed to the internationalisation of research – linking even fragile NARS partners to international scientific agendas.

Results of these capacity strengthening initiatives have included modernising and strengthening NARIs, generating new scientific knowledge, transfer of existing technologies, the introduction of new crop variants, more effective means of crop protection, sustainable agricultural practices, increases in farmers' income and increases in productivity and competitiveness of exports. There are positive results in outcomes and impacts.

Country studies and surveys of NARS partners have confirmed the difficulty of separating out training and learning from research and indeed germplasm distribution. However the majority of partners who responded to questionnaires and many of those interviewed face to face confirmed that training was a significant contributor to positive outcomes in collaborative research projects. These country studies have also confirmed the growing

importance of informal training and learning alongside formal courses. However as previously discussed many of these efforts are without pedagogic backup or quality assurance procedures.

Country studies have highlighted the problems that NARS are prioritising and which set the parameters for many of the interventions and projects in which current training and learning activities are embedded. These research challenges are often post production, market related, concerned with environmental problems including drought, seek to work in less favourable environments with poor farmers and confront policy and regulatory constraints. Given that many current projects focus on policy development and markets and work with extension and farmers' organisation, the prevalence of participatory learning approaches and ways of managing policy dialogues is also understandable.

Contextual factors outside the control of the CGIAR present clear limits to the effectiveness of its contributions to capacity strengthening. Regional differences were evident in terms of the likelihood of ex-trainees being able to use what they have learned, a problem often associated with lack of resource – and most strikingly so in SSA. Institutional instability was also a strong feature of the poorer countries of LAC – Bolivia and Ecuador – included in the study. However the success and contribution of CGIAR inputs have been striking even in the most adverse conditions, especially when working with innovative local partners and committed donors. The sustainability of the results of past investments in training and learning increases considerably when account is taken of a broader set of 'results' that go beyond intentions and objectives. Many projects that have apparently failed have left behind a large footprint and many investments in training and learning have had unintended but with hindsight foreseeable positive consequences for NARS.

The serious problems faced by countries where NARS are weak and where Centers in isolation can only expect to have limited impacts, highlight the need for innovative approaches to capacity strengthening. These will need to better integrate training and learning with other capacity strengthening measures and coordinate the plans of more than one Center together with those of other key stakeholders – NARS partners, donors, governments, and universities.



## 8 CONCLUSIONS

### *Commitment of the CGIAR to training*

There are different views within the CGIAR as to the priority that ought to be given to training and capacity strengthening. However, in practice Centers demonstrate a strong commitment to both activities. Training and more widely learning are viewed by the Centers as essential but not sufficient components of NARS capacity strengthening. Training is regarded as an indispensable element of Centers' research, not a sideline or by-product. It helps refine and execute their research program as well as encouraging the dissemination and take-up of results. It is one of the principal means of establishing and strengthening research partnerships: an 'investment in cooperation'. There is a perception both in parts of the NARS and in some Centers that training, learning and capacity development are not always valued within the CGIAR. The Panel has concluded that when training and learning is conducted within the context of collaborative research, is consistent with the research mandate of Centers and is prioritised in consultation with NARS, it merits support, funding and encouragement.

### *Characteristics of CGIAR training*

Training covers a wide range of activities, from formal courses to the informal learning which takes place, often during collaborative research. The differentiation of NARS – some of which have matured and developed new capacities while other have not – and the constant cycle of scientific innovation has reinforced the emergence of new pedagogic modes, settings and forms of delivery in which Centers support learning. This can be in courses or in degrees or in other recognizably educational setting. But they can also take place in a host of informal settings as in work experience, peer learning, networks or policy dialogues. There has also been an emergence of new types of informal and collaborative learning with new modes of instruction and delivery, many occurring in networks and among researchers who are peers. This has been reinforced by the proportion of current CGIAR research that focuses on markets and policy development working with extension and farmers' organisation, often using participatory learning approaches and on issues of regulation and policy development through policy dialogues.

An approximate typology of training and learning can be constructed which takes into account: training and learning strategies, learning modes and settings, learning objectives and who learns for what purpose. A typology based on course type, subject or whether directed at individuals or groups is not sufficient. One conclusion the Panel has reached is that appropriate strategies vary according to a number of contingencies including subject areas, institutions involved, pre-existing NARS capacity and broader policy and resource settings. It is not a case of 'one size fits all'.

### *Factors affecting training*

The three main sets of factors shaping the content and delivery of training in the CGIAR are: developments in the NARS; global concerns that have influenced policy and donor priorities; and funding arrangements in the CGIAR.



There has been an increasing differentiation between the NARS. New kinds of institutions, such as NGO's, farmers' organizations and the private sector, have joined them - some with little research experience. (Throughout this study the Panel has adopted a broad definition of the NARS to include NGOs, farmers' organisations, the private sector, universities, as well as NARI.) Some NARS have grown stronger and nowadays interact with the Centers as peers, while others have grown weaker and sometimes become less stable. This has widened the variety of subject areas and levels at which training has had to be provided, and created the need to retain some of the basic and remedial areas.

The Panel also concluded that a wide variety of additional factors have affected training in the last decade, from emerging issues of international concern such as the environment, sustainability and poverty reduction to developments in technology – all of which affect the content of training and learning as well as delivery modes.

However, the Panel concluded that the increase in project funding and the reduction in unrestricted funds available for training is probably the most important single factor which has affected the evolution of training in the CGIAR over the past decade. On balance, the Panel judged that the results of these cutbacks have been to lower the yield on the CGIAR's large investments in training and learning. The disadvantages of training within projects relate mainly to the effects on institutional strengthening: the difficulty of building a critical mass of scientists and multidisciplinary teams. Also, financing higher degree studies is more difficult when projects are of 2-3 year duration. Some of the weakest NARS, most in need of support, may be at a double disadvantage since they neither have the capacity to formulate fundable projects, nor to pay for training. The reduction in unrestricted funding has reduced pedagogic support to Center research staff. This has occurred precisely at a time when technological change opens up new possibilities for dissemination, but requires expert guidance in both the computational and educational aspects. At the same time, there has been a severe reduction in Centers' capacity to collect, adapt, translate and disseminate existing training materials in order to put them more widely at users' disposal, or to use training records for research and decision making. This is obscured by the fact that the fruits of such capacities in the past are still to be found at present.

The decentralization of training to researchers, which has resulted partly from the above trends, has increased the variability in all aspects of the activities, from needs assessment to data recording and quality monitoring/evaluation. The many cases of good practice encountered by the Panel are therefore not systematically applied. These trends have probably had a negative effect on the Centers' capacity for coordination, both across the System on matters related to training, as well as with other groups devoted to capacity building (e.g. information), or donors. Training in the regions has increased over the last 5 years at about half the Centers, and they estimate that over half of their training activities now take place outside headquarters. This has been of mixed benefit. It increases coverage at a lower cost and enriches trainers' knowledge of local conditions. But, on the other hand, trainees do not equate the special advantages of headquarters training with training outside, and most Centers have not yet extended to the regions new administrative systems to manage, monitor and quality assure what is being delivered.

### *Training records*

Records are incomplete and inconsistent in many Centers, and incompatible across the System. Particularly deficient are data from the regions (in-country training) and information on informal training is especially scarce. Records which do exist are generally not used for planning or evaluation purposes. Financial records are handled differently across the Centers, are not readily available for training and major discrepancies are encountered in the figures cited from different sources – e.g. Centers and at System level. The Panel concluded that the recording system (including financial systems) must be overhauled so that it facilitates decision making, both at Center and System levels. Its present state seems incompatible with the size of the System’s investment in training activities, and the importance attributed to training by the Centers themselves.

### *Trends in training types and themes*

Within the limitations of the records available, the main trends appear to include:

- a marked increase in group training carried out since 1990, due particularly to the activities of particular Centers and often involving large numbers of farmers and extension workers;
- stable numbers of individual trainees each year but, among these, a considerably increased proportion of higher degree students;
- an increase in shorter training periods for both group and individual trainees;
- somewhat higher numbers of trainees from SSA than from LAC and APO, and considerably more than from CWANA;
- high concentrations of trainees from host countries and about 12% from developed countries.

There have been drastic reductions in training in some of poorest countries (e.g. Malawi and Bolivia). The Panel concluded that there was no clear relation, on a country basis, between training intensity and poverty: certain countries, including some of the poorest have experienced a sharp reduction in training of all kinds.

Training ‘themes’ show changing patterns over time, though with differences between groups and individuals. While some areas (e.g. Social Sciences for group trainees, Biotechnology for individuals) have increased in importance, the traditionally strongest areas such as Crop Production, Breeding (group) and Crop Protection (individual) have not been seriously displaced. Training in Methods, which include themes sometimes considered beyond the Centers’ comparative advantage, has steadily accounted for about 10% of group trainees’ time, but for a very low proportion of time spent by individuals (3%). The data do not show very clear evidence of a discontinuation of training in specific areas, which could be suggestive of their ‘devolution’ to other suppliers over time, although this may explain the downward trends in Crop Protection (group) and Crop Production (individual).

### *Relevance*

The Panel found some differences in NARS’ (and other stakeholders’) criteria about and perceptions of the relevance of training to their needs. Training in most Centers is closely defined by their research programs. In so far as the research agendas are set in consultation

with the NARS, training is relevant to that part of the NARS' agenda which they share with the Centers. The Panel considers this a legitimate definition of the Centers' role, and that the Centers cannot themselves be expected to address the NARS' wider training or capacity building needs. To do so would extend training activities beyond their comparative advantage. However this does not mean that they do not have a contribution to make through joint efforts with other partners, donors, universities and the private sector. In practice, the degree of consultation on the research/training agenda varies between projects within Centers, as well as between Centers. But the Panel also concluded that the process is complicated in some cases by inadequate articulation of research and training needs on the part of the NARS, often associated with under-resourcing and political instability.

The effect on relevance of decentralization of training to researchers and project funding is not yet clear. On the one hand, experienced researchers may be better placed to fit training to candidates' needs. But since this is now commonly within a project or programmatic framework, it may have relatively short-term horizons and not necessarily lead to greater relevance to the institutional or wider needs of the trainees. On the other hand, since needs assessment procedures are not systematically applied, it cannot be assumed that satisfactory levels of relevance will be attained under this organizational mode in future.

From results obtained from questionnaire surveys, the Panel concluded that the relevance of training has been quite high. This is based, first, on the researchers' commitment and sense of importance they attach to the outcomes for NARS. Second, trainees themselves rate quite highly the benefits for them personally, their institutions and the wider goals of the CGIAR. Although the survey results will have been biased positively, this opinion was confirmed fairly consistently in the course of the country visits. There are some concerns about whether the training has been designed more to suit the Centers' research plans than the needs of the NARS, and whether the needs of the weaker partners are covered through training associated with networks. But these were not encountered frequently, and strengthening the NARS' capacity to articulate their own needs may be best way to deal with the relevance problem in future. However, the concern which does remain is whether relevance will be maintained unless the Centers adopt systematic needs assessment protocols.

### *Quality*

Quality monitoring and evaluation is uneven across the Centers, and is particularly deficient for in-country activities, individual training and for all kinds of informal training and learning. The importance of the investment in informal training points up the need to introduce monitoring and evaluation procedures, equivalent to those in place for formal training. Existing evidence indicates that formal training quality has been high, as judged by a range of indicators for groups and individuals. The possibly biased (positively) results of the trainee survey were backed up very consistently by interviews in the field. The single most important determinant of trainee satisfaction was the extent to which their new knowledge and skills were put to use. This emphasises the need to ensure that candidates are not sent, or accepted, for training unless suitable post-training provisions are made or are likely. Improved candidate selection procedures were considered by Center staff as one of the most important ways to improve quality. There was some evidence of differences between subject areas in regard to trainee satisfaction (e.g. crop breeding versus social sciences). The Panel concluded that there are many examples of good practice which could

be applied widely across the System. To maintain standards now that training is generally decentralized, it is important that QA protocols for planning, managing and evaluating formal and informal training quality should be specified and followed routinely, and that the results should be used for decision making, including researchers' performance assessment. The Panel concluded that these measures are essential to ensure that the System's investment in training is used to good effect, and that they require the existence of training support expertise and resources in the Center.

### *Efficiency*

*Investment in training.* The investment of CGIAR resources in training and learning has not been estimated accurately in the past, and current accounting systems at some Centers still make this difficult. The direct costs of these activities have amounted to approximately US\$30m per annum by the beginning of the 21<sup>st</sup> Century, a growth over the last decade despite a small reduction in the early 1990s. However, indirect costs are generally not estimable as distinct from research costs. To these must be added scientific staff costs which are substantial, although they may be overestimated by the survey results since less interested researchers may not have replied. Results from this study estimate that scientists are spending about 13% (formal) and 12% (informal) of their total time on training, and that this has increased over the last five years. However, there has been a notable decline in specialised expertise in training/adult education across the System.

In spite of imprecisions, the investment in training and learning is evidently very high. However the Panel concluded that the size of the investment and the declared commitment of the Centers to this activity did not match with several aspects of current practice. These latter include:

- reduced specialised pedagogic skills and support to training/learning activities;
- inadequate training data bases for use in decision making;
- unsystematic needs assessment and quality evaluation procedures;
- insufficient resources to collect, adapt and disseminate existing training materials;
- lax trainee selection criteria;
- absence of procedures for planning or evaluation of informal training/learning despite its importance in terms of staff time;
- limited value attached to training performance in staff evaluation procedures.

All these reduce the returns to the very substantial investment made by the CGIAR in this area.

*The distinctive competence of the CGIAR.* One area of efficiency examined by the Panel is the particular niche of the CGIAR as a supplier of training. All Centers see themselves as partners in the training enterprise, increasingly with southern as well as northern universities. Within this framework, the Panel found very consistent opinions expressed in the field as to the Centers' distinctive competence, and concluded that it derives from their:

- integrated approach to solving problems of world importance (hunger, poverty, resource conservation), integrated across biological and sociological disciplines, and across 'upstream' and 'downstream' levels of science;

- long-term experience in the production and utilization of the mandate crops in the social and physical environments where they are grown;
- unique collections of germplasm and institutional knowledge about them;
- their worldwide network of collaborators;
- their capacity to act as apolitical 'honest brokers' and facilitators in inter-institutional arrangements, and their appropriate research and information facilities.

The Panel also concluded that the amount of training which has taken place in areas arguably outside the CGIAR's comparative advantage is small, especially in the case of individual trainees. Some subjects (e.g. Statistics) which are treated as discipline-based, in fact have a high proportion of practical application content which bring them closer to the domain of the scientists, rather than the disciplinary specialists (e.g. Statisticians).

The Panel could not gather systematic information on the rate of 'devolution' of some of the Centers' traditional training subject areas (e.g. Crop Production) to other suppliers, nor on what had been the outcome in such cases. There were however particular cases instanced where devolution had gone badly and courses had declined or even had to be taken back by Centers. To the extent that the NARS now pay for their training, they would be expected to seek out the most effective supplier, which should reduce distortions which may have existed previously in this regard. At the same time, gains in efficiency should result from the increase in training partnerships (e.g. with Centers and universities) where specific aspects are taken on by the different partners, according to the particular competence of each.

*Training as international public goods.* Recent training activities have met the 'international public goods' (IPG) criterion for CGIAR activities much better than in the past. Regional and international events predominate over national events in most centers, with plentiful examples of inter-regional and inter-continental applications. Some of the most specific and according to this criterion more questionable training efforts, were justified in the Panel's view by the important potential role of the institution in contributing as a partner to the Center's international research mandate. Judgements can also be clouded by the stage in the research/application cycle that particular training and learning activities occur. Many international goods were at some point in time local or regional rather than international. Networking continues to play an extremely important role in internationalisation of training and the dissemination and adaptation of research. It may also be the best strategy for combating staffing instability (e.g. the loss of individual scientists due to disease in Africa). However, networks and regional programs can only be as strong as their individual members, and there is some evidence that the needs of the weakest members are not adequately covered.

*Efficiency of different training types and delivery modes.* The Panel concluded that no specific kinds of training can be considered a priori more efficient or effective than others, although they foresee a continued decline in long courses. They concluded that Centers will need to continue to provide a variety of training types, themes and delivery modes to suit the heterogeneous needs of the NARS. Greater efficiency will be achieved by fitting them more precisely to NARS and candidates' needs. The advent of new partners, some with little research experience, means that a certain demand for basic themes, as well as for advanced subjects, remains. Greatest demand in future is nevertheless foreseen for specialised short

courses, individual non-degree and higher degree training (the latter in collaboration with northern/southern universities). A major contribution is expected by making more materials available on-line. In this respect the Panel's conclusions are supportive of the System's ICT-Knowledge Management Initiative's Online Learning Resources project, the objectives of which include to strengthen capacity, facilitate cooperation between Centers as well as to disseminate existing training and learning materials. However, e-courses have been shown to be very demanding on staff time without adequate back-up and only suitable to subjects with a strong practical content, as are many of those in the domain of the CGIAR, when deployed in combination with other modes of delivery. At the same time there is considerable scope for added efficiency in CGIAR training through the strategic use of various e-learning tools and methods – including on-line modules, student selection and assessment, simulation and virtual environments, collaborative learning and on-line tutorial support.

