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Improving Farmer Learning in and for Sustainable Agriculture in Southern Africa

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Executive Summary

Southern Africa faces enormous challenges in feeding its population, around 40% of whom are malnourished and living in poverty. These challenges are escalating, given the threat to the region associated with climate change, land degradation, food crises, water scarcity and unequal resource allocation. Against this background, conventional agriculture is unlikely to hold the key to the region's future food security—the majority of farmers cannot afford to buy the high external inputs which conventional agriculture demands, and land degradation means that Africa produces less food per unit area than any other continent.

Drawing on PhD research by the author, this paper suggests that sustainable agriculture, which focuses on the sustained and regenerative growth of biological, physical and human capital, offers the potential to increase agricultural productivity enough to get the region out of the food security trap. However, a growth in these approaches will require new learning and extension systems. Based on case studies of three sustainable agricultural initiatives in the region—Machobane Farming System (MFS) in Lesotho; organic farming in South Africa; and permaculture in Zimbabwe—the paper finds that approaches to, training in and perceptions of sustainable agriculture in the region are currently rather negative, under-resourced and weak. Nevertheless, sustainable agricultural practices are growing and more farmers are consciously choosing to adopt them.

The main policy recommendations are as follows:

- Farmers should establish structures that enable them to learn and act jointly for both continuous learning and improvement of their practices and situations.
- Governments should ensure that extension systems are effectively equipped to support sustainable agriculture given its potential for achieving social, ecological and economic sustainability. They should also support the development of curricula for training institutions and agricultural colleges that bring together participatory and traditional ways of learning; set aside larger budgets and more time for supporting and training in sustainable agriculture; and use the education system to de-stigmatise agriculture in the eyes of young people.
- Sustainable agriculture NGOs should lobby and assist government to develop, implement and accredit sustainable agriculture training.

Improving Farmer Learning in and for Sustainable Agriculture in Southern Africa

Mutizwa Mukute

Why does southern Africa need more sustainable food production?

Southern Africa, and indeed much of Africa, faces multiple risks associated with climate change, land degradation, food crises, water scarcity and resource allocation. The percentage of malnourished people in southern Africa is relatively high, despite decreasing from 48% in 1990-1992 to 40% in 2000-2002 (African Union, 2006); and 45% of people in southern Africa live below the poverty line (SADC, 2008). Consequently, the majority of farmers cannot afford to buy the high external inputs which are essential in conventional agriculture. Africa produces less food per unit area than any other continent, partly due to land degradation (Versi, 2008). In addition to land degradation, research in southern Africa shows that a 2% increase in temperature would reduce precipitation by 10% and result in a 34% decline in reservoir inflows (Africa Geographic, 2008). Production from rain-fed agriculture in some African countries could halve and up to 250 million people in Africa are likely to face water shortages by 2020 (Vermuelen *et al*., 2008).

Given this background, Africa cannot afford to miss the opportunity to strike the balance between broadening energy access, sustainable management of natural resources and reducing energy intensity (Vyas, 2007; Africa Commission, 2009). Keely and Scoones (2003) argue that Africa should primarily focus on soil improvement to increase agricultural productivity to get out of the food security trap in the same way that high yielding varieties have helped Asia. Similarly, Pretty (2002) suggests that sustainable agriculture projects in Africa and elsewhere have demonstrated the capacity to produce more food at four levels: through intensification of a single component of the farm system, better use of natural resources on the farm, adding a new productive element to the farm (e.g. agro-forestry) and introducing new regenerative elements (e.g. nitrogen fixing plants).

The region's adaptation capacity, particularly to these fertility and energy challenges and changing weather patterns affecting agricultural production, will become imperative for

good development (Box 1). This capacity to adapt has implications for learning processes in southern Africa (Lotz-Sisitka, 2008). This paper explores the learning challenges required for such an adaptation to be successful, drawing on three case studies of similar types of sustainable agriculture initiatives in three southern African countries.

BOX 1. WHAT DOES A SHIFT TO SUSTAINABLE AGRICULTURE REQUIRE?

