

Epilogue

Looking back and looking ahead: the Wageningen experiences with interdisciplinary research and education programmes for development

The importance of science and technology for fighting poverty and hunger remains a debated issue. Trend-setting reports call on science and technology to realize a '21st century Green Revolution' or 'Rainbow Revolution' for Africa (Anon., 2004a; UN Millennium Project, 2005). But they also point out that 'current models of technology transfer and international assistance are not working as well as many would have hoped' (Anon., 2004b). Scientists are exhorted to come up with research that combines high quality with more relevance for solving the problems at stake (Anon., 2005). There is a general demand for local capacity building, interdisciplinary approaches, interactivity between researchers and stakeholders, and policy relevance.

The INREF programmes on which the papers in this issue were based have made clear contributions in these areas. But of course, they also show certain limitations. In this concluding paper we discuss both the strong points and the challenges that should be addressed in the next phase of the INREF initiative.

Strong points

Several INREF programmes have demonstrated the added value of interdisciplinarity, system approaches, and interaction with stakeholders. For example, Hounkonnou and colleagues have suggested in this issue that cassava, though often considered a fertility-depleting crop, may actually help to restore soil fertility. This has only occurred to agronomists by interacting with farmers. Similarly, Slingerland and co-workers in this issue have indicated that mono-disciplinary 'breeding for micronutrients' might not have led to the recognition that breeders can go for crops that take up more phosphorus (good for yields but bad for iron and zinc absorption by humans) if processors find ways to reduce phytate in food.

Using PhD projects as core elements in the research co-operation process has several advantages. PhD students possess a relatively high intellectual capacity. They are focused on obtaining a professionally attractive PhD degree within a limited time frame, which encourages strict planning and a high commitment. By using the 'sandwich' construction, in which PhD candidates from the South keep their jobs at universities or research institutes in their own countries, a structural link is made with the local knowledge network and the research topics are more likely to fit into local priorities. This way local capacity building is achieved which may not be realized when third-world students do their complete study in developed countries and do not return

to their home countries. Meanwhile, staff members of the northern university (in this case, Wageningen) are strongly committed to the process because PhD graduations are one of their key outputs. There is, however, a trade-off, as indicated in this issue by Hounkonnou and colleagues: the focus on the production of PhD theses may affect openness to stakeholder priorities and discourage the development of an overarching view beyond the individual PhD projects.

A university-wide framework like INREF has certain advantages above many ad-hoc research co-operation projects. It allows the administrators to impose programme features that give a particular thrust to the overall activities. That only joint programmes of two or more graduate schools were approved ensured that at least some degree of interdisciplinarity was realized. Besides, the size of the programmes facilitated a more systematic development of international networks that are crucial for future work. It also allowed working with cohorts of PhD students, and thus more efficient teaching and supervision (several programmes appointed special postdocs for this) and created room for learning from each other. Of course, the required programme features should leave enough room to give due attention to the interests of partners. Also, sufficient freedom should be left outside the framework for critical bottom-up initiatives that are vital for the innovative capacity of a university.

Larger co-ordinated programmes also make it easier to use an effective phasing of activities rather than to try to achieve all objectives at once.

- Some programmes started with interdisciplinary interaction between beta-sciences. This may be attractive because technically oriented scientists have a rather common vocabulary and set of practices. Social scientists can then be involved in a second phase to establish effective links with stakeholders and policy makers. There is a trade-off, however, because this phasing can also lead to pre-analytic decisions that hamper interaction with stakeholders but are difficult to redress (see the paper by Hounkonnou and co-workers in this issue). In any case, it pays to have beta and gamma scientists jointly supervise PhD projects, as this may also have important spin-offs beyond the project itself.
- Once the PhD research is being carried out, more attention can be paid to institutional development. This is also desirable to ensure that the research results are integrated into the working routines of the southern institutes, so that the effects continue beyond the duration of the programme. The ‘sandwich’ PhD construction is very helpful here again.
- When the research results arrive, it becomes important to ensure that they are really used by policy-makers or the private sector. Contrary to many traditional research projects that ended as soon as the final reports were published, INREF aspires to a certain amount of implementation. Such an institutionalization phase may take time, but we feel that that it is a *sine qua non* for making the research effective. For this reason, the duration of programmes should not be standardized, but be a function of local constraints and opportunities. If reaching the implementation phase means that a programme needs at least 10 years, so be it.