*Targeting trainees and institutions.* Although the choice of trainee type will obviously vary according to circumstances, the Panel see major potential benefits from engaging policy makers more widely in activities with learning objectives. Many of the needs that were evident in the NARS visited as part of this study were related to policy, regulatory and government investment strategies. The Panel has more questions about the efficiency of the training of farmers (which the data in Chapter 3 seem to indicate) on any scale beyond that needed for research purposes (e.g. to validate methodologies and implement research that requires the active participation of farmers organisations) or to build up NARS partners capacities vital for the future achievement of Center research mandates. The Panel also concluded that the selection criteria for trainees of all types have been too lax, and should address not only their pre-training preparation but also their post-training opportunities. It is in the interests of the NARS, as well as the Centers, to work together to apply rigorous standards, and that these would enhance both the quality and the efficiency of training activities.

With regard to institutions, the Panel concluded that increased support to local universities may be the most sustainable way of contributing to overall capacity building in the long term. This may best be accomplished by intensifying the ongoing trend towards training partnerships, such as those involving Centers-local universities-northern universities or advanced research institutions. There was strong evidence from the field studies that bringing local universities more actively into research directly benefited their teaching standards.

*Dissemination of existing materials.* The Panel concluded from the Center visits that major efforts are being made to globalise and circulate knowledge, but that there is still immense scope for collecting, adapting, re-cycling and disseminating existing materials for training purposes. This requires expertise and financial resources, but additional investment in this area would contribute greatly to making efficient use of major investments already made. (See earlier reference to the Systems ICT-KM Initiatives Online Resource Project.)

*Coordination and collaboration* The Panel concluded that there is scope for improvement in cooperation and collaboration at various levels. First, within Centers, there is a need to apply good practices (e.g. needs assessment, recording systems, quality assurance) systematically

across all projects/programs, at headquarters and in the field, and to ensure that training activities are well integrated with other areas related to capacity building such as information and communications. Second, while inter-Center coordination and collaboration is considered weak by researchers and those responsible for training at the Centers, the Panel observed variable situations in the field, with strong mutual support and collaboration in some LAC countries, but less so in some cases in Africa. There is, however, clear evidence of the need to improve coordination in aspects such as recording systems and data bases, the sharing of related good practices and integration with System wide initiatives in related areas such as IT. It was concluded that to achieve improvements in coordination, it would be necessary for each Center to have some kind of central training function and pedagogic expertise, although this does not necessarily imply the re-introduction of the traditional Training Units.

### *Effectiveness*

The effectiveness of CGIAR training has been as much determined by the conditions of the NARS as by the relevance or quality of the training. The surveys showed that over half of the trainees report positive results for themselves, their institutions and contributions to the broader CGIAR goals, but with less positive results in SSA than other regions. The partners in CGIAR-NARS collaborative projects also report positive changes for their institutions, and that training made a significant contribution to their project results. They attach great importance to the informal learning which takes place in the course of joint activities.

As before, the Panel recognises the positive bias in these results. They also noted that about 20% trainees reported constraints due to lack of operational resources, facilities and equipment which prevented them from putting their training to full use, although the situation may have improved under the present trend towards training within specific projects. They noted as well the high levels of 'wastage' of CGIAR alumni reported in certain of the Case Studies, particularly under conditions of chronic under-resourcing and institutional instability.

Nevertheless, the Panel concluded that there is impressive evidence about the effectiveness of training in a large number of cases. One of the most significant outcomes of CGIAR training has been the prominence of alumni in leadership positions in the NARS. The country studies show successful examples of training and learning contributing to capacity development e.g. in universities, among policy makers and in NARI's. There are also outstanding cases where training has recognised by the trainees to have been an indispensable component of field impact, with effects on production, income, diet, export earnings, germplasm conservation and other indicators.

On balance, therefore, the Panel concluded from the survey results and their own field work that the effectiveness of training has been occasionally outstanding and at least satisfactory on the whole. It is also clear that this depends on factors beyond the control of the Centers as well as on their own contribution. They also concluded that certain factors were usually associated with the most effective examples. These include:

- long-term engagement by the Center, with formal training of various types strongly reinforced by informal learning experiences;

- the formation of either a critical mass of researchers in a given field or multidisciplinary teams (including extension experts);
- availability of long-term funding or the ability to string together a sequence of short term projects;
- outstanding local leadership;
- local institutional support; and,
- a real or latent demand for the technology.

Explicit local demand for the training (i.e. before it started) was not a constant feature. In contrast, chronic political change, institutional instability, and low levels of government support to agriculture and to research, have been associated with high levels of 'wastage'. However, the Panel recognised that there is an extent to which it is difficult to anticipate the future insofar as the present, both in agricultural systems and in the capacity of NARS, grew out of a CGIAR of 15 or 20 years ago, which had a very different profile in terms of skills and resources.





## ACKNOWLEDGEMENTS

The Panel gratefully acknowledges the assistance of the many people who contributed to this study. They are too numerous to mention individually, but we would like to express particular thanks to:

- The Directors General, training specialists and research staff at the Centers visited: CIP, CIAT, ICRAF, ILRI, IITA and IRRI;
- The training focal persons at all Centers;
- Country Research Associates: Angela Machacilla (Ecuador) Carmen Calderon (Bolivia), Tran Thi Ut (Vietnam), Ora-orn Poocharoen (Thailand), Paul Jere (Malawi) Anne Muriuki (Kenya) and Dominique Endamana (Cameroon);
- All staff of national institutions who most generously gave of their time in the course of the country field studies;
- Mina Lantican and Rolando Kapmeyer (SC Secretariat consultants) for support with the questionnaire surveys, data transcription and analysis;
- Staff at the Science Council Secretariat, particularly Sirkka Immonen who served as Panel Secretary and without whose constant attention and support this entire exercise would have been impossible to complete; and Irmi Braun-Castaldi for coordination of travel logistics.

The level of cooperation that the Panel received is a tribute to the widely shared enthusiasm for training, learning and NARS capacity strengthening across the CGIAR.

However responsibility for this report and its conclusions rests entirely with the Panel – rather than any of the above-named.

Elliot Stern, Panel Chair

March 2006



## ANNEXES

### ANNEX I

#### **Terms of Reference for the Panel which will carry out an Evaluation and Impact Assessment of Training Activities in the CGIAR<sup>29</sup>**

These terms of reference relate to the Main Phase of this study. The First Phase involved a desk study and collection of background materials and data (see Annex I).

The Main Study will be carried out by a Panel of three experts, including the Chair. The Panel will be supported by a number of resource persons from the developing regions. The Science Council would like the Panel to use at least two complementary approaches in its data gathering and analysis (see Annex II). One approach would use NARS organizations as the unit of analysis and would rely on field surveys. The second would use specific training events across Centers as the unit of analysis and would be conducted virtually through trainee interviews. The Panel should base its analysis on a sample of the CGIAR's training efforts during the past decade that is feasible to conduct while allowing reasonable generalisability for drawing conclusion on the main study items (see below) and making recommendations at a System level.

The Panel will finalise, in close interaction with the interim Science Council and subsequently the Science Council (The Chairs of SCOER and SPIA and subsequently the Standing Panels on Impact Assessment and Monitoring and Evaluation), the interim study plan and methodologies to be used. The Panel will (a) carry out the Main Phase study; (b) interpret the results, using its own analysis and the Desk Study and its data and information as input and (c) report the evaluation findings. The Panel will be supported by a Panel secretary from the iSC/SC Secretariat and a member each from relevant Standing Panels of the SC.

Specifically, the Panel is expected to:

Define and develop the study methodology on the basis of the proposed approach (Annex II). Specifically, the Panel will select the study samples, design data collection tools, including a harmonised approach to be used across the regions, and develop a data analysis plan. The Panel will draw from the data and information collected during the Desk Study. The Panel will work in close interaction with the Chairs of the relevant Standing Panels of the SC in deriving to the final design.

Carry out and manage, with support from the Secretariat, the evaluation and surveys, and data collection. It will, in consultation with Science Council focal persons, decide on the engagement of the regional resource persons and their briefing.

Analyse the results of the survey covering areas specified below.

Submit a report to the Science Council by July 2004.

The study report should provide information, analysis and recommendations at the System level, specifically covering four items listed below.

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<sup>29</sup> Without annexes to the TOR

1. Assess the quality and relevance of the training activities within the CGIAR, specifically with respect to:
  - Processes used for assigning priorities to training activities and assuring quality and relevance;
  - Strategies to guide training as part of capacity strengthening;
  - Adoption of suitable new approaches to training.
  
2. Assess the comparative effectiveness and efficiency of CGIAR training activities, specifically with respect to:
  - Organisation of training;
  - Comparative advantage as compared with alternative suppliers;
  - Cooperation and coordination among Centers and other providers for effective supply;
  - Adopting new, promising approaches and modalities for training;
  - Achieving multiplier effects (leveraging CGIAR investments in training);
  - Responding to funding challenges; and
  - Allocating resources to training and within training vs. alternative activities.
  
3. Assess the intermediate outcomes and impacts of training, specifically with respect to:
  - The impact pathways planned and expected by Centers (see Annex III);
  - Sustainable increase in NARS effectiveness and efficiency in developing, generating, supporting and disseminating research results;
  - Enhancing the effectiveness of the Centers' research via e.g. closer partnerships;
  - Analysing constraints to achieving sustainable intermediate impacts and seeking ways to overcome these.
  
4. Assess to the extent possible the impacts of selected training activities on the ultimate goals of the CGIAR, giving particular consideration to the capacity-related constraints to achieving these goals, and developing counterfactual scenarios.

#### **Time frame**

The Desk Study report is due in June 2003. It is a working document and information and data may be added to it for the benefit of the Main Phase.

The Panel is expected to work largely in virtual mode, but it is planned to hold an initial planning meeting in third quarter of 2003, and one towards the end of the study if necessary. As an output from the planning, the Panel should:

- review and complete the evaluation design;
- produce a vision of the final product;
- decide on the order of the different parts of the evaluation (sequential or concurrent);
- agree on sampling criteria and principle data collection methods;
- develop the data collection instruments and procedures;
- agree on the regional input from resource persons and design their TOR;
- select the regional resource persons (list to be provided by iSC Secretariat).

The field surveys should be launched at the end of 2003 and completed in 2004. The Panel report should be submitted to SC in July-August 2004 and subsequently to the CGIAR Group at AGM'04.

## ANNEX II

### Biodata of Panel members

#### **STERN, Elliot (UK) – Panel Chair**

**Position:** Director, Evaluation Development and Review Unit, Tavistock Institute.

**Expertise:** Evaluation, education and training, regional and rural development, transfer of innovation and technology, organisational design, social policy

**Education:** Political Science and Conflict Analysis, University College, London Economics with Social Anthropology, University College, London.

**Experience:** He established and leads the Evaluation Development and Review Unit at the Tavistock Institute, which has a mission to develop and apply innovative evaluation methods. He has extensive experience in organisational design and development issues related to innovation and evaluation; Recent assignments have included program design, organisational review and evaluation system implementation. He has directed major European and UK public sector projects, and acted as consultant to OECD, UNESCO, IFAD, World Bank and the European Commission on evaluation and evaluation design in relation to local development, social policy and vocational education. Within the UK he has worked with many public agencies including the Welsh Development Agency, DfEE, the Department of Health and the UK Employment Service as well as a number of industrial companies. Recent assignments include : a review of the system level review processes of the CGIAR, (Consultative Group on International Agricultural Research); a review of the evaluation processes for international development co-operation in UNESCO; a review of the Welsh Language Board for the Welsh Assembly; an evaluation review and capacity-building exercise for the French national energy agency ADEME; and a design of national evaluation systems for a major national urban regeneration program in the UK. Memberships include: the Council of the UK Evaluation Society (founding President 1994-1996); Vice President/President Elect of the European Evaluation Society; Founding Academician UK Academy of Social Sciences; Advisory Committee of the MEANS Program (Methods for Evaluation of European Structural Fund Programs); Member of Advisory Board, Warwick Business School Research Bureau; Editor of *Evaluation, the International Journal of Theory, Research and Practice*; Editorial Board of the *British Journal of Education and Work*.

#### **DE VACCARO, Lucia (Peru/UK)**

**Position:** Professor Emerita and Head of Animal Breeding, Facultad de Agronomía, Universidad Central de Venezuela;

**Expertise:** Animal genetics and breeding, rural development;

**Education:** postdoctoral studies, Cornell University; Ph.D., Leeds University; M.A., B.A., University of Cambridge;

**Experience:** In her previous post Dr. de Vaccaro was also Head of Animal Breeding. She has spent her professional life in Latin American universities. Her research centers on the genetic improvement of milked cattle for rural development in tropical areas. She was a member of TAC 1996-2001. She served as Chair of the Board of CIAT and was a founding member of the ILRI Board. She is a member of the Council of Advisors of the World Food Prize.

#### **LYNAM, John K. (UK)**

**Position:** Head of Gatsby Foundations' work in east Africa

**Expertise:** Agricultural research for development, starchy staples, priority setting, impact assessment, institutional development, Sub-Saharan Africa, LAC.

**Education:** Ph.D., Food Research Institute, Stanford University (1978); M.A., Food Research Institute, Stanford University (1974); B.S., Dept. of Agricultural Economics, Ohio State University (1970).

**Experience:** Current position since 2004. Previously Associate Director, Food Security Division, Rockefeller Foundation, Nairobi, Kenya. Has developed a funding program for agricultural research in Eastern Africa. Principal areas of program management include developing a banana research capacity in

Uganda; Social science research at ICIPE and KARI; Development of an integrated soils research agenda in East Africa; Integrating GIS and modelling in agricultural research planning and priority setting; Management of the collaborative study of cassava in Africa directed by IITA; Development of a research capacity for crop and resource husbandry in agricultural faculties in East Africa; 1997-88: Head, Economics Section, Cassava Program, CIAT. Duties related to design and supervision of economic research on cassava: On-farm research in cassava-based systems; Marketing and demand studies in cassava food and feed markets; Integrated cassava development projects; Research planning and priority setting within commodity research programs; Role of technological change in small farmer development strategies in Latin America; 1974-75: Visiting research fellow, Institute for Development Studies, University of Nairobi, Kenya; Memberships include: Task Force, African Highlands Initiative (since 1993), Steering Committee, Cassava Biotechnology Network (1994-1999), Steering Committee, Global Change and Terrestrial Ecology (1995-1999). He has published widely on agricultural research and priority setting, sustainable development, agricultural economics and commodity issues.

### ANNEX III

#### Internal reviews of training carried out by the CGIAR Centers: a summary

1. Since 1990, 18 internal reviews have been carried out with written reports published or made available to the Science Council Secretariat, and which were reviewed by this team. Others are known to have been done, but the reports have not circulated outside the centers. Six centers have no internal review reports, five have one each and five (including ISNAR) had 2-3 each. This limited usage of internal reviews must be assessed against the background of the poor coverage generally given to training by the CGIAR-commissioned routine external reviews (EPMR's). These latter were judged by the present team to have been generally more descriptive than analytical, and not to have provided systematic evaluations of training relevance, quality, effectiveness or impact, nor of the procedures in place to monitor and improve them.

2. The objectives of ten of the reviews were evaluative and eight aimed to assess training impact, but most contained a mixture of elements of evaluation and impact assessment. Thirteen of them generated information from questionnaires carried out among ex - trainees, and supervisors or institutional leaders (five studies). Most of them referred to training carried out in the period 1966-1990, with a gap during the late 1990's when training budgets were reduced across the system and the fall in unrestricted funding limited the centers' ability to finance reviews beyond the EPMR's. However, three new reports were published in 2005.

3. The main limitations of the reviews are considered to be:

- a) A low proportion (27%) was carried out by independent persons (vs. staff or board members).
- b) Most dealt with specific courses or types of training, rather than the Center's training activities as a whole, providing no recommendations on overall training policy and strategy, nor comparative information on different training types, delivery modes etc.
- c) Most attention was given to training outcomes, with lesser coverage of relevance, quality, efficiency, effectiveness or impact.
- d) The combined coverage of ex - trainees through the questionnaires was low in proportion to the total number trained by the system: responses were obtained from 2168 alumni, with 67% from a single center. Responses from supervisors and institution leaders totaled less than 200. This was despite major efforts on the part of many centers to secure the responses.
- e) The low response rates to the questionnaires (17% - 79%, 43% overall) probably introduced a positive bias into the results. This was disregarded in all but two of the studies.
- f) The small sample sizes/study made statistical analysis of most questionnaire results irrelevant, but even when numbers were adequate, only two studies analyzed the significance of different sources of variation in responses, so disappointingly little information generated on these.
- g) Impact assessment was limited by the difficulty of obtaining long-term follow up information, and was mostly confined to the personal and institutional levels.