Rukuni (1994) identifies the following factors as central to the achievement of sustainable agriculture development:

- **New technology developed locally or outside and adapted to local situations;**
- **Human capital in the form of professional, managerial and technical skills produced by investment in schools, agricultural colleges, faculties of agriculture and on-the-job training and experience;**
- **Sustained growth of biological capital and physical capital;**
- **Improvements in the performance of research and extension, credit and marketing, and settlement; and**
- **A favourable economic and political environment.**

Building bridges between old and new ways of agricultural learning

There is a growing need for people-centred approaches in the context of sustainable development. Agricultural extension has long operated through a linear mode of technology transfer, conveying to farmers the latest technologies to improve production, with success measured by the rate of adoption (Worth, 2006). Historically, southern African research and extension systems were built on this research-design-disseminate-assimilate (RDDA) approach, although some changes have occurred over the last few decades. One of the key assumptions of the RDDA approach is that scientists do the research and design, extension workers disseminate and farmers consume (Leeuwis, 2004). However, the limitations of RDDA include being supply-driven by scientists; a lack of consideration of local knowledge, diversity, sustainability and farmer needs; and farmer inability to afford the kind of technologies being promoted. These limitations have led to the development of farming systems approaches—which include the train and visit approach, farmer first and participatory technology development—all of which elicit farmer participation and also pay attention to agro-ecological variations (Whiteside, 1998; Murwira *et al*., 2000; Mukute, 2010). One current approach that resonates with the kind of thinking behind this paper is called the people-centred learning and innovation approach (Scoones and Thompson, 2009). People-centred strategies in agriculture are "more appropriate to cope with diversity issues in both agro-ecological and socio-economic terms" (Stoop and Hart, 2005). In this approach researchers see farmers as innovators, partners and entrepreneurs; while farmers see scientists as one of many sources of information available to them. The scope of research and learning goes beyond the farm gate to include considerations of multi-functional agriculture, livelihoods, food systems and value chains across multiple scales from global to local and over long time frames. The main drivers are responsiveness to changing contexts such as markets, globalisation and climate change

and the approach involves getting farmers organised, plus considerations of power and politics. The thrust is to build capacities to learn, change and innovate within a trans-disciplinary orientation. Sustainability, institutions and politics are central dimensions of such change (ibid).

Despite the growing popularity of farmer-centred approaches, their adoption by agricultural extension institutions is inhibited by the lack of a bridging theory to link the old school of extension with the new (Leeuwis, 2004). In a similar vein, Visvanathan (2006) argues for modern science to exist side by side with alternative sciences. Perhaps his most important contribution here is his proposal of cognitive justice to replace "monocultures of minds" through "a simultaneous congregation of knowledges and knowledge-makers to debate their assumptions ... a parliament of knowledges for science, where a sense of plurality prevails" (Visvanathan, 2006). Similarly, Pimbert (2009) notes the need to "re-embed citizens in the production of knowledge and fundamentally democratise social and natural sciences research organisations and universities... citizens will inevitably have to challenge the positivist and realist epistemologies of 'actually existing' science."

In this paper I explore the value of a people centred-theory of learning and practice—specifically, cultural historical activity theory or CHAT—as a bridging approach between the two paradigms. CHAT operates at two levels, allowing people to learn from the more knowledgeable others, as well as from peers, in order to better understand (internalise) and put that understanding into practice (externalise). CHAT provides for both processes through its three interrelated conceptualisations of learning (Edwards, 2005):

1. "Scaffolding", where the learner moves to the next level of understanding with the help of a more knowledgeable person. The developmental goal of this scaffolded instruction is mastery (Tarulli & Cheyne, 2005).
2. Cultural interpretation of learning, where the more knowledgeable person links the novice's everyday knowledge and scientific knowledge through instructional conversation, leading to the development of mature concepts. Edwards (2005) notes that the educator should help the learner to move from "situated everyday understandings" to "scientific concepts which are powerful and situation free".
3. Collectivist interpretation of learning, or expansive learning, where a group of people with different experiences and perspectives work on shared problems and jointly develop new knowledge or tools to address them. It covers both internalisation and externalisation—learning, changing and acting on the world differently (Engeström, 1999; Edwards, 2005).

