Food security and development

We need dialogue not rhetoric

James Smith is a co-director of both the Centre of African Studies and ESRC Innogen Centre at the University of Edinburgh. Most recently he has been working on biotechnology partnerships in Africa, Asia and Latin America and is currently looking at the politics of biofuels in East Africa and South Asia

james.smith@ed.ac.uk

The recent IAASTD Report begins by highlighting the fact that science and technology have been relatively successful in increasing agricultural productivity, but much less successful in dealing with the complex social and environmental problems, and sometimes consequences, that new technologies may raise.[1] The report identifies increasingly constrained environmental conditions and globalisation as two additional factors that must be accounted for in the development of new agricultural technologies.

In the 1960s, the Green Revolution highlighted both the promise and the limitations of technological innovation as a means to ameliorate food security and promote development. It was conceived of as a package of technologies; high-yielding hybrid varieties of cereal crops that would respond well to intensive management and would significantly improve yields no matter the context in which they were applied. The scientific rationale was that problems of rising populations and unproductive agriculture could be solved by focusing on the 'isolable technical problem' of low yields.

This perspective would inevitably lead to the promise and promotion of a technological solution, new seed varieties. This approach was not without success. Between 1961 and 1985 yields of cereal crops such as wheat, rice and maize doubled in developing countries. However, yield increases varied in different environments, and were much more impressive in environments that most closely mirrored those of the research centres where the seeds were first developed.

Furthermore, optimum yield increases depended on the full application of management practices, irrigation and generous use of fertiliser, and this was something that only more wealthy farmers could afford. While aggregate food production certainly increased, when one looked a little more deeply, poorer farmers, and particularly poorer farmers living in more marginal environments, saw little if any benefit. The Green Revolution served to amplify many rural inequalities.

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The Green Revolution represents a linear version of agricultural innovation, primarily driven by the public sector. Scientists isolate an element of a complex problem that they are able to deal with, a technology is developed from their research, and ultimately farmers adopt the technology. Some farmers adopt new technologies earlier than others, and some may never adopt new technologies. Quite often farmers need to be educated about the benefits of these technologies. Technologies move in one direction, from lab to field, and there is little if any dialogue between farmer and scientist.

Many of the proponents of agricultural biotechnologies, what we might dub the 'gene revolution', similarly see agricultural innovation as the development of a technology that can be universally applied. Many opponents of agricultural biotechnologies argue that locally specific agriculture - building on indigenous knowledge and perhaps adopting an organic philosophy - is the most appropriate approach in developing countries. These perspectives frequently talk across each other (above the head of the developing country farmer), and dialogue is scant, if two sets of rhetoric can ever be called 'dialogue'.

Dialogue, though, lies at the heart of new thinking about agricultural innovation for development. As technologies become more complex, and the key players involved in developing new technologies start to include the private sector, NGOs and advocacy groups, our understanding of how innovation works has also become more complex.

We have come to recognise that innovation is not something that takes place parallel to economic production and development in a lab or experimental rice paddy. In reality innovation interacts with economic production through a complex process that is decidedly 'non-linear' and intrinsically systemic. Technological development is not characterised by processes of refinement, optimisation and

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adoption over time, rather the characteristic features are learning and continuous change.

Thinking in terms of an innovation 'system' allows us to view agricultural innovation in a much more holistic way, encompassing all the organisations that actually make up a technological system. This might include stakeholders who are not so evidently part of the linear system of transfer of technology, for example NGOs or farmers' interest groups.

This reveals the public sector in a broader context and in doing so allows us to identify what its most appropriate role in encouraging innovation might be. Similarly it allows the private sector to identify new opportunities and partners, and provides farmers with new ways to express their needs.

We need to place the sharing of knowledge at the centre of our thinking, as it is through knowledge that actors effectively interact in any system. This may mean relatively simple interventions such as assisting farmers in the purchase of mobile phones to allow them to discern market prices before they decide which market to take their produce to, or how best to price it, as has been the case with perishable fruit producers in Tanzania or grain producers in Niger.

In Peru, Bolivia and Ecuador an award-winning project called Papa Andina links up all members of potato value chains in fora in order to build trust between producers, processors and distributors and share ideas about what potato-derived products should be developed for faraway urban markets. Sharing information and learning has allowed thousands of small-scale potato producers to diversify their livelihoods, more effectively link with markets and increase their incomes.

Innovation systems approaches for developing country agriculture also allow farmers to articulate their technological needs in ways that may not have been possible in the past. For example, the private sector often cannot or will not respond to farmers' demands for new technologies, either because farmers cannot make themselves heard through markets or there is simply no likely profit to stimulate their engagement. We can work out ways to bridge these knowledge gaps in the system, perhaps via new forms of organisation or partnership. A public-private partnership might bridge such a gap in the system, as the public sector partner may better understand what farmers want and provide some sort of financial stimulus to encourage the private sector to become involved.

Innovation by its very nature is complicated. International Development Enterprises (IDE), an NGO based in South Asia, has spent almost two decades supporting the innovation of treadle pump technologies for small-scale technologies. These simple foot-operated water pumps offered many advantages to farmers in Bangladesh but did not catch on. IDE recognised this was due to gaps in the system and sought to develop a complete value-chain. After initially developing and selling the pumps themselves, IDE withdrew from production and offered technical support to small start-up companies to fabricate the pumps and subsequently promotes the use of the pumps through training and facilitation. Since 1984 over 1.5 million treadle pumps have been developed, fabricated and sold.

As technology becomes increasingly complex, so do the innovation systems and the efforts needed to engage with farmers. VITAA, a project to promote the development and widespread planting of carotene-enriched sweet potatoes across Africa, is an example of a learning network that links together researchers in Latin America with NGOs in Africa and village-level farmers' groups. This network includes international scientists, home economists, development workers, female farmers and market traders all sharing knowledge and working to develop and grow new varieties of vitamin A enriched sweet potato and new products that be derived from them and sold for profit.

So-called 'Golden Rice', a genetically engineered bio-fortified variety of rice, has been developed through a partnership that spans seven countries, almost twenty organisations and the accumulation of decades of scientific (and legal) expertise.

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Innovation systems thinking has also underlined the pressing need for scientists to communicate directly with farmers. Projects such as PETRRA (Poverty Eradication Through Rice Research Assistance) where research was only funded if scientists could demonstrate partnerships with farmers and farmers groups, and methodologies such as 'mother-baby trials' where new agricultural practices and technologies are developed and tested through trials and re-trials conducted in farmers' fields in partnership between scientists and the farmers themselves, underline the need to develop new ways to build partnerships, share knowledge and learn in order to promote pro-poor agricultural innovations

The IAASTD itself represents something of a departure for agricultural assessments in that it recognises multiple knowledge bases, the complex contexts and practices of agriculture and the multiple needs of the farmer. In doing so it highlights 'collaboration' as one of its core messages. Innovation involves using new ideas, new technologies and new ways of doing things in places or by people where they have not been used before, and ultimately for innovation to flourish we must enable and support farmers to interact and learn as part of complex systems and networks.

Through supporting farmers, building developing country research capacity, stimulating local private sectors and implementing policies, practices and mechanisms to support these actors to interrelate, share and learn, agricultural technologies will be developed that are embedded within local agricultural, social, economic and environmental contexts rather than developed as abstractions of externally perceived problems. When this happens, debates about the appropriateness or inappropriateness of the Green Revolution or of GM crops will be rendered moot (in developing countries at least) as new agricultural innovations will be developed via dialogue, in context, reflecting farmers' needs, not rhetoric, theory or ideology. ■