4. The main findings included:

- a) Training relevance was consistently rated good or very high to the trainees and their institutions. While some NARS suggested the centers should concentrate on 'frontier knowledge and technologies', quite recent opinions of others showed that the 'old' subject areas such as agronomy and plant breeding were still relevant, but that 'new' areas should be added.
- b) Quality ratings were also consistently good to highly favorable. However, specific recommendations were made about systematic quality monitoring, and the need to determine



whether learning objectives had been met. One study pointed up differences in quality between in-country and headquarters courses, and that the perception of quality varied according to the trainees' previous level or preparation. It also traced trends in quality of courses over time and found no indication of improvement. A common recommendation was the need for greater post-training follow up and direct support to trainees.

- c) Efficiency was covered very sparingly. Greater usage should be made of training modules already developed. The two studies which dealt with alternative suppliers, both from Asia, suggested that the centers retained a strong advantage for specific courses but that more higher degree training could be assumed by local universities.
- d) Outcomes at the personal level were dealt with in considerable detail, and were good to highly positive. The indicators most commonly used were research projects funded, publications and conferences, further training undertaken, training performed, networks joined, professional contacts maintained, interactions with policy makers, responsibilities assumed, scientific leadership given, promotions and higher salaries received. However, the proportion of trainees who experienced constraints such as lack of operating funds, inadequate experimental facilities and transport, poor communications (e.g. internet), insufficient or poorly trained support staff, low salaries and inadequate support from superiors was 40-91%.
- e) Outcomes at the institutional level were less widely documented. Indicators included training by trainees, improvements in priority setting, resource use, management, project funding, procedures for monitoring and evaluation. Three studies traced CGIAR alumni in leadership positions, showing high proportions in each case. An important conclusion from one study was that training has little weight in bringing about organizational change unless there is real institutional commitment. When training was integrated into broader capacity building efforts, increases in staff qualifications and disciplinary diversity, improvements in facilities and equipment, budgetary autonomy, senior authorship of publications, production of local scientific journals and growth of research networks were reported.
- f) Impact nearer the field level was assessed in five studies. A common factor was that training was an integral part of the centers' activities and that they had been engaged for a very long time (10-20 years). Impacts were reported in terms of selected varieties sown, yields increased, genetic resources collected and distributed food security and nutrition monitoring instruments used and policy changes achieved. These were not attributed to training alone, but it was considered an indispensable component of the achievements reported.

5. It is concluded that the centers have made sparing use of internal reviews of training, despite the shortcomings of EPMR's. This emphasises the need to ensure that other procedures are in place at the centers for monitoring and evaluation. In general, the studies made little contribution to policy and strategy decisions and their results are probably biased favourably. Within their limitations, they provided interesting and often impressive information on training outcomes and, to a lesser degree, impact, as well as on the factors which commonly prevent alumni from putting their training to full use. They underline the importance of gathering objective evaluation and impact information, and also the practical difficulties of doing so.

**ANNEX IV**  
**Trends in restricted and unrestricted funding of CGIAR Centers**

A. CGIAR FUNDING BY CENTER, 2004 (US\$ million)

	Unrestricted	Restricted	Member total	% of Unrestricted
Africa Rice (WARDA)	7.0	3.4	10.4	67%
CIAT	13.5	22.8	36.3	37%
CIFOR	8.0	6.8	14.8	54%
CIMMYT	18.9	22.2	41.2	46%
CIP	9.3	13.0	22.3	42%
ICARDA	10.5	14.3	24.8	42%
ICRISAT	11.0	16.7	27.7	40%
IFPRI	15.0	17.7	32.8	46%
IITA	12.6	30.2	42.8	29%
ILRI	15.7	17.1	32.9	48%
IPGRI	15.7	19.0	34.8	45%
IRRI	16.1	16.3	32.4	50%
ISNAR	4.8	0.9	5.8	84%
IWMI	10.8	12.8	23.6	46%
World Agroforestry (ICRAF)	9.6	20.1	29.7	32%
WorldFish (ICLARM)	6.7	7.6	14.3	47%
<b>Total</b>	<b>185.4</b>	<b>241.1</b>	<b>426.5</b>	<b>43%</b>

B. CGIAR FUNDING BY CENTER, 1999 (US\$ million)

	Unrestricted	Restricted	Member total	% of Unrestricted
Africa Rice (WARDA)	6.6	4.2	10.8	61%
CIAT	14.3	14.4	28.7	50%
CIFOR	7.4	4.1	11.5	64%
CIMMYT	15.1	18.7	33.8	45%
CIP	11.3	8.8	20.1	56%
ICARDA	8.5	11.0	19.5	44%
ICRISAT	13.4	7.8	21.2	63%
IFPRI	8.9	11.9	20.8	43%
IITA	15.9	14.8	30.7	52%
ILRI	14.8	11.7	26.5	56%
IPGRI	12.3	7.8	20.1	61%
IRRI	19.8	12.8	32.6	61%
ISNAR	5.6	2.6	8.2	68%
IWMI	5.9	2.9	8.8	67%
World Agroforestry (ICRAF)	7.8	12.9	20.7	38%
WorldFish (ICLARM)	9.3	5.0	14.3	65%
<b>Total</b>	<b>176.9</b>	<b>151.4</b>	<b>328.3</b>	<b>54%</b>

C. CGIAR FUNDING BY CENTER, 1993 (US\$ million)

	Unrestricted	Restricted	Member total	% of Unrestricted
Africa Rice (WARDA)	4.5	4.4	8.9	51%
CIAT	22.3	7.8	30.1	74%
CIFOR	5.1	0.0	5.1	100%
CIMMYT	20.2	9.0	29.2	69%
CIP	12.2	8.4	20.6	59%
ICARDA	12.3	4.0	16.3	75%
ICRISAT	20.6	10.9	31.5	65%
IFPRI	7.3	5.6	12.9	57%
IITA	18.8	15.3	34.1	55%
ILRI	18.5	3.6	22.1	84%
IPGRI	9.9	3.3	13.2	75%
IRRI	22.1	21.7	43.8	50%
ISNAR	6.0	4.3	10.3	58%
IWMI	3.3	5.8	9.1	36%
World Agroforestry (ICRAF)	5.5	7.8	13.3	41%
WorldFish (ICLARM)	2.7	4.1	6.8	40%
<b>Total</b>	<b>191.3</b>	<b>116.0</b>	<b>307.3</b>	<b>62%</b>

ANNEX V  
CGIAR CENTER INVESTMENT IN TRAINING 1992-2002 (US\$ MILLION)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CIAT	1.7	1.5	0.8	1.1	2.3	2.1	1.6	1.5	1.4	1.4	1.6
CIFOR	0	0	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.3
CIMMYT	2.7	2.5	1.5	0.9	2.6	4.4	4.6	5.2	5.4	5.7	5.7
CIP	1.0	1.6	0.7	0.3	1.6	1.5	1.3	1.1	0	1.1	1
ICARDA	2.2	2	1.4	2.6	2	1.8	0.9	1.1	0.7	0.7	1.1
WorldFish (ICLARM)	0.05	0.1		0	0.1	0.1	0.8	0.9	0.6	0.7	0.5
World Agroforestry (ICRAF)	1.6	1.3	2.1	2.6	2.4	2	3.9	3.6	4.2	4.4	4.5
ICRISAT	1.5	1.3	1.4	2.6	2.9	2.1	2.1	2.2	2.3	2.3	2.2
IFPRI	0.3	0.4	1.1	1	1	2.5	2.1	3.2	3.1	3.4	3.5
IITA	2.4	1.6	1.4	3.2	2	1.8	1.7	2.4	1.6	1.8	1.6
ILRI	2.9 <sup>a</sup>	1.8	1.6	1.2	1.7	1.3	1.2	1.7	1.6	1.8	1.6
IPGRI	0.6 <sup>b</sup>	1.1	0.9	1.0	0.4	1.2	1.6	1.7	1.6	4.2	3
IRRI	2.6	2	2.3	1.5	2.2	1.5	1.5	1.6	2.6	0.6	2.5
ISNAR	1.7	1.5	1.2	2.1	2.7	1.9	2	2	2.3	2.2	2.2
IWMI	0.4	0.6	0	0.4	0	0	0	0	1.1	0	<i>na</i> <sup>c</sup>
Africa Rice (WARDA)	0.8	0.3	1	0.8	0.4	0.6	1.4	1.5	1.1	0.8	1.3
<b>Total</b>	<b>22.5</b>	<b>19.6</b>	<b>17.5</b>	<b>21.4</b>	<b>24.5</b>	<b>25.1</b>	<b>26.9</b>	<b>29.9</b>	<b>29.8</b>	<b>31.3</b>	<b>32.6</b>

Source CGIAR Finance Reports

<sup>a</sup> ILCA+ILRAD

<sup>b</sup> IBPGR+INIBAP

<sup>c</sup> IWMI expenditure for strengthening NARS in 2002: 5.2

**ANNEX VI**

**Relative change in individual training in the 10 top countries in developing regions\***

<b>Region/Country</b>	<b>n</b>	<b>90-92</b>	<b>93-98</b>	<b>99-04</b>
<b>Asia</b>				
India	1100	19.6	28.9	49.9
China	371	9.3	15.6	10.3
Vietnam	239	14.6	9.8	4.4
Indonesia	198	4.8	5.2	8.6
Philippines	193	10.1	7.4	4.5
Bangladesh	162	5.6	4.6	6.3
Nepal	127	4.8	5.3	3.1
Thailand	126	5.3	5.8	2.4
Pakistan	86	2.6	3.4	2.4
Sri Lanka	73	7.7	2.6	0.8
<b>Latin America</b>				
Peru	1259	33.5	31.3	44.5
Colombia	847	15.4	19.9	33.0
Mexico	214	3.9	10.0	3.2
Ecuador	158	8.4	4.8	3.5
Brazil	144	7.1	5.6	2.2
Bolivia	120	4.5	4.6	2.3
Argentina	105	3.1	4.8	1.3
Venezuela	93	4.7	3.3	1.7
Costa Rica	67	2.6	1.9	1.9
Chile	65	2.1	2.7	1.1
<b>Sub-Saharan Africa</b>				
Kenya	549	14.2	17.8	19.7
Nigeria	400	12.1	12.9	13.5
Ethiopia	373	12.5	13.5	10.2
Uganda	173	4.0	5.6	6.5
Ghana	149	3.7	6.0	4.1
Tanzania	145	5.0	5.9	3.1
Cameroon	130	4.4	4.0	4.3
Zimbabwe	118	4.6	3.7	3.4
Sudan	117	7.8	3.9	1.3
Cote d'Ivoire	77	0.3	1.4	5.0
<b>CWANA</b>				
Syria	736	56.1	39.0	36.4
Iran	227	6.4	13.9	14.7
Egypt	99	5.0	7.4	3.6
Morocco	81	5.3	4.4	4.4
Yemen	81	5.0	5.5	3.1
Jordan	80	2.6	6.1	3.4
Turkey	76	4.4	4.9	3.4
Iraq	71	0.3	2.8	7.5
Lebanon	68	0.9	6.4	2.2
Algeria	65	3.8	4.5	2.5

\* average trainees/year given for three periods.

**ANNEX VII**  
**Distribution of training volume among themes in group training in each Center**

	agro-forestry	bio-technology	breeding	crop production	crop protection	genetic resources	livestock	method	NRM	post-harvest	Seed	social science	not know
	y	y		n	n			s		harvest		science	n
CIAT	P	12.4	2.2	30.8	3.2	2.4		6.5	21.8	3.7	1.8	15.2	
	TD	29.1	4.8	30.9	3.3	3.0		1.9	5.8	5.6	1.0	14.4	
CIMMYT	P	4.2	26.8	13.0	2.8	0.7		9.4	21.4	1.4	10.8	8.3	
	TD	1.0	39.1	45.1	0.4	0.1		5.0	3.1	1.8	2.4	1.8	
CIP	P	4.8	1.6	16.5	22.8	4.7		6.7	12.0	8.7	15.2	3.3	
	TD	3.9	2.2	15.6	20.6	3.8		12.5	7.5	10.2	17.8	3.6	
ICARDA	P	4.1	7.9	6.8	6.7	3.3	2.2	21.8	19.3		21.4	5.0	
	TD	2.7	20.9	5.3	7.4	3.1	2.1	19.5	15.2		18.3	3.6	
ICRAF	P	53.6		<0.1	0.6	0.3		17.8	8.8	4.1	0.6	12.7	
	TD	52.2		<0.1	1.0			23.7	9.9	0.4		11.3	
ICRISAT	P	2.4	19.3	17.0	14.8	4.2		31.1	4.1	4.1	2.4	0.7	
	TD	0.6	15.3	38.9	4.3	1.1		28.3	6.6	3.3	1.1	0.4	
IFPRI	P							22.4	2.9			74.7	
	TD							8.9				91.1	
IITA	P	1.0	5.4	32.7	7.5	2.6	0.5	14.5	4.9	13.3	3.2	10.9	
	TD		5.8	37.2	11.5	4.3	0.3	10.0	4.0	10.7	2.1	10.4	
ILRI	P	1.6		4.8	0.8	4.4	55.8	20.0			5.8	3.6	
	TD	0.9		5.2		6.1	58.4	12.7			4.4	12.3	
IPGRI	P	5.3	1.3		2.4	76.0		6.0		6.0	0.4	2.0	
	TD	7.7	0.9		7.5	80.1		3.7					
IRRI	P	1.8	3.2	9.8	4.9			22.3	7.4	2.9	1.9	44.9	
	TD												
IRRI-in-country	P	0.3	2.7	21.2	7.6	5.0		28.9	15.7	<0.1	5.1	9.7	2.6
	TD		2.5	12.6	3.8	2.2		35.0	4.3	<0.1	1.1	8.5	28.9
WARDA	P		6.0	35.8	9.7			16.5	6.2	10.4	11.7	3.6	
	TD												
Courses w/o data	P	19	16	39	19	10		39	35	4	28	33	1
	TD	55	36	97	71	228	24	202	120	10	54	92	8

P=participants

D=trainee days

**ANNEX VIII.**  
**Relative importance of different Methods themes**

**A. Group training**

	1990-2004				1990-92		1993-98		1999-04	
	% td methods	% td all themes	% p methods	% p all themes	ranking (td)	ranking (p)	ranking (td)	ranking (p)	ranking (td)	ranking (p)
statistics/data management	23.0	3.2	20.5	3.3	2	1	1	1	1	1
training/education/materials	10.0	1.4	13.1	2.1	6	9	2	3	5	3
research management/process	9.5	1.3	9.8	1.6	4	3	3	4	7	5
scientific/proposal writing	9.2	1.3	13.4	2.2	9	5	5	5	3	2
information/library	8.3	1.2	5.2	0.8	7	8	4	6	8	11
station management*	8.2	1.2	2.8	0.5	1	4	8	9	12	14
experimental design	7.6	1.1	11.7	1.9	3	2	6	2	10	4
English**	7.3	1.0	3.5	0.6	13	13	15	10	2	8
computer	4.9	0.7	2.8	0.4	12	11	10	11	4	10
management/administration	3.8	0.5	4.9	0.8	5	10	9	12	9	6
machinery/equipment/facilities	3.2	0.5	1.3	0.2	11	12	13	14	6	13
surveying	2.7	0.4	2.3	0.4	8	6	7	7	16	16
presentation/documentation/publishing	1.2	0.2	3.0	0.5	14	14	11	8	11	9
database management	0.6	0.1	0.8	0.1	15	15	12	13	13	15
group dynamics	0.4	0.1	3.6	0.6	10	7	14	15	15	7
other	0.3	0.0	1.3	0.2	16	16	16	16	14	12

\*\* ICARDA has done most of the station management training

\* IRRI (both HQ and particularly IC) has done most of the English training

**B. Individual training**

	1990-2004				1990-92		1993-98		1999-04	
	% td methods	% td all themes	% p methods	% p all themes	ranking (td)	ranking (p)	ranking (td)	ranking (p)	ranking (td)	ranking (p)
information/library	20.8	0.7	16.8	1.4	1	2	3	3	1	1
management/administration/finance	15.6	0.5	13.2	1.1	4	8	1	2	6	3
statistics/data management	13.4	0.4	18.9	1.5	2	1	2	1	5	2
training/education/materials	11.8	0.4	8.3	0.7	5	5	4	4	4	6
machinery/facilities	11.0	0.3	7.4	0.6	3	11	8	8	2	5
computer	9.9	0.3	10.1	0.8	7	3	5	7	3	4
presentation/documentation/publishing	4.7	0.1	6.4	0.5	6	6	10	6	7	7
research management/process	3.1	0.1	2.0	0.2	11	12	7	10	10	11
lab skills	2.8	0.1	7.9	0.6	8	4	6	5	12	8
database management	2.1	0.1	1.7	0.1	12	13	11	12	8	10
station management	1.8	0.1	2.2	0.2	10	9	9	9	13	12
bioinformatics	1.5	0.0	1.3	0.1	13	14	16	16	9	9
other	1.0	0.0	1.2	0.1	14	15	15	13	11	13
experimental design	0.4	0.0	2.0	0.2	9	7	12	11	14	14
surveying	0.1	0.0	0.1	0.0	15	16	13	15	15	16
scientific writing	0.1	0.0	0.5	0.0	16	10	14	14	16	15