Objectives and methodology

For this study I drew on CHAT and its associated methodology Developmental Work Research (Warmington *et al*., 2005) to explore with farmers and other relevant actors how the learning and practice of sustainable agriculture could be improved in southern Africa. The specific objectives of the study were twofold:

1. To explore how farmers are learning and practising sustainable agriculture.
2. To make recommendations for how this learning could be enhanced at the educational, practice and policy levels.

I chose case studies of three sustainable agriculture sites. The sites were:

- Case study 1: Zimbabwe: the Schools and Colleges Permaculture Programme (SCOPE), focusing on St Margaret Primary schools and its community in Hwedza District.
- Case study 2: South Africa: Isidore Community of organic producers and marketers in Durban.
- Case study 3: Lesotho: Mafeteng and Mohale's Hoek districts, where a home grown sustainable agriculture practice called the Machobane farming system (MFS) has been practised for the past 50 years, promoted by the Rural Self Development Association (RSDA) and the Machobane Agricultural Development Foundation (MADF).

A brief history of each case study is discussed below, and the various approaches to sustainable agriculture are compared in Table 1.

TABLE 1: MAIN FEATURES OF SUSTAINABLE AGRICULTURAL PHILOSOPHIES BEHIND THE CASE STUDIES

Organic farming (IFOAM 2005)	**Permaculture (Mollison, 1991; Nyika, 2002)**	**Machobane farming system (Mosenene, 2000; Machobane & Berold, 2003)**
A comprehensive system of organic farming regulations in 60 countries including the European Union, United States and Japan, which aims to: • Produce safe and nutritious food. • Emulate natural ecological systems and cycles. • Ensure equity, respect, justice and stewardship between people and other living things across space and time. • Manage resources in a precautionary and responsible manner to minimise risks.	• Creating beneficial relationships between different elements in the system. • Growing as many diverse species as possible and use as many diverse production processes for nutrition, medicine, beauty, spiritual and economic value. • Taking the long view and plan for long-term sustainability. • Recycling, reusing and reducing waste. • Building and enhancing the number of beneficial relationships in a system to achieve stability. • Copying the processes of nature to allow an environment to sustain itself naturally.	• Using organic fertiliser which is locally produced. • Ensuring perennial vegetation cover. • A cropping pattern adapted to the seasons of the year, which includes nitrogen fixing legumes, cash and food crops. • Natural pest control. • Relay cropping. • Mass education.

SCOPE, Zimbabwe

SCOPE was started in the mid 1990s in Zimbabwe with support from the Ministry of Education. It began work in pilot schools, with the aim of promoting "sustainable land use of school and college grounds and homesteads in the surrounding communities" and integrating ecological principles into the school curriculum (Nyika, 2001). Between 1994 and 2008, the number of schools involved in SCOPE increased from two to 126, covering all the districts of the country. Today, 13 teachers' colleges and six agriculture colleges also participate in the programme, with two universities providing advisory support. SCOPE introduced a cluster system at district level in which six or more schools are supported by a lead member to establish permaculture in the school and the surrounding community. Following its success in Zimbabwe, a regional SCOPE programme was established in 2007 to provide training and support to other countries in southern Africa

Machobane farming system, Lesotho

The MFS was developed between 1944 and 1956 by its innovator (Mr James J. Machobane). Between 1957 and 1965 it was expanded and taught to 200 farmers, who had success with potato harvests (Machobane & Berold, 2003). It was later promoted by NGOs in Lesotho, especially the Rural Self Development Association (RSDA) and the Machobane Agricultural Development Foundation (MADF). Despite this success, the initiative was undermined by government who feared the 'alternative' power and philosophy of the MFS, and who subsequently closed down the MFS college. Between 1970 and 1980 Mr Machobane lived in semi-hiding, wrote a book on MFS and continued to teach the approach. In 1990 he was paradoxically awarded an honorary doctorate by the state university in Lesotho (Machobane & Berold, 2003). By then, over 2,000 family farmers were practising the MFS, the vast majority of them in Lesotho. During its historical development, the MFS has faced a number of challenges, including stigmatisation, polarisation between MFS and conventional agriculture, and suspicion between government officials and MFS promoters (Machobane & Berold, 2003). This is changing though, with the inclusion of the practice in the national agricultural policy. At the local level one district council, the Mafeteng District Council, has allocated RSDA a piece of land on which they have established an MFS demonstration plot (Mukute, 2010).