The difficult problem of scaling up

The main challenge is directly related to this last point. Most programmes have not arrived at a phase in which their results have tangible effects in the practices of public or private actors. Indeed, several programme managers recognize the scaling up of results as a key problem.

Interestingly, this problem has a clear geographic dimension: it seems to be much bigger in Africa than in Asia. Five of the six programmes have activities in South-East and East Asia, but they do not anticipate particular scaling-up problems in this region. In the Vietnamese tapioca village discussed by Mol & Tran in this issue, neither the authorities nor the local people are ready to take action to reduce pollution. But such situations are found in developed countries too, and have more to do with sectoral interests and bureaucratic slack than a special problem of scaling up. In any case, the environmental research network in South-East and East Asia that Mol & Tran's programme fits into develops quite successfully. The same is true for the WU–CAAS programme, where the Chinese partner decided to expand the Sino–Dutch genomics laboratory, to add a Solanaceae programme to the existing Brassicaceae programme, and to upgrade the Institute for Vegetables and Flowers into a centre of excellence for Brassicaceae and Solanaceae research. Besides, a Dutch private seed company is also involved in the programme. These are excellent examples of local capacity building.

In comparison, scaling up in Sub-Saharan Africa seems to be much more difficult. The research results in Benin and Burkina Faso discussed by Slingerland and colleagues in this issue are exciting, but how they will be put into practice is not yet very clear. In the discussion by Hounkonnou and colleagues of the work of CoS in Ghana and Benin, scaling up is identified as a major problem. In POND, the original aim to use fishponds to make African farming systems more sustainable has been abandoned. There were specific reasons of programme planning for this, but the lack of practical perspectives also played a role.

Experiences of Wageningen researchers outside the INREF programmes confirm these regional differences. For example, the office of Wageningen University and Research Centre in Vietnam is readily enlisted for commercial initiatives by local and foreign entrepreneurs, while similar experiences are lacking in Sub-Saharan Africa. That scaling up is a lesser problem in Asia is not because Asian scientists are already wedded to an agenda of interdisciplinarity, systems approaches, and interaction with stakeholders. China and Vietnam have had their own experiments with participatory scientist–farmer collaboration during the Cultural Revolution and before the Doi Moi. However, they have returned to hierarchical traditions and disciplinary specialization since, as is vividly illustrated by Bonnema and colleagues in this issue for China. Nevertheless, it does not seem to hinder the institutionalization of the programme results, even though one might think that more interdisciplinarity and interaction with stakeholders could facilitate the putting of outcomes into practice.

Academic structures in Asia are embedded in fast growing economies, and to some degree, their hierarchical tendencies seem to fit in with the nature of the 'developmental state' that, according to some (e.g. Johnson, 1987) is associated with the success of Asian economies. Conversely, most African researchers work in poor, partly

collapsed institutional structures within stagnating economies. At first sight, INREF's approach of academic partnerships and stakeholder participation here seems to be a perfect godsend: it can fill holes that have fallen in institutional structures and money streams. However, weaknesses soon become apparent. African scientists are much more dependent on their Dutch partners than their Asian counterparts, who, for instance in the WU–CAAS programme, can finance half of the programme themselves. While the co-operation between Dutch and Chinese researchers is complicated by different academic cultures, African researchers seem almost too open to the ideas that their Dutch colleagues are forwarding. More generally, African academics readily accept 'donor' notions of participation and interdisciplinarity. Nevertheless, as Hounkonnou and colleagues point out, few successes of participatory projects survive outside the artificial context of the programmes.