**ANNEX IX**  
**Summary of case studies and their characteristics**

A. Summary of case studies in Kenya

<b>Country/ Title</b>	<b>Kenya 1: Smallholders Dairy Project</b>	<b>Kenya 2: Introducing Monitoring &amp; Evaluation into NARI</b>
Center/ Theme	ILRI Livestock and Policy Development	CIAT Social Science & management
Training 'Target'	Partners in dairy sector, smallholders, government department	NARI as an institution – including 15 research centers
Training & learning modes	Degree training (MSc & PhD), short courses, informal learning, problem solving teams	MSc student training, collaborative Research, workshops for research centers, joint project planning, mentoring
NARS Capacity Outcomes	Development of new knowledge, developing partnerships and disseminating knowledge through partnerships	Pilot introduction of M&E systems, developing action plans, developing M&E frameworks
Wider Impacts	Not yet known – but related projects elsewhere in East Africa	Favoured by donors as part of new World Bank loan

B. Summary of case studies in Bolivia

<b>Country/ Title</b>	<b>Bolivia 1: Participatory Research</b>	<b>Bolivia 2: Bean Production</b>	<b>Bolivia 3: PROINPA Foundation</b>	<b>Bolivia 4: Tropical Pastures network</b>
Center/ Theme	CIAT Social Science /Participatory Research	CIAT Crop production	CIP Crop Production, Institution building	CIAT Crop science, Forage
Training 'Target'	NARI, University researchers, local trainers, producers	University research institution	NARI	NARI University researchers
Training & learning modes	Instruction/didactic, experiential, peer learning, learning by doing	Formal courses, individual programs at Center HQ, exchange visits, networks. In classrooms and field stations & networks	Advisory, transitional leadership, instruction, peer learning in courses, collaborative projects, exchange visits, joint planning	Peer learning, experiential, managed network in formal courses, network meetings, exchange visits
NARS Capacity Outcomes	PR capacity in NARI, new methods validated/improved, Community structures & producer associations created	Multi-disciplinary research skills in university, curricula modernised, improved crop rotation	Establishment of independent institute, strong finances, research skills applied	New varieties evaluated (limited adoption), seed production technologies developed , university curricula improved
Wider Impacts	Improved production technologies, superior crop varieties identified, germplasm conserved, new markets, increase in community income	Land use improved, crop production increased, new export markets, production costs reduced, poor households diet improved, incomes raised	Crop production/ protection improved, farmers income increased, germplasm conserved in situ	Seed markets opened up, seed production increased, improved forage varieties adopted, incomes raised



### C. Summary of case studies in Ecuador

<b>Country/ Title</b>	<b>Ecuador 1: INIAP</b>	<b>Ecuador 2: Cassava Processing</b>	<b>Ecuador 3: Participatory Research (PR)</b>
Center/ Theme	CIAT,CIMMYT,CIP,IPGRI NARI capacity building	CIAT Post harvest technology	CIAT Social Science & Participatory Research
Training 'Target'	NARI scientists	Farmers & Processors organisations, collaborating Institutions (NARI, National Foundation, Producer Union	Researchers, trainers, small-scale farmers organisations
Training & learning modes	Instruction, mentoring, exchange visits, joint activities, advisory roles	Instruction, peer learning, farmer to farmer, exchange visits	Instruction, learning by doing through courses, workshops in country practicals, exchange visits
NARS Capacity Outcomes	Limited by factors other than training – high turnover, few resources	New technologies applied, institutional support structures (for producers) created, research undertaken	PR applied, producer associations formed, research undertaken, institutional cultures changed, producer associations formed
Wider Impacts	Not documented	Production of processed Cassava increased, incomes increased, community& individual empowerment	Improved varieties and production technologies adopted, endangered germplasm conserved

### D. Summary of case studies in Thailand

<b>Country/ Title</b>	<b>Thailand 1: Participatory mapping ComMod</b>	<b>Thailand 2: Integrated Cassava cropping</b>	<b>Thailand 3: Landscape Agroforestry</b>
Center/ Theme	IRRI NRM/methods	CIAT NRM, Crop protection	ICRAF (ASB program) Agroforestry, NRM
Training 'Target'	Lecturers researchers & NARI officials	Local researchers, extension workers, whole villages & farmers groups	NARI, university researchers, NGOs; villagers & local trainers
Training & learning modes	Residential course: lectures, group exercises, ICT resources, online networks, mentoring	Trials & collaborative research, Training of Trainers, Farmers Participatory methods	Instruction/didactic, participatory – learning by doing, collaborative research
NARS Capacity Outcomes	Courses run by trainees in Thai universities, PhDs & MSc	Learning by networks of trainers, extension workers about FPR & new techniques, new FPR methods developed by CIAT	Mobilising NARS research in agroforestry, training PhDs& MSc students, raised policy awareness
Wider Impacts	Regional (Asian) networks, 7 applications of method in Thailand	Adoption by farmers of new technologies re soil conservation, higher productivity & production, increased farmer incomes	Villagers use participatory watershed management tools, extension of research by ICRAF in Thailand and regionally

E. Summary of case studies in Vietnam

Country/ Title	Vietnam 1: Sweet Potato (SP) & pig feed	Vietnam 2: 3 Reductions/3 Gains	Vietnam 3: Enhancing Gender Equality in NARI
Center/ Theme	CIP Crop breeding & livestock	IRRI, IRRC network Crop Protection/NRM/Social Science	IRRI Social Science
Training 'Target'	NARI scientists, trainers, extension workers & indirectly farmers	NARI Scientists, University researchers, national officials, state (regional officials) farmers organisations	NARI (Cuu Long Rice Research Institute), women farmers collaborating in research projects, local authorities who send farmers and extension workers to be trained
Training & learning modes	Degree training, CIP courses, Training of Trainers, who then trained farmers leaders who then trained groups of farmers	Collaborative research, mentoring, Farmer Participatory trials, media campaigns, policy dialogue	Awareness raising, mentoring, collaborative research, informal (e.g. attendance at workshops), policy discussions with unions and management in NARI
NARS Capacity Outcomes	NARI able to develop new varieties of SP & research programs, new capacities in universities	National program, new research and farming systems skills in NARI and at District level, NARI adopts project methods for 'sustainable agriculture'	Changes in human resource policies/practice in NARI: recruitment and promotion of women scientists. Insertion of gender into research projects and training offered by NARI
Wider Impacts	Widespread adoption of new varieties, increased farmers incomes, production and productivity, national policy focus	National policy change, self directed by Vietnamese authorities, increases in income, production, productivity of farmers	Increased women's' participation in training and participatory research, greater gender awareness by local authorities

## ANNEX X

### Cameroon country report

In Cameroon over the last decade and half the CGIAR has built a significant internal capacity focused on the sustainable development of the humid forest zone. This was led by IITA in the establishment of an ecozone station in Yaoundé and has been progressively joined by a range of other IARC's, particularly ICRAF, CIFOR, and ICLARM. At the same time deepening of national research and development capacities has been constrained, particularly during the structural adjustment and economic crisis of the 1990's. CGIAR programs are hosted by the national research institute, IRAD. The co-existence of well-resourced international programs and under-financed national programs creates, on the one hand, an immediate demand for capacity strengthening programs and, on the other hand, the desire to be equal partners in research. This report will explore training and capacity building activities of the CGIAR within this context of deepening programs of the CGIAR and often struggling national programs.

#### **National Agricultural and Development Capacities in Cameroon**

National agricultural research capacities have their roots in the colonial structures and expansion of research units with the Ministry of Agriculture. Independent national structures are relatively recent, beginning with the creation of the Institut de Recherche Agricole in 1979. This was followed by the creation of an institute working on animal diseases and veterinary medicine in 1982, where both managed a network of 69 research stations and sub-stations. The two were merged in 1996 into a semi-autonomous parastatal, the Institut de Recherche Agricole pour le Developpement (IRAD), under the Ministry of Science and Technology. This was accomplished under a World Bank loan for agricultural research, the first phase of which ran from 1988 to 1993.

Research within IRAD is organized within five scientific coordination units, namely annual crops, perennial crops, animals and fisheries, forestry and the environment, and farming systems. There is another unit which coordinates links to extension. The research is undertaken across five regional research centers, three specialized research centers, eight multi-disciplinary stations and twenty sub-stations. The research is undertaken by 235 scientific staff. The system is medium-sized by African standards, but does not have the financial resources to sustain a high degree of productivity. The government budget for agricultural research essentially only covers salaries, which during the economic crisis was even difficult to meet. The government has relied on donor aid to provide the operational, capital and training costs required to develop a productive research system. From 1988 to 1998 agricultural research was supported by a World Bank loan, support from German aid, and USAID. Since 1999, IRAD has primarily been supported by the African Development Bank. Capacity building at a NARS system level has been principally motivated and supported through these donor programs.

During the early nineties donor programs, particularly that of USAID's National Cereal Research and Extension project, supported degree training of IRAD staff. 52 scientists were trained at MSc and PhD level in US universities, all but four returning to positions in IRAD. There was an organization in the US that administered the fellows, ensuring visas, admission requirements, and language training. Sending so many staff for training at the same time delayed research program development until they returned and by that time, Cameroon was in the depth of an economic crisis. It has been difficult for IRAD to consolidate the capacity strengthening efforts over the past decade and a half.

IRAD is currently putting together its first training and human resource development plan. This is being driven by projections of a shortage of trained manpower in the near term future. IRAD staff appointments come under the civil service and hiring is determined by the Ministry of Science and

Technology. Under structural adjustment new hiring was essentially curtailed and IRAD could not hire any new staff for ten years. Last year 105 new staff only with first degrees—note that Cameroon universities currently are based on the French system, where the first degree is a five-year agronomic “engineer” degree—were hired by IRAD. This is addition to another approximately 100 staff, who do not have terminal degrees. As well, the age of mandatory retirement within the civil service has been reduced to 55. In the coming decade most of the current PhD’s will retire, creating an increasingly under capacitated national research system—this problem is not unique to Cameroon as many systems across Africa, e.g. Kenya, Uganda, and Mali’s NARI were developed under similar programs. Research management is aware of the emerging situation, realizes that large donor training programs are a thing of the past, and are looking for cost-effective means of staff development.

One necessary part of such a manpower development plan will be the national universities. As with many other African countries, there has been a significant expansion in new universities. Prior to 1993 there was only one university in Cameroon, the University of Yaoundé. In 1993 several university centers were developed into independent universities. One of these was the University of Dschang, which had been a university center or faculty of agricultural sciences. In 1981 USAID had funded a program through the University of Florida to develop Dschang into the only agricultural faculty in Central Africa, with the idea that it would provide training at a regional level—this objective was never effectively realized. There was also a staff training component and 22 faculty members received their PhD in the US. The faculty is still developing its post-graduate programs and to date offers such programs in plant protection, animal production, water management, and forest management and wood technology.

The degree system is based on the French academic system and a recent national policy has dictated that the universities in Cameroon change their system to be compatible with the BSc, MSc, and PhD system offered in Anglophone countries. As a part of this process the rector is initiating a reflection and change process in the university. The vision he wants to instil in the university is that it become a principal driver of agricultural development in Cameroon. Nevertheless, he is aware of the capacity constraints within the university to achieve that vision.

The largest constraint is financial. The university is restricted to charging about US\$100 per year for student fees, which is far from covering costs. Government funds provide the major part of the budget and yet these are far from sufficient, again covering mainly salaries and some operational costs. The research budget is virtually negligible. The university has not been able to achieve sufficient budgetary independence to accept private students—as Makerere has in Uganda. Nevertheless, the university is just finishing installing a LAN for the campus, and ICT is a particular focus of capital investment—although the faculty did not currently have access to AGORA or TEAL. Whether this will help to reverse the isolation of the university is another question. Dschang is distant from the capital, it has virtually no interaction with IRAD—even though there is an IRAD station in Dschang—and contacts between the faculty and the CGIAR Centers are limited, principally to the participation in ICRAF’s ANAFE network.

The revisioning process is only just starting but the dean expressed many of the constraints on developing the faculty as a major contributor to agricultural development. Firstly, feedback from stakeholders suggests that students do not have the skills and competencies needed by employers. Second, the very limited research that is done is highly fragmented, done as an academic exercise, and has virtually no links to farmer problems. Similarly, virtually none of the students’ thesis year is done through on-farm research. The dean wants to increase the research that is done within the faculty, improve links to other agricultural research organizations, improve the relevance of that research, and better conceptualize how to enhance farmer linkages.

Capacity development in agricultural extension was also supported by donor funding. This came during the period of the World Bank's support of training and visit extension in Africa. In Cameroon it began as a pilot project in six provinces focusing on cocoa in the humid forest zone. The US\$31 million project began its operational phase in 1991; a second phase with national coverage began in 1997. The project employed 2,394 personnel, 69% of whom were field extension workers, 11% were regional technical specialists, and 20% had supervisory roles. The project in the second phase also had an adaptive research component led by IRAD involving on-farm adaptive trials of promising technologies and monthly technical training of extension workers. Early in the second phase the World Bank began an overall reassessment of training and visit extension, and the project was terminated in 2004. The extension system is now left with virtually no operational funds, although the staff remains in place, and ministry must consider how to restructure within an alternative extension model.

Cameroon is not untypical of building capacity in agricultural research and development in Africa. This has involved periods of institutional restructuring, importation of institutional models through donor programs, periodic programs for staff degree training, and reliance on donor funding. Adequate financing remains the largest constraint to effective institutional development and productive output. However, even within this context talent and entrepreneurial ability can be successful, where they search for their own funding and institutional links. However, with the strengthening of the private sector and civil society organizations, much of this, usually younger, talent is often attracted out of the system. The CGIAR must develop its capacity building and research partnerships within this institutional context.

#### **CGIAR Research Programs in Cameroon**

With the expansion of the CGIAR system some 15 years ago, resource management within tropical forest zones became a more explicit research objective within the system. Given the political instability in the Congo Basin and the significant clearing of the forest in coastal West Africa, Cameroon became a focus of CGIAR research on this ecosystem, connecting as it did the coastal West Africa and Central Africa forest ecosystems. IITA established a research station in the country in the early 1990's as its benchmark site for the humid forest zone, joining a small program of ICRAF. Over time CIFOR and ICLARM have also developed programs there with out posted staff. The system-wide program, Alternatives to Slash and Burn (ASB), also has Cameroon as one of its benchmark sites.

It is fair to say that even with relative physical proximity, building programs across the different IARC's within a common strategic frame for both research and capacity building has taken some time to develop. A large part of this has come around organizing at least part of the research around the benchmark site that was defined and characterized by IITA. This involves a gradient of population density and market access, with varying levels of forest degradation and cropping system intensification. There are 45 villages that are monitored within the benchmark area, with six principal research pilot sites. This has allowed the building up of an increasingly sophisticated understanding of development processes, land use mosaics, and constraints on crop production within the zone. Overtime this has led to a more shared view of development challenges within the humid forest zone.

The different centers have very complementary missions within the humid forest ecosystem. IITA focuses its programs on the development of sustainable crop production systems, ICRAF on indigenous fruit and medicinal tree domestication, ICLARM on developing aquaculture systems, and CIFOR on sustainable management of tropical forests. Each of the programs has more recently integrated a marketing component into their research programs, as this is a critical part of improving farmer incomes in this zone. The ASB program has in many ways been the catalyst for better

integration of CGIAR Center activities in the benchmark site, as well as linking the site to similar benchmark areas in tropical forest zones around the tropics.

There is no common strategy for strengthening capacity in national institutions involved in research and development programs in the humid forest ecosystem. Capacity development in each of the centers is done within the research programs of the particular center. Only to a limited extent is their overlap in the institutions involved across the IARC's, and rarely is there overlap at the research program level. Moreover, IRAD itself, while having regional research stations in both the unimodal and bimodal forest zones, does not have an overall strategy for development of the humid forest zone and by extension the capacities needed to undertake such a strategy. Rather, the approach to capacity building by the IARC's is very much couched in facilitating and understanding institutional innovation at a pilot scale. Stephan Weise, coordinator of the IITA eco-station, refers to this as research on development pathways, which fits into the larger context of research for development. Capacity development, i.e. both training and institutional strengthening, in such a framework focuses on what might be referred to as more downstream capacities, that is extension, market innovations, farmer organizations, and NGO's. The work is organized and funded within the frame of projects, but the focus on capacity building through institutional innovation characterizes most of the work of the IARC's. Examples of this include Farmer Field Schools and strengthening of farmer organizations in IITA's Sustainable Tree Crop Program (STCP), strengthening of market agents and farmer negotiation ability in ICRAF and CIFOR's non timber forest products (NTFP), ICLARM's work on participatory approaches to pond and hatchery development, CIFOR's work under ASB on co-management (community and government) of indigenous forest resources, and ICRAF's projects on on-farm domestication of indigenous fruit and medicinal trees.