Isidore organic farmers' network, South Africa

In the 1990s South Africa started producing various organic products. Organics Association South Africa estimated that by 2006 there were 200 certified organic farmers in the country and a substantial number that were practising but not certified (Saruchera, 2006). Isidore Organic Farm brings together a network of organic farmers in Durban, South Africa, to grow and market organic produce, share knowledge, seed and tools as well as provide training to interested 'new' organic farmers. In the early 2000s the Isidore network established a number of marketing outlets in Durban. Produce could not meet demand, and communities of organic farmers were established. Between 2005 and 2008 the Isidore Organic Farm consolidated and established a more permanent marketing structure called Earth Mother Organic. [1]

1 See www.earthmother.co.za

I used document analysis, individual and group semi-structured interviews to generate data to explore how farmers were learning sustainable agriculture. A total of some 80 people, comprising farmers, government extension workers (who largely promote conventional farming), sustainable agriculture facilitators, organic marketers and permaculture pupils participated in this process across the three sites. The majority of the participants were farmers.

I then used change laboratory (CL) workshops in each research site to embark on an expansive learning process with research participants. CL workshops are a research method used in the context of CHAT. They involve "double stimulation", which "is focused on making subjects masters of their own lives" (Engeström, 2007). The first stimulus is a problem that the subject cannot solve alone with the help of previously learned concepts, while the second stimulus is a neutral tool that the subject can use for organising the problematic situation to develop a solution. In CL workshops, the subject is provided with active and structured guidance to work towards constructing new means of developing a solution to a problem. A summary of the research process and participants is given in Table 2.

Findings

In this paper I focus on what the findings tell us about farmers' motives for learning: how they learn and the factors that shape their learning and practice of sustainable agriculture. The thrust of the study was to generate the range of motives, not to assess how popular each was. More detailed findings are discussed in Mukute (2010).

Farmer motivation for learning

Farmer learning is influenced by both intrinsic and extrinsic factors. Extrinsic factors include the need to produce adequate safe and nutritious food for the household and a surplus to generate income; to improve their resource base for their own good and for the benefit of future generations; and to generate ecological services. Some farmers have taken up the 'trade' because "it is in their veins" or they have a passion for it; or because of a concern for the future of the people and the Earth (Box 2); or because of a disposition to farm.

How farmers learn

Farmers use different ways to learn. They learn through both vertical and horizontal movement of knowledge, *i.e.* from experts and promoters as well as among themselves. Much of their learning has a practical orientation and includes learning by doing, observation, trial and innovation. However, they do not appear to have systematic and joint mechanisms for continuous and strategic learning around their emerging needs and interests.

TABLE 2: SUMMARY OF THE RESEARCH PROCESS			
	Phase 1: Interviews, documents and observations in the field	**Phase 2: Focus group discussions, observation of learning processes in workshop and of practice in the field.**	
		Change laboratory workshop	**Feedback workshop**
Case Study 1 (SCOPE)	3 individual interviews & 2 group interviews, involving 4 farmers and 6 development practitioners. A total of 10 people involved (2 women) 11 documents and 1 website	Attended by 4 farmers, 4 permaculture facilitators; 4 pupils and 1 government agriculture extension worker. It took place over 4 days and involved about 10 hours in all. Researcher served as facilitator and had an assistant. (4 of the 17 participants were women/girls)	2 farmers; 4 pupils; 4 permaculture facilitators, researcher and assistant. Workshop lasted about 2.5 hours. (4 of the 10 participants were women/girls)
Case Study 2 (Isidore Organic Farming Community)	10 individual interviews involving: 5 farmers, 1 farm worker, 4 trainers and 1 organic produce marketer. A total of 11[a] people were involved (3 women) 4 websites	Workshop was attended by 16 people: 2 organic farmers; 2 farm workers; 2 organic trainers; 3 environmental educators; 4 rural NGO leaders; 1 photographer. Daily attendance ranged from 6 to 12. CL workshop lasted 12 hours and took place over 4 days. I worked as facilitator and worked with a research assistant. (8 of the 16 participants were women)	3 feedback interviews with 2 organic farmers/facilitators; 1 organic marketer; 1 funding partner. Interviews lasted 3 hours altogether. (2 of the four interviewees were women)
Case Study 3 (MFS as promoted by RSDA and MADF)	3 individual interviews and 4 group interviews involving 33 farmers and 5 development practitioners. A total of 38 people were involved (21 women and 17 men) 10 documents	Attended by 2 MFS promoters; 8 farmers from two districts of Lesotho; and 4 government agriculture extension workers. I worked as researcher and facilitator, with an assistant. Workshop took about 12 hours, in 4 sessions over two days. (9 of the research participants were women)	5 MFS farmers and 2 MFS facilitators attended a 2 hour feedback workshop; 2 MFS facilitators were interviewed for an hour. (5 of the 9 participants were women)