Interaction with mechanisms at higher scales

Why is scaling up difficult in Africa, even if participatory methods are used? Many people think that the participatory approach was born in a development context. In reality, it emerged from the interaction of agricultural scientists and farmers in developed countries in the early 20th century, in a context of populist farmer movements and agricultural modernization based on family farms. An important instance was the participatory county agent system in the United States, which proved its effectiveness in the struggle against the boll weevil and was subsequently institutionalized by the Smith-Lever Act of 1914 (Scott, 1970). The 'grassroots' approach got a new impulse in the New Deal period, and was introduced in 'development aid' by western progressives after WWII. To be sure, tension continued with the older top-down approach that was associated with 19th century agricultural scientists like Liebig (Rossiter, 1975) and put its stamp on colonial 'betterment' policies (e.g. Anderson, 1984; Mackenzie, 1998; Rochelau *et al.*, 1995). Besides, some developing countries had their own grassroots experiments, of Maoist or other inspiration.

In general, participatory approaches in developing countries have borne most fruit in Asia. This is true both for participatory technology development and farmer field schools, whose success was closely related to green revolutions (Berg, 2004). Apparently, for being successful the approach requires certain conditions that are present in Asia but less so in Africa. The problem is not that African farmers would suffer from some kind of inertia. As Hounkonnou and colleagues observe in this issue, African farmers are dynamic but have small windows of opportunity. Why is this so? Because adequate social capital and good governance are lacking, many western development experts would be inclined to respond. But what good governance precisely amounts to is not so clear. The prevailing Washington consensus type of thinking equates it to democracy, liberal-economic policies and classical state functions. However, both in developed countries and successful Asian countries like South Korea or Taiwan, farm policies have gone much further than these functions (Koning, 2004). They included systematic support of farm research and education as well as considerable income and price support. It leads to a difficult discussion on the precise relationships between

world markets, farm policies and economic development.

It is clear that until the mid-19th century, Ricardian constraints on farm production made increases in population cause rising agricultural prices that stimulated agricultural growth also under a free-trade regime. This growth in turn created opportunities for farm-related activities, fuelled the demand for industry and services, and prepared the minds for economic changes, and thus became an engine of wider economic development. In the late 19th century, however, a new phase of the Industrial Revolution broke the endogenous relationship between population growth and rising agricultural prices. Railways and motor vessels allowed shipping grain across the ocean prompting new waves of reclamation; the chemical industry brought cheap inorganic fertilizer that accelerated the increase in yields; and electricity, internal combustion and artificial fibres reduced the share of farm capacity needed to produce biomaterials and bio-energy. These breakthroughs made the supply in international agricultural markets outrun the effective demand. Prices declined, and continued to decline when, in the 20th century, new varieties and irrigation allowed new production surges.

Policy responses to this new evolution diverged between regions. Developed countries protected their farmers, and supported farm research and structural reforms, assisting the emergence of a new pattern of farm progress based on family farms. In Latin America, large landowners evicted many rural poor to enforce an extensive type of agricultural modernization in spite of low prices. In South-East and East Asia, developmental states, goaded by farmer movements, supported farm progress and shielded farmers against falling world market prices. (See e.g. Dorward *et al.*, 2001, who show that most Asian countries had stabilizing or supportive price policies at the time of their green revolutions.) In Sub-Saharan Africa, however, traditional land rights precluded a massive eviction of rural poor, but colonial and post-colonial governments taxed rather than protected the farmers. For some time, major problems were avoided by a horizontal expansion of long fallow systems, but when the room for reclamation was exhausted, a downward spiral of poverty and soil degradation followed (cf. Cleaver & Schreiber, 1994). This drove people from the land, but did not stimulate industry and services, so that people crowded into marginal activities or fought for jobs in the public sector.