The capacity issue within the humid forest area comes back in a more fundamental manner when these projects move from a pilot stage to a scaling up phase. Scaling up is very much at the research frontier of NRM programs. In Cameroon these involve a platform of institutional partnerships—very much within the frame of innovation theory--, development of a functional division of labour within the platform, funds flow for national partners, building training capacity within partner institutions—for example, to produce master trainers for Farmer Field School methodology--, a coordination capacity with the attendant transactions costs, and building in an exit strategy that ensures institutional sustainability. The STCP is currently designing a project for a second phase that explicitly focuses on scaling up. This involves not training of trainers, but rather developing training capacities in national institutions. As the experience with the early devolution of training within the CGIAR suggests, this will not be sustainable unless these capacities can charge to cover their costs.

As with the pilot phase, these units must utilize a range of training methods, with an additional problem of how to ensure quality within the ongoing training activities. It is not out of the question that the IARC's could serve as something of an accreditation agency for methods such as Farmer Field Schools. In the STCP a Canadian NGO, SOCODEV, performs something of this function in the training and formation of farmer groups, where it develops skills in farmer organizations in accounting, conflict resolution, micro-credit management, and market negotiations and monitors group effectiveness. Training within such projects is done to build a range of competencies across multiple institutions, that in the end must interact in a synergistic manner to achieve a particular development goal.

### **Conclusions and Emerging Issues**

Cameroon is not atypical of NARS capacity issues in Africa. These are still relatively young institutions that have been put under a range of structural reforms that have in turn limited more organic program and institutional consolidation. This is exacerbated by the continuing dearth of

financial resources needed to produce effective research programs. That said, IARC's have not been explicit in first whether and second how they can contribute to human and institutional development within the NARS. It is probably a fair assessment that the IARC's in Cameroon do not, and in many ways can not, address the principal capacity needs of NARS institutions. Rather IARC's lead with their research programs and it is through these that programmatic, rather than institutional, capacities can be strengthened.

Two broad guiding principles condition how the IARC's develop such programmatic capacities. The first is that they must generate at least regional, if not global, public goods. Virtually all the projects are regional in scope, and ASB provides connectivity to global networks to distribute methods and knowledge generated within the Central African humid forest zone. The second factor is that these are in conception natural resource management programs, where systems research is the framework and different centers can contribute technological components, policy studies, site characterization, research tools and methodologies, and institutional innovations. Training and capacity development done within such a framework is by its very nature multi-faceted, involves a range of institutional partners, and is organized around project goals and strategies. As innovation theory suggests, these are structured in an extra-institutional context through platforms. Training and capacity development can only be evaluated in the context of such learning fora, rather than on the basis of contributions to the needs of a NARI or a faculty of agriculture.

Scaling up is on the agenda of many of the IARC's programs. ICRAF has a scientist whose job title incorporates scaling up. Scaling up by its very nature implies an institutional context, whether that be through markets or through networks of organizations, and the capacities to take technological, institutional, and policy innovations to scale. How to develop such capacities is in itself a research area, as it involves transfers of functions and capabilities developed in the pilot phase by the IARC's, conceptualization of organizational contexts where capacities need to be built, and the mix of private, public, and civil society organizations that can best facilitate scaling up.

Such a scaling up research agenda runs is emergent in all the IARC's in Cameroon. There is a question of whether a joint training and capacity building unit would make sense in the Cameroon context. It could provide better coherence in capacity building activities across the IARC's, provide research guidance on capacity building in a scaling up framework, provide monitoring and quality control of training activities, and absorb some of the administrative burden for training that is now shouldered by the individual research scientists. How this would be financed from budgets primarily dependent on special project funding is a question, which would require in turn some coordination in how such fixed costs could be built into respective IARC overheads. In that regard, Cameroon could become an example of how different centers come together around a common agenda and finance cross-cutting research and service support activities.

## ANNEX XI Malawi country report

### **Background**

Malawi is one of the poorest countries in Africa, and therefore in the world. Virtually two-thirds of the population live below the poverty line. Since around 85% of the population reside in rural areas, poverty is concentrated there. Such high rural poverty levels are in part due to an agrarian economy—85% of exports are agricultural and 80% of the labor force are in the rural sector—that must produce under very severe land constraints. Average farm size outside the estate sector is well less than a hectare, and plots are often fragmented, particularly in the southern part of the country. Soil nutrient depletion levels are some of the highest in Africa and farmers have difficulty in meeting subsistence needs, as average maize yields are only around a ton on the majority of smallholder farmers' fields. There are corresponding high rates of malnutrition and increasing periods of famine, such as occurred in 2003 and is predicted for next year, 2006. Malawi has had only three "good" harvests in the last 15 years for its basic staple, maize, and the country has essentially moved to a net import position to meet its basic food needs.

Malawi urgently needs to increase agricultural productivity. However, it must do this within a context of heavy demands on government budgets and resultant difficulties in financing agricultural research and maintaining sufficient capacity within the system. This situation creates something of a dilemma for IARC's working in Malawi, namely how to develop effective research partnerships with the national system, reinforced by capacity building efforts, when that capacity is both difficult to maintain and is generally weak. This often leads to the IARC's themselves substituting for capacity gaps. Nevertheless, given the CGIAR's mission statement and its focus on poverty alleviation, Malawi would have to be a focal country, given its status as a "hunger hotspot" in Africa. Moreover, strategies for poverty alleviation in Malawi must encompass the whole country, given that poverty is pervasive, unlike countries in Asia and Latin America where rural poverty tends to be spatially concentrated in lagging regions, not effectively integrated into the broader agricultural economy. In Malawi the task is how to generate an agricultural growth process under conditions of capital and land constraints, limited market infrastructure, depletion of natural capital, limited urban markets, and weak agricultural institutions.

### **The Agricultural Research and Extension System in Malawi**

Agricultural research in Malawi is carried out principally by the Department of Agricultural Research Services (DARS), located within the ministry of agriculture. The current structure came into being in 1985, when agricultural research within the ministry was reorganized and expanded from its traditional focus on agricultural export crops, exclusively produced by estates. Research was organized into six research programs, an adaptive research unit, and a technical services unit. This restructuring was supported by a World Bank loan, the National Agricultural Research Project, running from 1986 to 1993, and augmented by a USAID program on research and extension. Much of the human capacity development occurred during this period, as 13 PhD's and 31 MSc's were trained under the World Bank and USAID programs, or about 40% of the overall scientific staff positions. This was a period of significant capacity development, and was followed by a broader sectoral development program, the Agricultural Services Program, which ran from 1994-1999. The program supported agricultural research, extension, and a competitive grants program. During the period 1986-2000, donor funds provided on average two-thirds of the DARS budget. Donor funds were particularly important in supporting capital, operational costs, and training. Government resources essentially covered salaries.



Ironically, the period of donor support was a period of declining expenditure on agricultural research in Malawi. From the early 1970's to mid-1980's, investment in agricultural research increased at a modest rate, peaking in 1987. However, with the advent of donor funding and the shift away from emphasis on estate crops, spending on agricultural research declined, dropping from around US\$22 million in the mid-1980's to US\$13 million in 2001 (IFPRI, 2004). This loss of commitment to agricultural research on the part of the government had significant consequences when donor funding stopped in the year 2000, as by that time government spending priorities had shifted, and the drop in funding was only partially made by the government.

Agricultural research essentially depends on well supported and well trained scientific staff. DARS has been particularly unable to maintain its degree staff over the past 20 years. Current vacancy rates are about 50%. Four factors have combined to that have led to such high attrition rates. First, a freeze was put on recruitment in the mid-1990's, as part of IMF conditionality. This has only been rescinded in 2004. Second, the mandatory retirement age in the civil service is 55, and most of the degree students trained in the mid-1980's are reaching or have reached retirement age. Third, alternative employment opportunities have increased substantially in the last two decades, especially the expansion in the number of NGO's working in the agricultural area. Finally, Malawi has been particularly hard hit by HIV-AIDS, affecting all social strata. Thus, of the 137 of 202 DARS staff (including technicians) trained by the IARC's that could be traced in this study in 2005, 25% died, a large majority from AIDS, 20% retired, and 10% resigned. That is, 55% of all trainees have been lost from the system, significantly reducing the returns on CGIAR investments in training in Malawi. DARS must significantly rebuild its human capacity, and with the lifting of the hiring freeze, have started to hire staff at the BSc level. Nevertheless, funds for training at higher degrees for such staff are very limited.

Virtually all of these BSc graduates come from Bunda College, which until recently only had a faculty of agriculture. Its infrastructural and staff development was greatly aided by the same USAID program that supported DARS. This ran for a decade from the early 1990's, and was particularly instrumental in developing MSc programs in many of the departments. As compared to DARS, staff retention has been much better, averaging 80%. Of the more limited number of CGIAR trainees (34), of the 27 that were traceable, 10% had died, only 1 had retired and none had resigned, resulting in a retention rate for CGIAR trainees of 90%. However, the budget over the last few years has not allowed any funds to be put into the research fund, and academic staff must pursue outside funding for both research and supporting MSc students—who must come with their own tuition, either provided personally or through project funds. The vice-principal reports that staff retention has been so high partly because of the collaborative research opportunities with the IARC's. There is virtually no collaborative research with DARS staff, partly due to the lack of funding on both sides.

The extension system was restructured and capacitated under the Bank's ASP during the 1990's. The country was divided into semi-autonomous Agricultural Development Divisions (ADDs) under the direction of a Program Manager. This was the period of the Bank's promotion of Training and Visit extension and this system was the basis of the support to extension. A college was set up to train extension staff to diploma level, which has been recently renamed as the Natural Resources College and is moving toward private students, as government training for extension staff is moribund. With the termination of the ASP program in the year 2000, extension has as well many of the capacity and financial constraints of DARS. NGO's have moved in to fill the vacuum, expanding their work in the agricultural sector. More recently there is movement to piloting a demand-driven, pluralistic extension system with German funding, but this is only in the formative stages.

Institutional development in agricultural research and extension reflects virtually the same processes as in Kenya and Cameroon. Donors led by the World Bank restructured agricultural research in the

ministry of agriculture in the mid to late 1980's. USAID at the same time supported the revitalization of faculties of agriculture at Bunda, Egerton, and Dschang. A significant amount of degree training was done in this period, usually abroad, and resulted in the formation of professional capacity in the agricultural sector. At the same time, the World Bank provided loans to roll out Training and Visit extension in all three countries. The turn to PRSP's at the turn of the millennium and much more donor focus on social services resulted in a downturn in both donor and government budgets for agriculture, especially agricultural research. This was coming exactly at a time when the investments in human capital in the mid-1980's was needing major replenishment. By the year 2005, agricultural institutions across Africa were highly under-resourced. This was most true in Malawi, where government resources were limited to begin with, but the situation was exacerbated by the AIDS epidemic in the country. However, the need in the agricultural sector is if anything even more acute, as food shortages again loom in the country.

### **An Overview of CGIAR Training and Capacity Strengthening Activities**

The CGIAR maintains a significant capacity in Malawi. Five centers have regional staff based in the country, including CIAT, ICRISAT, ICRAF, IITA, and ICLARM. CIMMYT as well has major activities in the country, coordinated from its office in Zimbabwe. Most of the research can be characterized as being commodity-based, with a principal component focused on breeding and varietal development. Much of this work is organized in regional networks, principally under the auspices of SADC. Thus, from their offices in Malawi CIAT coordinates a network on beans, ICRISAT on groundnuts, and IITA on cassava and sweet potatoes. Much of the work of CIMMYT is done through its maize network. ICRAF, on the other hand, is organized into various interacting country programs in southern Africa. ICLARM as well has principally a country program.

The regional SADC programs in maize, groundnuts, and beans started around the mid-1980's. The IITA network was started at the same time but for East and southern Africa, but was divided between the two regions in 1994. As the ICRISAT coordinator noted, donor funding for CGIAR programs and national program development tend to track one another in overall funding cycles for support to agriculture. However, as in Malawi, rarely are support to the IARC's and capacity strengthening within the NARI's coordinated in any synergistic manner. The two were obviously reinforcing, but synergies in degree training, in priority setting, and in research program development were sacrificed. This work now represents two decades of research, primarily focusing on the development of crop populations adapted to the constraints of southern Africa. The early tendency to distribute new varieties from centralized breeding programs through multi-locational testing programs was found to be inadequate for the particular biotic and abiotic constraints of the region. This two-year span of dedicated breeding has resulted in an increasing flow of new varieties from national programs, but within a context of very limited uptake and impact.

A conjunction of an increasing amount of technology "sitting on the shelf" and a shift in donor funding toward improving rural livelihoods has significantly shifted the research that is being done by the IARC's. This has been reinforced by dependence of the IARC programs on project funding. Over the last five years, research has significantly shifted to what might be termed the development pathway, namely understanding the chain of interventions that need to be in place to have impact with the new varieties and crop management practices. Thus, there has been a major focus on seed systems, particularly after market liberalization and the privatization of the seed sector, on output market development, and on innovative extension methods, particularly for complex, management intensive technologies. The traditional breeding activities continue, but the balance of activities has shifted to research on impact pathways. This has significantly broadened the clients with which the IARC's work. Rather than just commodity programs within DARS, the IARC's now as well work with the private sector, farmer organizations, NGO's, and extension.

It is within the above context that training by the IARC's is prioritized, trainees selected and courses developed. Training across the IARC's has been decentralized to the regional programs. As well, funding for training is embedded within project budgets. In general across the IARC's, there has been a shift in training, primarily due to current project priorities, away from MSc degrees and to short courses that builds capacity in dissemination. This training is integrated into research on such scaling up, best represented by an ICRAF scientist whose research focuses on scaling up. The current balance towards developing downstream dissemination capacity as opposed to research capacity reflects both the immediate food security situation in Malawi and the need to understand the necessary and sufficient conditions required to have impact with new technologies. Building such capacities is necessary to test those conditions, and currently the balance is on the downstream capacities.

Given the very weak institutional capacities that exist in both research and extension in Malawi, how do the IARC's both link their research programs to Malawian institutions and conceptualize capacity strengthening in the country. CIMMYT has followed a more traditional approach, focusing on maize breeding but with some work on soil fertility through SoilFertNet. (Capacity in soils research has been practically decimated in both DARS and Bunda with the deaths of the principal soil scientists.) CIMMYT provides populations for evaluation together with the funds to carry out those evaluations. A recent focus has been on breeding for drought and low nitrogen tolerance, but populations are also evaluated for quality protein and soil acidity. Targeted training is a principal component of this work, as maize scientists have attended courses on breeding for quality protein maize and a course on drought and low N breeding and evaluation. There has also been significant loss of personnel in the maize program through death and resignations. Much of evaluation work is now done by a DARS scientist who has retired, but has been retained on contract. To fill this gap there are two Malawian scientists supported by CIMMYT who are out for degree training in South Africa and Zambia. Under these conditions several OPV's from the drought work have been released, with evidence to suggest good acceptance by smallholder farmers. It is apparent that the maize research program would not be functioning at all, much less releasing new varieties, were it not for the continuing support of the CIMMYT program based in Harare.

The next phase of CIMMYT's work on drought and low N will shift from breeding to seed production and dissemination, although continuing some of the breeding program. While new varieties are being released, there is limited uptake by seed companies of the OPV's—only when there is a large order through a relief program--and limited distribution to smallholders. The focus will be on improving seed production and distribution of these new varieties. In many respects, CIMMYT is following by a few years the shift in focus that has already happened with the work of ICRISAT, IITA, CIAT and ICRAF. Seed production and dissemination is a focus of CIAT (community seed systems), ICRISAT (seed revolving fund and NGO production), IITA (rapid multiplication systems), and ICRAF (farmer organization nurseries). There is a range of training courses organized around seed technologies and dissemination and involve primarily NGO's and farmer organizations. There have been attempts to involve private seed companies in the production of these self-pollinated varieties, for example ICRISAT's work with SeedCo, but with limited success.

There was a general shift to on-farm testing of new technologies across the IARC's in the mid-1990's. This should have linked to the adaptive research program in DARS, but that program was never well integrated into the program structure and it was suspended in the early 1990's, possibly because the technologies were not quite at a sufficient stage of development for on-farm adaptation. This on-farm testing then produced technologies that had potential for wider scale adoption. In the last five years, this has produced a research agenda on how to achieve broader based dissemination, combining seed systems, extension of production technologies, and output marketing. Much of the training done by the IARC's in Malawi now revolves around these issues, with the central focus on training farmers

through intermediary organizations. Such work is well supported by donors, although primarily through regional programs.