a. One person is active both as a farmer and as a trainer

BOX 2. THE PUSH FOR PERMACULTURE: VOICES FROM THE SCOPE CASE STUDY

Farmer Mu: ***In the past we were made to believe that crops cannot grow properly if you do not apply chemical fertilisers. Permaculture taught us that it is possible and desirable to use organic fertiliser, which also improves the soil… Organic fertiliser is made from locally available resources… Permaculture also taught us about soil and water conservation not only in the garden but beyond, in the broader environment. We also learnt and applied intensive intercropping from permaculture. Apart from skills, we also got new seed varieties, including herbs… You see, there is very little one must spend in order to produce. Besides, with intercropping, you can produce a lot of crops at the same time, each with a different value. The other thing that we do here is to make sure that there is something growing in each part of the garden during most time of the year… What makes this kind of agriculture sustainable is that you produce one crop after another, continuously.***

Farmer AB: ***The social aspect is high because you do not talk about survival of the fittest. Everyone, even the poor people can practise permaculture or sustainable agriculture. Most of the resources are locally available. For manure, you can go and collect humus from the mountains. I know of some families whose lives were transformed by zero tillage.***

Factors that shape farmer learning of sustainable agriculture practices

Time is a central explanatory factor in farmer learning of sustainable agriculture. It is necessary for mastering a practice, building soil ecology, enhancing agro-biodiversity and improving ecological services. Time is necessary to build the resource base so that farming becomes viable (Box 3).

BOX 3. TIME: AN ESSENTIAL INGREDIENT

SCOPE facilitator/trainer: ***The main challenge is that it takes time for the results to show. Farmers are used to quick results and conventional farming is very good at that. Permaculture feeds the soil so that the soil feeds the plant and it takes a while to build good soil. With chemical fertilisers, you can just buy today and apply the following day and changes will show in a few days. Some of the benefits in permaculture are not visible, at least not in the immediate future. An example is recharging water tables through swales and other water harvesting techniques.***

Place, in terms of soils, topography, weather and seasonality, determines what can be feasibly raised and when. For example, an MFS facilitator in Lesotho noted:

> *We used to know that, particularly in the southern districts, we are going to have winter rains. And of course there will also be rain in summer. But nowadays it's difficult… You no longer know when frost will hit… it hits any time it likes.*

As well as the material and physical factors such as soils, ecology and weather patterns, *social and cultural backgrounds* also shape people's dispositions to go into farming. For example, those who have a history of farming in their families and neighbourhoods are more likely to develop an interest in it. At the same time, opportunities can also encourage people to go into farming irrespective of their backgrounds. Here is what one farmer in South Africa had to say about social and cultural background: "*Upbringing is an important factor, people who know what it is to farm. Coming from a farming background is important*".

Generally, the low economic capital of the mainly NGOs promoting sustainable agriculture has undermined the quality of training because facilitators themselves mostly only receive short-term training. This in turn reduces the efficacy of the training they can offer to farmers, resulting in sub-optimal implementation of the practices and poor results. Farmers' *levels of formal education*—a form of cultural capital—are generally low and the training language and materials employed by facilitators are often unsuitable. The negative connotations associated with farming in general and sustainable agriculture in particular also undermine successful learning and practice (Box 4).

