Future Agricultures

Discussion Paper

Making Science and Technology Work for the Poor

Ian Scoones

Knowledge, Technology and Society team, Institute of Development Studies, University of Sussex, Falmer, UK BN1 9RE

In this viewpoint piece I want to argue that, as currently organised, R and D systems – both public and private - don't necessarily respond well to the needs of poor people in developing countries. Despite all the hype about the potentials of science and technology for reducing poverty, there are many missed opportunities. Very often poor and marginalised people across the global south do not end up benefiting from S and T. How then should we rethink R and D so that S and T can help in the important challenge to 'make poverty history'?

I want to suggest three reasons why currently S and T doesn't always work for the poor, and illustrate these with three examples from developing country agriculture.

First – In the context of globalisation, the dynamics of the market and control by large corporations are increasingly important factors governing access to technologies, both new and old. The lion's share of agricultural R and D globally is controlled by a handful of large corporations. In the developing world this is increasingly the case, especially with the decrease in public sector capacity for R and D.

Take agricultural biotechnology and GM crops. A few years ago there was much made of the potentials of GM crops to solve the problems of world hunger. But today, years later, the only GM crops that are being planted in the developing world at scale are essentially cast-off products, developed for other markets. GM cotton or soya were engineered for the commercial farms of the Americas, not for Africa or Asia. Some of these products have found demand and a market and are clearly benefiting some farmers in some places. But, more generally, GM technologies are not addressing the big challenges of drought, nutrient poor soils and so on.

I would argue that the focus on GM crops by large corporations - eager to recoup major R and D investments inside patent periods - has distorted our view of the biotechnology field. With the explosion of the new genetics there are all sorts of non-GM biotechnology applications which offer potentials which are just not getting the limelight or the funding.

Marker assisted selection, for example, which uses insights from genetic screening and sequencing, can speed up breeding processes significantly. Researchers working in southern Africa have bred drought tolerant maize varieties that help farmers in drought stricken areas get a better crop with dramatic effects.

Therefore a re-gearing of priorities towards crops and traits that are of importance to poor people's livelihoods could offer real potential. But who is going to do it? Not the private sector: perhaps the public sector – taking a leaf from that great technology success story, the Asian green revolution?

But my second reason why technologies don't always work for the poor raises questions about this more hopeful storyline.

The Asian green revolution is of course iconic. During the 1960s and 70s high-yielding varieties of rice and wheat spread across large parts of Asia, boosting yields and reducing food insecurity, at least on aggregate. A simple set of technologies, supported by a strong, well-organised public sector, funded by aid money, had a dramatic effect on large numbers of people. So why isn't the green revolution being repeated in Africa?

The problems of African agriculture are not simple, and are not amenable to such single fix technical solutions: diverse agro-ecologies interact with diverse farming systems – requiring instead what some have called 'multiple rainbow evolutions', rather than a big bang revolution.

But is public sector R and D geared up to respond? The answer, sadly is, in my view, no. Public agricultural research in Africa in particular has been decimated by a sequence of policies which have undermined funding and capacity. And the international system - while having better funds and more qualified personnel - is often not tuned in to local priorities.

Take just one example – the 'system of rice intensification', a way of planting rice which, because of the way soils, water and roots interact, can increase yields several fold. This was an innovation first developed in Madagascar by a Catholic priest working with a small group of farmers. Through the activities of individual researchers, NGOs and increasingly governments, it has now spread across the world, with perhaps millions of poor farmers benefiting.

But the system remains shunned by the scientific establishment, including apparently the International Rice Research Institute. Unable to replicate the success on their own research stations, they are unable to recognise the experience of numerous farmers. How can this be?

This is, I would submit, because of the way elite science is organised – located away from farmers' fields; focusing on particular disciplines (in this case breeding not soil/root biology); and having experimental designs that do not account for farmer skills as part of the technology.

So, if technologies are to work for the poor we need to rethink – fundamentally I would say - how public sector science is organised, making it more responsive and so more effective.

Finally, and this links to the rice example, technologies should not be seen as isolated - separate from their social, cultural contexts. Very often old technologies, available for years, are not being used by people because the social 'software' has not been combined with the technical 'hardware'.

Research organisations are often focused only on the technical end – the fix. But this is not enough. A wider perspective is needed that sees technology as part of a broader innovation system, encompassing the mechanisms for adaptation, spread and delivery. Without this, perfectly good technologies may just sit in the lab, on the research station or on the stockists' shelf.

There are many examples of this dynamic. Take for example soil and water conservation technologies in

dryland Africa. There have been huge investments in trying to get farmers to adopt particular techniques and technologies. But the issue is not just soil conservation and water engineering. It is about trust, enthusiasm, and confidence in the technology. And this can only be built through social processes. Soil and water conservation technologies therefore should be seen as 'socio-technical' systems, where the social and technical, the software and the hardware are linked. This requires not only technical innovation, but also social innovation.

In southern Zimbabwe, Mr Zephaniah Phiri is a master at both technical and social innovation. A rural farmer and now over 70 years old, he has inspired his own community and through his small NGO – Zvishavane Water Projects – has reached out to many, many more. His most popular technology is a hole in the ground – carefully sited water harvesting pits, where run off from irregular rain storms is captured and stored and seeps slowly to nurture growing plants. This hole in the ground is more effective than any fancy technology I know – including certainly any available GM technology – in fighting drought and reducing hunger.

So what can we draw from these examples? How, given the problems I have identified, can we make S and T work for the poor? I will conclude with four observations:

First - Don't expect the private sector to deliver on this challenge. The profit motive inevitably drives private R and D, and expecting a sudden philanthropic turn around is naïve – beyond some well-publicised PR gestures. If the very considerable talents and resources of the private sector are to be unleashed for development, some new incentives – both push and pull - need to be applied.

Second – Remember too that the public sector has its limits too. There is a major task of rebuilding public sector R and D capacity in Africa, for example - but let's not rebuild in the old image, or create elite isolated islands of 'scientific excellence'. Public sector institutions need to re-gear their research styles and priority setting mechanisms fundamentally if they are to capture the potentials of S and T for poverty reduction. This will require some significant organisational rethinking.

Third – There is need to identify the multiple sources of innovation – high and low tech; social and technical; from both elite science and from farmers – and combine these in interesting ways, suited to local circumstances.

And, finally, there is a need to insist on participatory and collaborative research that responds to locally-defined needs and priorities, creating multiple pathways of technology change, and real choice among options. This means involving technology users not just in 'downstream', back-end adaptation and testing, but right upstream in front-end technology design and priority setting.

This note was originally presented at a public event on science and technology at the Brighton Festival, May 2005. For further information on research in this area, see: www.future-agricultures.org

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This **Discussion Paper** was written by **Ian Scoones** of the **Future Agricultures Consortium**. The series editor is David Hughes. Further information about this series of Discussion Papers at: **www. future-agricultures.org**

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