The most well developed model for this is probably that of ICRAF. Extension and adoption of agroforestry technologies face particular challenges. The improved fallows and other soil fertility replenishing technologies being promoted in Malawi are management and information intensive, require changes in the production system, and have more than two year lags in generating benefits. Such technologies require innovative methods in extension and dissemination strategies. Training and capacity development in this area requires three essential steps, namely development and testing of the extension methodologies, development of the farmer curriculum that will form the basis of the “training of farmers”, and developing the courses for the training of trainers in these methods. In the initial stages ICRAF worked directly in training farmers. It is probably fair to say that there was not a systematic comparative evaluation of alternative extension approaches and farmer training methodologies. Much of the training was demonstration followed by some learning by doing through on-farm trials in which the farmer applied the technology and was then monitored. Such methods over time then coalesced into an understanding of farmer information needs and standards of practice, which then formed the basis for the training of trainers.

The ICRAF farmer training methodology has evolved into a modular form on the basis of the phasing of the technology components that must be put in place for a fertilizer tree system. This phasing would include nursery development, germplasm selection, tree establishment and management within the crop field, product marketing—particularly for indigenous fruits—, and enterprise development. This is somewhat similar to IITA’s integrated cassava production, processing, and market development projects and the modular training done within that framework. However, the ICRAF Malawian staff estimate that a five year commitment is needed to ensure farmer understanding of all the components and to effect adoption. As Steven Carr notes, “there has been increased uptake of (agroforestry) technology associated with projects (in Malawi) but little osmotic spread.” (Rao and Kwesiga, 2004) This gets at the fundamental research question of what are the costs and benefits associated with such projects and how can these be taken to a sufficient scale so that per farmer costs can be reduced. ICRAF is only beginning to evaluate this question.

ICRAF is probably the most advanced in developing a research agenda around this scaling up question, although the question is also within IITA’s work on cocoa in West Africa. In Malawi the team operates in about 12 pilot scaling-up sites. These are organized at the level of the EPA, the smallest administrative unit in Malawi. Given the weakness of extension currently in the country, a NGO provides the organizational structure within which to carry out the work, but with involvement of local extension agents. These pilot sites provide the focus for training and capacity building. However, while methodology development (i.e. the global public goods aspects of this work) is a central part of the research, as well as the actual potential for impact on Malawian farmers—ICRAF has set a target of 100,000 adopters of agroforestry technology in the country—, the emerging questions are how sustainable are the capacities being built (and therefore the return to training investments) and what are the requirements in moving to the next level of scaling up. In Malawi this will depend on whether the growth in NGO’s will continue—there is an active agricultural working group of NGO’s—and to what extent they will fill the extension capacity void. There is discussion of moving toward a more pluralistic extension system, such has evolved in Mozambique, but even in such systems, there is a vexing question of how to build capacities in such hybrid systems. Thus, moving to either a district or even national scale does then return to question of how to overcome the current inadequacies in extension in the country. The IARC’s are poised to have input into that question, but they cannot assume a direct role in rebuilding such capacity.

The other dimension to the scaling up research agenda, and the capacity and training issues that derive from it, is the issue of integrating technologies. The move of each of the IARC's into working through dissemination and scaling up methodologies for each of their crops and building the capacities to do so raises the problem that extension methodologies are not being developed within a farming systems context. Crop specific extension and scaling up methodologies make little sense once the work moves beyond the pilot stage. There would be value at this stage of the work in Malawi for the IARC's to begin to integrate their work and the capacity building and training initiatives that flow from it. Institutional pluralism in extension must be matched by technological pluralism. There are current discussions to do exactly this in the Chinyanja triangle with USAID funding. If this does evolve, there will as well be significant potential for feeding into the African Challenge program site in Southern Africa.

The shift in IARC funding to dissemination research and the broadening of partnerships in the process has driven something of a wedge between DARS and its traditional extension linkages. The shift has necessarily left the NARI behind in developing and evolving its own dissemination partnerships. It can be validly argued that neither public sector research nor extension have the personnel and operational capacity to affect such linkages and that this problem is a reflection of such weakened capacities. This issue highlights an important point, and one that was missed in the period of institutional restructuring starting in the mid-1980's. The IARC's have been quite successful at working through innovation in dissemination methods working from the bottom up, i.e. developing methods, testing them at the scale of the EPA, and building necessary capacities. However, this process is currently bumping up against institutional constraints that can only be solved by analyzing the R&D system as a whole, i.e. as was done through the 1990's. In essence there is potential for top down now to meet innovation coming from the bottom, but what is needed is a revisit of the structural constraints at the level of DARS and the extension system.

### **Conclusions and Emerging Issues**

Malawi raises a central question for the work of the CGIAR. Given its mission of alleviating poverty, how far does it go in addressing capacity constraints to have impact on rural poverty rates, and as a corollary, how far does its research and capacity building programs extend through the impact pathway in order to realize sufficient scale in farmer adoption? The preconditions, most of them institutional, that allowed new technology to drive the Green Revolution in Asia, do not exist in countries like Malawi. The IARC's in Malawi have adapted their research programs in relation to the declining capacity of the national system and have maintained continuity in what research is carried out in the country. This long-term continuity of the CGIAR in agricultural research is now producing a stream of promising technologies, where uptake is now limited by other factors than the technology itself. Nevertheless, the return on the past investments in training has been low. Human capacity development must be combined with a focus on retention if those capacities are to produce effective research, and retention in turn depends essentially on institutional capacities.

However, the CGIAR is bumping up against what it can effectively do in Malawi. To move further will require dedicated rebuilding of capacity, of the type donors supported in the 80's and 90's. The CGIAR's research programs in the mid-1980's were restructuring to better focus on the particular problems of African agriculture. After 20 years there is now the possibility of a productive synergy between the CGIAR and World Bank and other donor support to rebuilding research and extension capacity in Malawi. The Rockefeller program of the same period suggested the mechanism, whereby loan funds from the Bank would support broader research system change but the Rockefeller grants supported the work of the IARC's in linking with national program scientists—this program also was closed at about the same time as other donor support (Blackie, 2005).

The Director of Agricultural Services at DARS detailed his wish list of what the CGIAR could provide in support of capacity building of agricultural research in Malawi and included the following four points: (1) a long-term commitment to training and capacity building, i.e. maintaining rather than substituting for national capacity; (2) training needs to be determined jointly; (3) integration of CGIAR training with local institutions, particularly Bunda College and the Natural Resources College; and (4) a dedicated effort to preserving human capital investments from the ravages of HIV-AIDS, including anti-retrovirals. This is rather sage advice, and meeting these four points would best come from a more coordinated approach across CGIAR Centers to training in Malawi, as is currently being discussed in the Medium-Term Plan on CGIAR integration in East and southern Africa. As only partly detailed in this report, what now appears as a super ordinary challenge, could with renewed donor commitment be turned into an opportunity for meeting Malawi's future food needs.

## ANNEX XII Case study from Kenya

### ILRI'S SMALLHOLDER DAIRY PROJECT

#### Background and Capacity Innovation

Higher level constraints often limit the uptake and impacts of new technologies, especially in Africa. These can be constraints at the level of markets or at the level of policy and institutions. For an institution such as ILRI, that focuses principally on technical innovations in livestock production systems, interventions at these higher systems levels are often necessary to achieve impact from investment in their research programs, especially impacts on poorer segments of the population. This 8-year project focused on an integrated approach to productivity change in smallholder dairy systems in Kenya, where an estimated 800,000 smallholder households keep 1 to 3 dairy cows on 1 to 2 hectares. The project initially focused on improved understanding of constraints to increases in smallholder dairy productivity and a systems approach to research on dairy production systems. However, the diagnostic surveys led to a shift in priorities to market and policy constraints. This project is typical of many that tied research to fostering development outcomes, and as such expanded both the number of partners, opened the set of interventions beyond purely production technology, and resulted in a reformulation of regulations to allow poorer urban consumers access to milk.

Kenya in many ways offered the opportunity to test how to direct higher value dairy technology to poorer segments of the rural population, noting from the diagnostic work that there was a certain minimum requirement of capital and land resources needed to enter into this market and that proximity to milk collection points and milk processing plants was critical to farmer entry into the market. These findings led to a focus on access to informal markets for raw milk as an initial entry point for improving the welfare of smallholders who had limited access to roads or milk processing plants, a focus which ran against food safety regulations in the country. Change in regulations required a range of interventions, including risk assessment, study tours to other countries, and building of evidence and policy research. As the project review stated, the project relied on a multi-pronged approach to capacity building around strategic intervention points, including developing highly credible evidence, honing good partnerships, achieving a catalytic, facilitatory role, mixing strategic vision, opportunism and luck, effectively using a steering committee, and forming a focused, issue-based network. There were a combination of approaches, all involving different types of learning and mixing formal and informal approaches. Most of this work was done outside formal institutions, a trend in developing institutional innovations in linking research, development and policy reform.

#### Implementation and Instruments Used

Training and informal learning approaches were integral to the smallholder dairy work by ILRI in Kenya. MSc and PhD thesis research—19 students in all—formed the basis of both the diagnostic work and the policy research. This was a critical part of the work, as this evidence-based learning provided a continual flow of new knowledge into the evolution of the work. However, the central focus was on improving the capacity of partners in the dairy sector to use effectively the new information and knowledge. All of this was coordinated by a steering committee, consisting of three key institutions the ministry of agriculture, the Kenya Dairy Board, and ILRI itself. However, as the project proceeded, an initial focus on the public sector was complemented by involvement of civil society organizations and NGO's, that effectively expanded the implementation capacity. A consortium formed around the issue of informal milk markets as a counter to impressions being given by the large-scale, commercial dairy industry. In such collaborative work, equal stress was put on

valuing process together with the hard empirical evidence, and as a result fostering ownership in a policy change process.

ILRI played a key role in several respects in facilitating the development of this research and policy process. Critically in an African setting, ILRI played a neutral role in bringing the different institutions together, in organizing the funding, and in putting together the management team. This process culminated in the launching of the Dairy Forum, which brought together all key stakeholders in the dairy sector to discuss research-based information that could be applied in the industry. The particular emphasis was on expanding input and output markets to increase further participation of smallholders in the formal sector, but without undercutting the key role of the informal milk market in promoting initial investment by smallholders in higher-value dairy production. The informal market remained the larger market though which milk was distributed and particularly was important in access of poor rural consumers to dairy products.

As the project objectives moved from purely productivity research to linking research to development impacts, the training shifted from a focus on improving individual capacities to institutional capacities, and in the process the range of learning modalities expanded significantly to short courses, e.g. on risk assessment and dairy farm management, study tours such as the South-South smallholder dairy production tour, conferences, and steering committee meeting, all of which culminated in the creation of the dairy sector forum. Individual training was augmented by being part of a problem-solving research team, where individual research was directly fed into the learning and policy process and where each research component built on other research. Being part of a larger team, focusing the research on problem solving, and direct channels for uptake of the research all contributed both to developing research skills but also understanding the institutional framework within which that research would be applied. Finally, the institutions from which trainees were drawn expanded significantly. Particularly important to the evolving focus of the interventions, training and certification of small-scale milk traders was found to be a much better intervention than tightening regulation of those traders.

### **Outcomes and Impacts**

ILRI's work in the expanding dairy sector in East Africa focused on improving access of smallholder farmers to this higher value market. There are a range of technical issues involved in integrating dairy effectively into diversified systems where farm size rarely is over one to one and half hectares, particularly achieving productivity complementarities between the crop and livestock component. However, given the limited location of milk processing plants, especially after market liberalization of the sector, and the high cost of transport, significant numbers of smallholder farmers were effectively barred from entry to this market, unless through the informal, raw milk market. This project effectively shifted the debates first from a focus on commercial farmers to integration of smallholders and poorer segments of the rural population, second from a focus on technical interventions to policy interventions, and third from a policy focus only on the formal milk market to improving food safety and quality control in the informal raw milk market.

The principal outcomes were the development of the knowledge base to inform these debates and the creation of the institutional innovations that would drive resolution of these debates. The project can be conceptualized purely in terms of formal and informal training and capacity building, especially where the research was essentially done by Kenyan MSc and PhD students. However, many of the organizational structures were built around the partnerships across the different stakeholders in the dairy sector, rather than organizational capacities within these institutions. To maximize the benefits of this work, future capacities would need to be strengthened in these organizations, particularly in livestock extension. In this case, focusing first on capacity strengthening in these organizations would



not have worked as effectively, without first creating the linkages across the sector, however, noting that this depended on external resources.

There is as yet limited information to evaluate the final impacts of this work on the incomes and welfare of smallholder dairy farmers. This will depend on the improved efficiency and capacity of informal milk traders and with improved market access, the ability of smallholders to invest in dairy livestock and adopt new production technology. Case studies support the potential of this chain of interventions to impact on smallholder dairy farmers, but a large impact evaluation has yet to be done. Nevertheless, the pre-conditions for impacts on poor dairy producers was built into project objectives, and remain in place for expanding impacts on both poor producers and consumers of dairy products.

## ANNEX XIII

### Bolivia country report

#### 1. Overview of capacity needs

##### Background

Bolivia is by far the poorest country in South America. Of its 8.3 million people, 59% were classified as poor by the 2001 census, but for the rural population (40% total) the poverty incidence was 91%. Overall, 91% of the total population was estimated to have energy-deficient diets. The census detected a 71% level of educational insufficiency in Bolivia's rural population, an index reflecting illiteracy and proportions of children not in school.

##### Policy

The country is characterised by political instability and by the politicization of its institutions. This has repercussions on all those involved in agricultural research and development, and has led to serious 'wastage' of trained human resources, equipment, infrastructure and information.

The most recent change was the dissolution of the national institution for agricultural technology (IBTA) in 1998. Bolivia is now the only country in South America with no national agricultural research institution as such. A new institution (SIBTA) was set up in 2000 which operates through foundations (FDTA) in each of the four main agroecological zones which range from very high altitude lands to lowland tropics. The foundations operate through competitively funded projects, with a market-driven, producer-consumer chain orientation. Eight priority areas have been set at government level, mainly with a view to export potential, but the foundations appear to set their priorities independently. Most of the projects in progress (>200) are concerned with technology transfer, and only two of the present ones relate to research and technology development. SIBTA also has responsibility for genetic resource conservation, which it discharges through contracts with national institutions. At the same time, the Ministry of Agriculture and Rural Affairs has contracted a study of research institutions with a view to classifying those which qualify as centers of excellence, which would receive government support. There are major concerns in the research community about the new policy. First, as to whether a strongly market-oriented demand for technology is an appropriate basis for defining national research and development policies and priorities for the long term. A case in point refers to potatoes which is the national basic crop and of which Bolivia is one of centers of genetic origin. Since this was perceived not to have export potential, it was not included as a priority crop. Secondly, there are questions about whether the real demands for technology at the community level are being expressed through the new process: supplying technology to those most able to voice their needs may not reflect the long term interests of the community at large.

The present time is, thus, one of transition. All interviewees emphasised that while education and training are the cornerstone of capacity building for technology generation and transfer in the country, the lack of clear long-term research and development policies which would serve as a framework, is an overriding limiting factor. Education for policy development and to form a sufficient body of opinion to bring about some degree of stability in policies for agriculture and related fields is therefore perceived as high priority.

##### Research capacity

Agricultural research has been severely debilitated in recent years and only survives in a few institutions (most estimates are 3-5) which have independent funding. Expenditures on R&D for the period 1996-2000 (0.3% GDP) were close to average for the region. But the numbers of professionals estimated to work in this area (98/million people, years 1996-2000) was much lower relative to the size

of the population than all other countries except Ecuador and Colombia, and the estimated total number of researchers (157 in 1996), most of whom were in the government sector, was by far the lowest in the region. Consequently, there is a serious question of whether sufficient technology exists or can be generated in the short term to satisfy the demand detected by the foundations. This is especially critical in the areas of the country with severest natural and social limitations where comparatively little technology is available (e.g. the highlands above 3000 m, and lowland tropics). Improved capacity for technology generation is therefore essential if the new system is not to collapse. Institutional stability, political independence and funding are of fundamental importance, so the potential role of training in capacity building is variable, but in the more stable centers of research, further training is given high priority, as exemplified by PROINPA (Case study 3).

### **Social aspects**

The particular characteristics of Bolivia's rural population pose special challenges for technology transfer which, as described above, is the main focus of the new policy. Apart from the high rate of illiteracy, the population in many highland and lowland areas communicate best in native languages, whereas many professionals speak only Spanish. There is a strong tradition of forming associations among groups of all kinds which intervene in the producer-consumer chain, but in practice these tend to operate mainly for political purposes, rather than for facilitating production or marketing processes. Identifying real demands is therefore one aspect of the problem of rural development, and facilitating the adoption of appropriate technologies on a massive scale is another. Given the size of the rural population, large numbers of agents, trained in appropriate methodologies and communication skills, are required to implement the new system successfully.

### **University Education**

University education in agriculture and related fields was perceived to be deficient, with few notable exceptions. There are 11 Faculties of Agriculture (or related fields) in public universities and three more in private ones. They are mostly underfunded with limited resources beyond salaries, and often highly politicised, so generally play a very limited part in agricultural research and development. Most professors are part time and do no research or extension work. Students are considered to be ill-prepared to enter the fields of research or extension. Also, deficiencies in their university formation often affect researchers' ability to take full advantage of their CGIAR training later on. Interviewees saw an urgent need to modernise and improve university education in fields related to agriculture, and bring the universities more actively into research and extension which, in turn, will be reflected in the relevance and quality of their teaching.