Discussions continue about the relations between these policy responses and the development or stagnation of regions (e.g. Timmer, 1995; Aksoy & Beghin, 2005; Koning *et al.*, 2005). Whatever the answer, these discussions indicate that the local context for the scaling up of research results like those of the INREF programmes cannot well be understood without considering the interactions with mechanisms at higher scales. National policies, world markets and international arrangements have a decisive influence on the windows of opportunity of farmers and other stakeholders. However, as Hounkonnou and colleagues rightly observe, this interaction with developments at higher levels has not been analysed in the INREF programmes. Even RESPONSE, where the complex dynamics in less-favoured rural areas was the explicit research subject, has limited its analysis of the causes mainly to the internal heterogeneity in these areas themselves. (Only Oskam *et al.* (2004), have taken a broader view.) Such a limitation to the internal heterogeneity can be quite legitimate: not every

research programme can analyse the whole world. But the effect is that the researchers are left with an incomplete understanding of the forces that hamper the scaling up of their results.

A practical answer?

Even if we were to have an encompassing analysis that would explain the scaling-up problems in Africa, changing the causes of these problems may well appear to be outside the reach of a university. How could Wageningen and its partners alter the policies of national governments, the Bretton Woods Institutions, or the WTO? However, even when we cannot attack the problem head-on we still need some practical answer to cope with it.

The question of how to cope with the scaling-up problem has prompted considerable discussion among those involved in the INREF framework. Many researchers feel that their task is to come up with correct advice on possibilities for sustainable development, but that they cannot be held responsible for the failure of public or private actors to follow their advice. However, this is not a viable motivation for continuing with applied research in settings where nothing is done with the results. True, many African institutes will remain eager to co-operate with centres like Wageningen even if practical results are lacking. They need the benefits of such co-operation, which have become increasingly important for their survival. Western researchers, therefore, will find the southern partners that they need to convince critical financiers that they are trying to do something in the field, but financiers will not long be satisfied when real impact is lacking, and researchers will see themselves competing for shrinking donor funds.

Is there a better answer? In situations where windows of opportunity are too small for inducing investment by larger entrepreneurs (larger farmers, trade companies or whatever), entrepreneurial initiative can only be realized on some other base. This is what small farmers, village schoolteachers and other local officials in developed countries did around 1900 when they pooled their resources and established farmer co-operatives to fill the void that was left by more substantial investors. (Butter co-operatives in the south-eastern Netherlands are a clear example of this.) Translating to the situation that we face in Africa, one could imagine that African farmers, African scientists and Wageningen scientists pool their resources to start some small-scale commercial initiatives in which results of their joint research can be used. To achieve this, a limited part of development-oriented research funds should be earmarked for risk-bearing investment in local chains. Adequate incentives should stimulate researchers to make this investment yield a profit. For the same purpose, entrepreneurial persons should be enlisted to run the initiatives and make them a commercial success.

In fact, this proposal boils down to a new form of 'public-private' partnership. (Semi-)public institutions and their staff themselves would assume a private entrepreneurial role that motivates and challenges them to be really effective. If researchers can really contribute something productive, why not invest some of their research funds and benefit from it? Of course, this does not alter the fact that the research

involved is a public good that depends on public investment. Therefore, taxpayers pay the salaries and other costs of the staff involved, and additional funding may be required to make the programmes feasible. However, the fact that researchers who propose a programme are willing to run a risk and invest some of their research funds, gives the managers of public funds a better indication of the prospects, while the profit actually realized makes the outcomes of the programme transparent. This way, progress may be initiated that would not be realized in a classic research environment.

We hope that as the INREF programme evolves into the future there will be continued attention for creating conditions that allow real change and development, also in Africa. So far, the INREF programme has made significant progress in stimulating truly inter- and transdisciplinary research in a context where institutionalization and joint learning are not empty concepts but have been realized in several projects, despite considerable odds. This is quite encouraging for the future and provides an innovative and stimulating example for development research in general.

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