Education at higher degree level is generally not rewarded in Bolivian institutions. Professionals with higher degrees tend not to be sought out by national institutions because they aspire to higher salaries. When professionals return to their institution after graduate level training, they usually shift to some administrative capacity. However, all interviewees agreed that a higher degree was almost indispensable for having access to external donors' funding. Given the shortage of national funds, this was all the more important. There are several Master's programs in fields related to agriculture, sometimes in association with national research institutions (e.g. PROINPA, Case 3) and/or foreign universities. Particular interest was expressed in inter-institutional arrangements which would allow the candidate to take specific course work in a given university, combined with research in his home institution or in collaboration with a CGIAR Center. Language was mentioned frequently as a factor affecting the selection of institutions for graduate studies.

## **Funding**

There is a mixed picture about funding as a factor limiting capacity for agricultural research and development. Bolivia has received massive contributions in this area over many years, from multilateral (e.g. IDB, World Bank) and national donors (e.g. Switzerland, USA, Denmark, Holland, Germany, Japan, Italy, United Kingdom, European Union). This support may reasonably be expected to continue. First, because of the high incidence of poverty, and second because of recent increases in the production of cocaine and the growing political strength of the coca producers. However, national researchers perceive these funds as extremely difficult to access, and report an acute shortage of national funds which they consider essential to provide continuity of work in the long-term priority areas. Reliance on project funding has made it difficult for the few national institutions which do engage in research, to maintain long term research/development policies (Case study 3). Capacity building needs, including training, arise erratically in response to funding opportunities. Professionals trained to work in a given area move to a different one when the project ends and stop making use of the skills and knowledge acquired. An urgent need is therefore to equip institutions better to access funding to fit their priorities. As suggested above, higher degrees are important in this context, but there is also a need for greater expertise in all aspects of project writing, donor contacts and negotiation.

## **2. Overview of the role of the CGIAR**

### **Past contributions**

A considerable proportion of the trainees' institutions have suffered major transformations or have ceased to exist. Forty-one members of the national institution, IBTA's, staff were trained by the CGIAR and though some of them were absorbed by other institutions when IBTA was dissolved, many are known to be working in areas outside their scientific competence such as tourism and commerce. In the case of a more stable institution (CIAT-Santa Cruz), 42% of the 43 CGIAR-trained scientists no longer work there, and only one of the six trained through the Tropical Pastures Network (RIEPT) remain.

Faced with these institutional problems, there are several examples in Bolivia where CGIAR Centers took exceptional measures to contribute to stabilising and strengthening, by long-term systematic collaboration with strong formal and informal training elements (e.g. Case studies 2, 3 and 4). The case of PROINPA, where CIP made major contributions to planning, policy setting and management as it evolved from a potato project into an autonomous foundation, is the outstanding example (Case study 3). It is significant that there has been remarkably little turn over of staff: of 49 scientists trained by the CGIAR since 1989, 41 still serve the institution.

In the more stable institutions and programs, the Centers' contribution to institutional strengthening typically consisted of a combination of inputs, as illustrated in all the case studies. The starting point was usually a formal training component, possibly combined with provision of germplasm and sometimes equipment, followed by continuous informal contacts between Center and national staff, widening of contacts through networks, updating of methodologies through repeated formal training experiences, and joint research project design and implementation. Training in scientific areas was complemented with training and informal advice on priority setting, institutional management, research monitoring and evaluation, information management, (e.g. CIAT-Santa Cruz, PROINPA), and even accounting and library management (PROINPA). The germplasm freely provided to national institutions by the Centers was rated as a vital and unique contribution of the Centers to capacity building. The case of beans (Case study 2) illustrates the importance of this contribution quite dramatically, with over 97% of parental material having CIAT genebank ancestry. The detailed

knowledge about the characteristics and performance of the accessions which the Centers' scientists share was considered to be as valuable as the germplasm itself. The costs of much of the germplasm and of the training carried out until the mid 1990's, and in some cases beyond, were covered completely by the Centers. Improved access to funding was another major contribution: counting on an international center as a collaborator was perceived to affect positively the success of their submissions to donors. There was, nevertheless, some feeling that the Centers had been more concerned with financing their own agenda through this mechanism, than in ensuring that national needs were adequately covered. There was also some discomfort with the fact that, due to IDB rules which required international tenders for the foundations' projects under the new system, centers had competed with national institutions. This was seen to conflict with their declared mission of strengthening the capacity of the national institutions and although the rules have now been changed, the perception of the centers as competitors for funding remains.

Given that the overall contribution to capacity strengthening generally had multiple components, looking at any one type of contribution in isolation tends to distort the real picture, but some comments on the main training components are given below.

### **Formal training**

Formal training by the Centers has been relatively important in Bolivia. The country ranks fourth in Latin America in terms of the intensity of training (SC Secretariat, 2004) despite having far fewer (10-43%) professionals engaged in agricultural research than Peru, Colombia or Ecuador which rank higher. Table 1 gives an overview of the formal training carried out by the centers, according to existing records provided by each of them. A total of 233 Bolivians are known to have benefited, often with several training experiences at the same or different centers. However, existing figures certainly underestimate the real dimension of the training effort, mainly because in-country training activities are partly or totally (e.g. CIAT) excluded. Trainees were usually researchers (mainly agronomists and biologists), but also technicians, educators, students and a few producers. They came from research institutions, NGO's and producer associations, universities and the private commercial sector in that order. This was interpreted by interviewees to reflect the degree of activity of the various types of institutions engaged in research and development in the country, rather than a strategy of targeting them differentially.

*Correspondence with NARS' needs:* Discussions on formal training touched first on how far NARS' demands were perceived to be taken into account by the centers. After the disappearance of IBTA, interviewees considered that there was no 'voice' or coherent expression of demands across the institutions which comprised the national system, and that this continues to be true. Centers had therefore worked with institutions individually, and most interviewees believed that international research trends and the availability of funding through the centers had been the major forces determining their training 'needs'.

*Reduction over time.* A topic consistently raised in discussion was the reduction in CGIAR training which has occurred in recent years. Center records are insufficiently complete to quantify this trend overall, but CIP, for example, no longer finances training in Latin America from unrestricted funds. Another example is given by time trends for different types of training of Bolivians at CIAT headquarters, for which records are accurate (Table 2). Attendance to generalised courses practically stopped after 1985. Specialised courses reached a peak in the 1980's but no Bolivians have attended these since 2002. Similarly, individual training has fallen off markedly since the mid 1990's, although two higher degree students started training after 2000. The course work has been substituted to some extent by in-country events, but these obviously do not replace individual training. Without

exception, interviewees drew attention to this reduction and strongly advocated a reversal of the trend.

*Advantages of CGIAR training.* Interviewees were very forthcoming about the advantages of training by CGIAR Centers. PROINPA researchers were asked by management (i.e. unconnected with this study) to note the most important training experiences of their careers. The results shown in Table 3, although from a small sample, are quite favourable to the CGIAR. In addition, interviewees in two research institutions included professionals who had not received Center training. They consistently reported to have benefited from information or skills passed on, and by widening of their professional contacts through their Center-trained colleagues.

Taking together the evidence from all the institutions visited in the course of the study, the following aspects stood out as the particular advantages of CGIAR training, compared with other institutions. They are arranged in approximate order of importance as captured from the interviews:

- unique holdings of germplasm and knowledge about the accessions;
- multidisciplinary expertise and integrated problem-solving vision in areas of particular relevance to Bolivia, ranging widely from, for example, specific crops to a whole watershed management;
- understanding of local conditions, language;
- short, highly specialised training opportunities, fitting easily into the demands of current job;
- worldwide professional contacts;
- knowledge of financing options and donor requirements;
- 'gateway' to collaborative projects and access to funding;
- specialised libraries and access to information.

A major consideration was also that up until the mid- 1990's, and sometimes thereafter, much of the centers' training was free. This drew researchers into training where the opportunities arose. At present, Bolivian scientists report an acute shortage of funds for training. So while the advantages set out above were genuinely perceived, the cost factor may have coloured their overall perception of the comparative advantage of the CGIAR

*Training strategy.* The Centers were not seen to have any particular strategy with respect to the formation of a given individual. Very variable backgrounds and qualifications were observed among participants to most courses and workshops. Interviewees would welcome clearer candidate selection criteria and their strict application, to ensure that the level of training was suitable in each case, and at the same time to improve training quality. A need was also perceived for guidance about the logical sequence of training themes in some areas, so that trainees' overall learning experience could be rationally structured.

In contrast, there were several examples of a clear strategy with respect to building critical mass in a specific disciplinary area (e.g. participatory research, Case 1), building multidisciplinary capacity in crop programs (e.g. Cases 2 and 4,) and, in an exceptional case, capacity building at the institutional level (PROINPA, Case 3). Their specificity raises the question of whether they fit with the 'international public goods' criterion for CGIAR activities. Strengthening members of international networks would seem valid on the grounds of benefit to other national programs (Cases 2 and 4), and in fact the contribution of the Bolivian bean program (Case 2) to the regional network (PROFIZA) was outstanding, according to annual reports. The case of PROINPA (Case 3) may seem more difficult to justify. But Bolivia is the source of origin of many potato varieties which have a real or potential role to play in CIP's global mandate for this crop, and at the same time the poorest country in South America. With the collapse of the national research system and the risk of losing unique germplasm, there would therefore seem to be convincing reasons why CIP should go to exceptional lengths to help

ensure the survival of at least one partner institution in the country. PROINPA is, arguably, the strongest and most sustainable of Bolivian research institutions today.

*Training types* Table 2 shows how training types have changed over time, using the example from CIAT. Long production (general) courses and, later, short production courses were replaced by short specialised ones, while individual training has continued, albeit at a lower level. Higher degree training has been maintained with two new Bolivian students since 2000. The clear recommendation was that no single type(s) are most useful, but that a combination of different training options should continue to be offered to fit varying needs and subject matters appropriately. Short, specialised workshop-type courses; specialised individual training; higher degrees in collaboration with national and foreign universities; and collaboration on joint projects were all expected to continue in strong demand. These options would ideally be complemented with informal training (see below) and contacts maintained with the centers over long periods of time. Great importance was attached to continuing to provide practical experience, as well as theoretical knowledge, in most subject areas of interest.

*Subject matter.* Center records as a whole are incomplete with respect to subject matter, but some details from center and local sources are given in the case studies. These show that the number of areas covered is very wide (e.g. Cases 2, 3 and 4). They include subjects such as data processing, documentation, information and communication as well as scientific areas. The trend from general to specialised themes (e.g. from breeding to molecular techniques) can be traced in some specific cases (e.g. Case 2), and is clearly shown in the records provided by CIAT (Table 2).

Although information is incomplete, a subjective appraisal of the main areas covered by the centers taken together indicates that four subject areas stand out in terms of the numbers trained and numbers of training activities provided. The first concerns germplasm. In addition to training for the genetic improvement of the traditional crops (e.g. maize, rice), Bolivia has important, and in some cases unique, collections of native plants (e.g. Andean roots, tubers, grains, trees, fruits) and camelids. There has been a major contribution from CIP, CIAT, CIMMYT and IPGRI in training to improve their collection, conservation, characterisation, genetic improvement and utilization, and to understanding the complexities of international agreements on genetic resources. Secondly, seed production where CIP (potatoes) and CIAT (beans, forages) made numerous contributions to training in propagation, diagnostics, disease control, quality control, conservation and management. Examples of the impact associated with this are given in cases 2 and 4. Thirdly, in crop protection, where CIP (potatoes), CIAT (beans, forages, rice) and CIMMYT (cereals) had many trainees and, fourthly, participatory research methodologies. Training in this area represents 11% of CIAT's efforts alone, in terms of numbers of activities provided, and this was associated with changes in institutional policies as well as impact at field level (Case 1).

*Training quality, location, delivery modes.* Training quality was not brought up at all as an item for discussion in the course of the interviews. This suggests that it was generally found to be satisfactory and that other topics were more important. With respect to location, the experience of visiting the Centers was valued very highly by individuals who had done so, particularly for the learning experience from co-trainees and center staff in areas outside their particular fields. Examples in Case 2 refer to work ethic and discipline, an enhanced understanding of institutional organization and management, and introduction to new methodologies from colleague trainees. Against this, visits to Bolivia by center scientists had the important advantage of giving the centers a clearer understanding of local conditions and needs, and larger number of national researchers benefited from the visit. In this context, the value of having scientists outposted in Bolivia was underlined.

With regard to delivery modes, a mixture of these continues to be appropriate. Training of trainers was a particularly valuable approach in the technology transfer/extension areas where such large numbers of people needed to be reached. Bolivians have considerable experience with distance learning (e.g. for higher degrees offered by national and foreign universities). While fully recognising the advantages, they emphasised the danger that over-reliance on e-learning could reduce the practical learning components which are indispensable in most areas of competence of the CGIAR.

*Inter-center synergies* No evidence was gathered to suggest that lack of coordination between the Centers in training activities had been a problem. Rather, several examples were cited of the complementary interventions of groups of Centers (e.g. CIAT, IPGRI and ISNAR in the bean program in Santa Cruz; CIP and ISNAR in PROINPA, Cases 2 and 3).

### **Informal training**

All the case studies underline the effort devoted by the centers to informal training, through exchange visits, mentoring, center contact scientists, joint work on collaborative projects and other means. Researchers who had received formal training frequently referred to the even greater benefits which they perceived from the informal exchanges sustained between center scientists and themselves over long periods of time. Expressions such as “they taught me the best things of my life” and “it opened my eyes” were common. Comments were made most frequently about changes in attitudes, work ethic, widening horizons and vision, research discipline and rigour, understanding the importance of multidisciplinary, and expanding professional contacts.

### **Networks**

The paradox of the networks seems to be that while researchers consistently recognise the importance of knowledge sharing and coordination of research across countries in the region, the networks’ sustainability has been low. The activities of the RIEPT (tropical pastures) were almost completely discontinued once support from CIAT ended, and PROFIZA (beans) was not sustained from national sources much after external funding stopped, although in Bolivia it was replaced with a national network, PRONALAG, with a wider mandate to include legumes besides beans, where CIAT only provided technical advice. PAPA ANDINA (potatoes) which still has Swiss funding, will provide a test case when this expires. The RIEPT provided an interesting example of how international networks may not fill the research/training needs of all partners, in this case Bolivia, because the technology was not relevant. This indicates that even the most mature of the international networks may not necessarily attend to the needs of individual members, and there is the danger that the weakest ones may be at a particular disadvantage (Case study 4).

### **Outcomes and impact**

Most of the information on these topics is given in the case studies attached to this report. They were chosen because they represent a major training effort on the part of the centers concerned. This in itself may have caused a bias towards successful ones, but the availability of information was also a prerequisite in choosing them, and since proper documentation is a feature of successful initiatives, the bias was probably reinforced. Nevertheless, they provide detail of the dimensions of formal and informal training carried out by the centers, and information on some of the components associated with particular outcomes and impact. All of them represent long term involvement in formal and informal training by the centers. Other common features were the availability of funding, outstanding local leadership, and local institutional support. Explicit demand for the training was not always an ingredient of successful outcomes (Case 1), but a real or latent demand for the resulting technology was (Case 4). Perhaps the most important recurrent outcome at the personal level was a widened



vision and understanding of the multidisciplinary nature of research problems. There are clear cases of new scientific knowledge generated (e.g. Cases 2,3), new crop varieties released (Case 2), germplasm conserved *in situ* (Case 1), university curriculum modernization (Cases 1, 2, 3 and 4), institutional culture and policy changes (Cases 1,3), overall institutional strengthening (Cases 2, 3), and contributions to national policy (Cases 2, 3). At field level, the cases document increased production (Cases 2, 4), employment (Cases 2, 4), income (Cases 1, 2,4), export earnings (Cases 2 and 4) and consumption (Case 2) which would, in all probability, not have occurred if the training had not taken place.

Additional information was obtained from the surveys of trainees and partners, but is also biased favourably, since dissatisfied trainees and partners would not bother to reply. However, the responses from Bolivia were quite numerous with up to 85 trainees responding to some questions. In general, the greatest personal benefits from training were in improving abilities in the areas of priority setting, project planning and fund raising; in increased research output and in being able to pass acquired knowledge on to colleagues and their own trainees. At the institutional level, their training had led to a quite high degree of improvements in priority setting, and to a lesser degree in funding, inter-institutional linkages and access to information. High average ratings were given to the effect of training on scientific knowledge generated adoption of new attitudes and technologies, and benefits to farmers and consumers. However, over 60% of respondents reported lack of resources for carrying out research and networking with relevant scientific communities as the most important limiting factors.

### **Future directions**

Given the present situation, the role of CGIAR Centers in training was perceived to fall into four categories.

First, at the policy level. It was felt that the Centers (particularly IFPRI) could make a valuable contribution to the process of setting policies which balance the long-term interests of producers and consumers, with the present strongly market-oriented shorter term goals. This kind of input was expected to follow mainly from informal exchanges and workshops, with a limited number of formal training opportunities at the individual visiting scientist or higher degree level. Great importance was attached to the formation of a sufficient critical mass of trained scientists who might eventually prevail to ensure stability in matters of agricultural development policy, and transparent, scientifically based criteria for decision making and staff appointments.

Second, there is a need for strengthening local institutions engaged in research. They need to access and utilise the scientific knowledge and technologies developed by the Centers and others, maintain their scientists at the forefront of developments in their particular fields and carry out the research required to satisfy the country's needs over the longer term. No single types of training were identified as most useful. Rather a mixture of options are needed to suit varying needs, including short courses and specialised individual training, higher degree 'sandwich' courses, promotion of research networks, joint research projects and informal exchanges sustained over time between center and national scientists. Learning experiences in project formulation and donor negotiations are essential. While collaborative projects may be the best immediate option for obtaining funding, greater care must be taken to cover local operational needs and to help national institutions conserve their long term policies. It is expected that the centers' role in training will continue to be complemented with the provision of germplasm and with helping national institutions access information relevant to their research agendas.

Third, there is a need to strengthen national teaching institutions. The role of the Centers here was perceived as making accessible materials which would contribute to modernising university curricula,

through teaching partnerships (e.g. for higher degrees). More collaborative research partnerships are also needed to bring universities more actively into the research and extension fields so that teaching would become more dynamic and relevant to existing conditions. E-learning must be fully exploited, but the need for practical experience must not be neglected at the same time.

Fourth, in the area of technology transfer, most 'available' technologies need local adaptation or validation, so continued training in new participatory methodologies is required. At the same time, Centers have an important contribution to make in developing and sharing participatory methodologies for monitoring and evaluating technology transfer initiatives. Short courses, workshops or specialised training in these methodologies, coupled with joint projects to develop and validate new ones, were perceived to be of particular relevance in this area.

**Table 1. Number of training events/activities attended by Bolivian scientists, according to Center and training type**

Type:	Group	Individual	MSc	PhD
<b>Center</b>				2
CIAT	164	80	7	-
CIFOR	17	6	-	1
CIMMYT	50	96	9	-
CIP	28	26	3	-
ICARDA	2	-	-	-
IPGRI	70	1	-	
ISNAR	7	-	-	
<b>Total</b>	<b>338</b>	<b>209</b>	<b>19</b>	<b>3</b>

**Table 2: Time trends in training of Bolivians at CIAT, by training type (numbers of events/activities attended at headquarters)**

Type of training	1970-5	1976-9	1980-5	1986-9	1990-5	1996-9	2000+
Courses for trainers	-	-	-	-	1	-	-
Short production courses	-	8	4	2	1	-	-
Long production courses	8	12	-	-	-	-	-
Specialised courses	-	9	38	8	13	11	18 <sup>a</sup>
Specialised course + IT <sup>b</sup>	-	4	17	10	3	-	-
IT (non-degree)	5	7	4	3	17	4	6 <sup>c</sup>
MSc	-	-	1	1	1	-	1
PhD	-	1	-	-	-	-	1

<sup>a</sup> Not after 2002

<sup>b</sup> Individual training

<sup>c</sup> 5 in 2003, 1 in 2004

**Table 3. Perceptions of the value of CGIAR training, relative to other institutions\***

**Number of scientists**

Replying to survey <sup>a</sup>	18
With CGIAR training	10
Rating as the single most important experience	
CGIAR training	5 <sup>b</sup>
Northern university	1 <sup>b</sup>
Southern university	2 <sup>b</sup>
Other	2 <sup>b</sup>
Rating CGIAR training as one of the three most important experiences	10 <sup>b</sup>

<sup>a</sup> From a survey carried out by PROINPA management; respondents remained anonymous.

<sup>b</sup> Refer to the 10 CGIAR trainees, all of whom received specialised, individual training

**Sources:**

**Interviews with:**

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- Ing. Jorge Rosales King (Director), Ing. Alejandro Ramírez. *Oficina Regional de Semillas, Santa Cruz*
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ANNEX XIV  
Case studies from Bolivia

## 1. PARTICIPATORY RESEARCH

*(Partner Institution: Fundación para Promoción e Investigación de Productos Andinos PROINPA, Cochabamba; main CGIAR Center involved: CIAT)*

This case was chosen because training in participatory research accounts for a substantial proportion of CGIAR training activities in Bolivia (about 10% all trainees). It traces the outcomes observed in a single research institution, PROINPA.

### *Background*

The history of PROINPA is described as Case 3 in this study. It was originally part of the national research institution, IBTA, which had a traditional 'top-down' approach to R&D. This, together with the relative exclusion of the poorer small farmers from the benefits of research, provided fertile ground for introducing participatory methodologies in Bolivia. At the same time, participatory approaches were favoured by Bolivia's long-standing donors (e.g. the Swiss SDC) and partners (e.g. CIP, FAO). In 1993, Kellogg Foundation funding was obtained by CIAT for the validation in Bolivia of community-based research committees, known as CIAL's. The funds covered training of PROINPA staff, the cost of personnel with exclusive responsibility for setting up the CIAL's, and start-up funding as incentives for new ones. Besides having funding opportunities for work in this area, PROINPA scientists had strong leadership and a stable, supportive institutional setting for their work, circumstances which were unusual given the precarious state of most other Bolivian institutions at the time.

### *Implementation*

Training in participatory research was provided by CIAT to professionals (mainly agronomists) working in research institutions and universities. The intention was to build capacity in this area and to validate in Bolivia methodologies developed elsewhere (e.g. Colombia). It was supply-led at the start, since there was no explicit demand on the part of the NARS. Altogether, 23 Bolivians were trained at CIAT headquarters. Table 1 shows that PROINPA was the institution which received most training. Thirteen PROINPA scientists were trained at CIAT, two of them in the specific methodology related to CIAL's (1999-2001). Eight more PROINPA staff attended a 2-day course participatory breeding course run by IPGRI (2003). The first three Bolivian trainees were invited to a course at CIAT in 1993 and there were a few trainees most years until 2001-3 when a group of twelve went to Cali (Table 1.1). By that time, too, there were two higher degree students trained at CIAT (Table 1). The 1993 group attended a 40-day course on participatory research, but the later events were shorter (5-18 day) workshop type courses. This was reinforced by additional training in Bolivia in at least two events where CIAT staff acted as instructors. From the start, formal training was complemented by practical work in Bolivia, setting up CIAL's under the collaborative project described above. This involved constant interchange between CIAT staff and trainees in the joint activity on the ground. CIAT staff visited Bolivia approximately twice yearly from 1993 onwards. The CIAL methodology developed in Colombia needed adaptation to Bolivian conditions, using modifications not dealt with in the manuals or formal courses. As a result, there was considerable discussion which enriched the learning experience of the Bolivians. The availability of funding gave trainees the opportunity to put their knowledge to use. This was also encouraged by strong institutional support and leadership, and by the interest of other partners and donors, as a result of which participatory methods were incorporated into projects in other areas.

### *Outcomes and impact*

At the individual level, some interviewees returned from their training with serious doubts about the scientific validity of participatory methods and sceptical of their applicability to Bolivian conditions. Their decision to continue owed something to the shortage of funding for other projects, and something to an increasing realization that working more closely with end-users was required for effective technology change. After some years of experience in the CIAT validation project, they became genuinely convinced of the value of participatory methods. They made special reference to the importance of the informal training which occurred during the visits of CIAT staff and the implementation of the joint research projects. By 2005, ten of the thirteen PROINPA scientists originally trained at CIAT were still active in the institution and all of them record that they still make good use of their training. This is remarkable given the instability of most Bolivian R&D institutions. Six responded to a survey on their training experiences in general (i.e. including northern and southern universities as well as CGIAR Centers), and four of them perceived their CGIAR training to have been the most important for them personally. One of the trainees gained the IICA award for the outstanding contribution of a young professional to participatory research in Bolivia in 2003.

At the institutional level, there is strong evidence that participatory methods have permeated the culture of PROINPA. This is demonstrated consistently in their publications (e.g. Annual Reports) and is a constant feature of their research project proposals. Examples include the current projects on bacterial wilt in potatoes and on potato varietal selection. All new professional staff coming into the institution are required to have training in participatory methodologies. As related above, this has occurred at a time when the international climate was favourable to participatory research, but the staff interviewed unanimously agreed that CIAT training had made a major contribution to the establishment of this institutional culture.

At the inter-institutional level, PROINPA is recognised as the pioneer and leader in the application of participatory methodologies. This is recognised at national level by the fact that PROINPA has been given the responsibility for monitoring and evaluating the technology transfer projects executed under the new Bolivian System of Agricultural Technology, SIBTA (using participatory methods –SEP –under the FOCAM collaborative project with CIAT). This has enhanced the quality of the service and ensured better attention to users' needs. PROINPA has also provided support and training for many of the institutions which execute the projects under the new system (e.g. ASAR, ANAPO, SITSA, DAI). This has proved successful even under the most difficult conditions, as in the case of a US AID financed project (DAI) to promote alternatives to coca growing in a notoriously difficult area (Chapare), where the influence of the cocaine industry is dangerous. PROINPA trained DAI technicians in participatory methods and, as a result, farmer field schools and participatory methods of evaluating technologies have now been successfully institutionalised. In the establishment of CIAT's, PROINPA collaborates with a number of national research institutions (e.g. CIAT-Sta. Cruz) and NGO's (e.g. CARE) in four departments of Bolivia. At the same time, PROINPA staff contribute to academic activities at the Universidad Mayor de San Simón. A module on participatory methods has been included in the course on extension for undergraduates of the Facultad de Agronomía. Three undergraduate theses on participatory research were submitted in the period 1998-99. There are now two diploma-level courses with 77 students on participatory methods for agricultural innovation, and material on the same theme has been incorporated into the Master's courses on crop protection and genetic resources, respectively.

An important indirect effect of the training described, according to the Bolivian interviewees, was that it led to the refinement of CIAT's participatory research methodologies and training methods. This was the result of the mutual learning experiences which occurred particularly during collaboration in the setting up of the CIAT's, where considerable adaptation of the Colombian model had to be made.

Thus, the training of professionals in a specific country led to the improvement of the research and training methodologies for more universal application.

At the field level, CIAL's were set up initially to work on potatoes. By 2001 there were 26 established in four departments and there are now 54. They have extended coverage beyond potatoes to other Andean roots and tubers, beans and peppers. PROINPA staff concur that this would not have happened without CIAT training. Scientific information has been generated and technologies validated, notably in the areas of: frost and disease resistant potato variety selection; integrated insect pest management; protected beds for certified potato seed production; and bacterial wilt control (for which information was generated in 19 CIAL's). They have also made an important contribution to genetic resource conservation *in situ* by developing new markets for organically grown native potato varieties. The exchange of information and experiences has been a constant element of the project, both between CIAL's in different Bolivian communities as well as in Colombia, Ecuador and China.

Three CIAL's were visited in the course of this study. The interviews were conducted mainly in Quechua through translation into Spanish, which indicates part of the challenge involved in establishing them. CIAL members had a clear conviction of the importance of research and of their own ability to carry it out. They also appeared to have conveyed this message to the communities which they represent, or at least to the younger members. All of them had expanded the crops covered beyond potatoes. From small groups of 3-5 members originally, two of them had developed into producer associations with over 20 members in three years. They had identified novel products for the market (certified potato seed and organically grown native potato varieties for direct consumption). One of them had developed a well-functioning packaging plant and had sent 15000 kg attractively packed and labelled native varieties to supermarkets since 2004. The five varieties selected had been chosen from a total of 80 which they had evaluated themselves. They had also produced a beautifully illustrated catalogue of native crop species, with collaboration from CIP, IPGRI and the SDC. Another group had developed a simpler but effective processing method of producing fried beans and potatoes for local consumption (e.g. in schools). All of them participate in exchange visits to other CIAL's, field days and agricultural fairs, and monitor their activities through a participatory process. The members were mostly young, with a high proportion of women. They unanimously agreed that they had obtained economic benefits through the CIAL's which would be used primarily to improve housing and education.

### ***Conclusions***

This case describes a training initiative which was sustained for more than 10 years, with formal components strongly reinforced by visits and practical experience in Bolivia through collaboration on joint projects. It did not arise from an explicit NARS 'demand' but, despite initial scepticism, eventually led to the formation of a considerable 'critical mass' of Bolivian professionals who, through practice, became convinced champions of participatory methods. Given strong leadership and stable institutional support, this was associated with a change in PROINPA's own culture, which then widely pervaded other national institutions and influenced university curricula. It also permitted CIAT to refine their research and training methodologies as international public goods. While the general climate among donors and partner institutions was favourable to a participatory approach, there is enough evidence from the Bolivian interviewees to conclude that the training, and especially the collaborative work experience, was a vital factor in determining these outcomes. Field level impacts in terms of technology generated and adopted, genetic resources protected and incomes increased are evident. Whether the CIAL methodology will survive, due to its high cost and subsidised structure, is not an issue here and no information was available on the failure rate. But among those which had prospered, there was clear evidence of recognition of the importance of

research, a sense of empowerment and economic progress. This was the more impressive given the extreme depression and hopelessness evident in many surrounding communities in the Andes.

**Table 1.1 Training in participatory research undertaken by Bolivians at CIAT headquarters, according to year and institution (days/months duration in brackets)**

Year	Number of trainees/year <sup>a</sup>	
	Institution:	
	PROINPA	Other
1993	3 (40 d)	-
1994	-	-
1995	1 (13 d)	-
1996	-	1 (18 d)
1997		1 (12 d), 1(3 d)
1998	-	-
1999	1 (10 d)	1 (10 d)
2000	-	-
2001	1 (5 d)	-
2002	9 (5 d)	3 (5 d)
2003	-	1 (12 m) <sup>b</sup>
2004	-	1 (33 m) <sup>c</sup>

<sup>a</sup> Some trainees attended two events, the total number of trainees was 23

<sup>b</sup> MSc

<sup>c</sup> PhD

### Sources

Interviews with:

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## 2. BEAN PRODUCTION

*(Partner Institution: Instituto de Investigaciones Agrícolas de 'El Vallecito', Universidad Autónoma Gabriel René Moreno; main CGIAR Center involved: CIAT)*

This case is an example where a complete research team, with replacements, was trained by the CGIAR.

### *Background*

Bean research in the area of Santa Cruz arose in response to a need to identify a suitable crop to fill the winter gap in the rotation. A single scientist from the Universidad Autónoma Gabriel René Moreno (UAGRM) attended a general bean production course for a month at CIAT in 1978, was encouraged to experiment with beans and provided with 10 kg of seed. A small research team was set up at the university in 1980 consisting of an agronomist and a breeder. This was later expanded with two more 'generations' of scientists with a wider range of disciplines. The team has been under the same leader since 1986. The university provided them with stable tenure, and CIAT continued to provide improved germplasm at no cost. Financial support was obtained from the Swiss SDC from 1989 onwards, first through the Andean bean network PROFIZA and, after 2001, directly through a national network (PRONALAG) which was led by the program. PROFIZA was also a valuable source of information, exchange visits and learning experiences. Additional support came from CIP and FAO in establishing a diagnostic laboratory, while US AID financed the first 50 ha of beans to be sown for export. Once production expanded, the program counted on farmer associations, NGO's and entrepreneurial seed companies who contributed to the expansion of markets for consumption, certified seed production and export.

### *Implementation*

The team who received training at CIAT, financed by the Center up to 1989, were all agronomists except for one biologist. Table 2.1 summarises the types of training and subject area. Most of the activities consisted of short courses in specialised topics followed by individual training for periods of up to about three months and, in some cases, repeat visits to CIAT over long periods of time. This provided increasing degrees of specialization in the team's skills (e.g. from breeding to molecular techniques, or from farming systems to the specific agronomy of the bean crop), and filled gaps in their collective expertise (e.g. participatory research methods, research data management). Each team member had their own contact scientists at CIAT who provided information and support, including frequent visits to the Bolivian program. In addition to the team's base staff, a socio-economist from the same university was given individual training at CIAT for three months to carry out a study of bean consumption in rural and urban households in the Department of Santa Cruz. The research team was later supported by two home economists. Training of trainers for technicians and farmers in all aspects of bean production started in 1992, with direct involvement of CIAT staff. CIAT's Seed Unit also provided support to the small producers' association which pioneered the production of certified seed. Until 1989, all training was financed by CIAT. IPGRI also provided advice to the team on studies of wild bean relatives, while strategic planning advice was given by ISNAR through the CIAT-led Andean bean network PROFIZA.

### *Outcomes and impact*

At the individual level, the program leader underlines the value of training in several dimensions. The formal training at CIAT was 'made to measure' to the team's requirements. Besides acquiring scientific knowledge and skills, their experience helped them: form a work ethic and discipline;