BOX 4. NEGATIVE VIEWS OF AGRICULTURE

***One of the largest stumbling blocks I have come across in working with trying to train people in small-scale agricultural development is the negative effect of the education system of apartheid years where if you were clever you went to a normal school, and if you weren't so clever but were good with hands, you went to a technical school and if you weren't good with your mind or hands, you went to [study] agriculture. There is a stigma attached to agriculture that pervades our society to the core, where especially in the last two to three decades, a lot of people got uplifted from agriculture areas into urban and have finally got a job through much hardships and much perseverance in the commercial sector. To hear that his son wants to do agriculture is like a knife in the heart*. Farmer/facilitator from South Africa**

Before I went to Bulgaria **[to do a PhD in Agriculture],** ***there was a general impression given to us by the powers that be, yes, the government – that the MFS was primitive … So that was my impression, although it was not well-founded, it was just what we heard from government, the officials, and the extension officers then. They were so much against it that we were not, even the teachers, allowed to talk about it at school. It was almost like a crime … So I had the impression that this man [Machobane] was sending us back to where we came from 100 years ago*. MFS Facilitator from Lesotho**

Mainstream *agricultural and educational policies* in the three study site countries are still inadequate and ineffective for supporting the growth and development of sustainable agriculture. They also generally favour high external input agriculture. Meanwhile, HIV and AIDS have had ambivalent effects on the learning and practice of sustainable agriculture. On the one hand, they have created a demand for safe and nutritious food, while on the other they have killed the productive segment of a farming population who would have been well-placed to deal with its labour-intensive nature.

Recommendations

The main limiting factors for the learning and practice of sustainable agriculture common to the three cases studies were inadequate budgetary and government extension systems, curricula and educational support in mainstream education and time for learning. The result is shallow and inadequate training for sustainable agriculture promoters. The study makes six policy recommendations for improving the learning and practice of sustainable agriculture in southern African countries, as well as in other places with similar contexts:

1. **Governments need to support comprehensive and accredited training in sustainable agriculture:** The study showed that NGOs do most of the promotion of sustain-

able agricultural practices. Governments should be encouraged to give more strategic support for sustainable agriculture given its demonstrated potential for food security, health and ecological sustainability. Sustainable agriculture NGOs should lobby the relevant authorities to mainstream sustainable agriculture education in the context of "Education for Sustainable Development" which seeks to integrate principles, values and practices of sustainable development into all aspects of education and learning towards environmental integrity, economic viability and social justice (UNESCO, 2005). They should also lobby for college and universities to offer accredited training so as to attract young to learn sustainable agriculture. At the time of this study there was little accredited training in sustainable agriculture practices in the region; where it was available it was only being offered below degree level.

2. **Provide enough time for the learning of sustainable agriculture:** Learning institutions training both trainers and farmers in sustainable agriculture should allow more time to ensure effective learning and practice. Allowing sufficient time enables the farmer (and the trainer) to absorb information, master a practice and be confident enough to experiment and innovate. This is consistent with the *law of the transition of quantity into quality* (Macey, 2000), which argues that quantitative change leads to qualitative change. For the training institution, this means offering training at higher levels such as degrees.

3. **Incorporate different ways of knowing** into curricula to bring together participatory and other learning approaches for farmers. Sustainable agriculture education represents the meeting point of different knowledge systems and sources: traditional and western, farmers and scientists. This means that curricula for both workplace and formal learning need to incorporate these different forms of knowledge from different sources.

4. **Develop, package and promote new theories which bridge RDDA approaches and participatory approaches.** Theories such as cultural historical activity theory and concepts such as cognitive justice debates and alternative science offer potentially effective solutions to bridging. But these need to be packaged and communicated for training institutions and agricultural curricula in ways that are accessible to their target audience. Suitable educational materials should be developed to accompany this process.

5. **De-stigmatise sustainable agriculture.** One of the main limiting factors to the spread of sustainable agriculture is its double stigmatisation whereby people, especially young people, regard agriculture as a profession that is 'not cool' and sustainable agricultural practices as backward. Government is best placed to deal with this problem by developing 'agrarian consciousness' in society through schools. It should also do this by ensuring that land tenure, curricula design and implementation, and agricultural budgets support sustainable agriculture. Land tenure policies should be long-term to allow for the building soil fertility and the ecological dimensions that support long-term productive capacity. The private sector can promote sustainable agriculture by investing in it at various levels: such as research, training and marketing organic produce. Use of appropriate language is an important pre-condition for success.

6. **Farmers should develop learning and development forums:** One of the main constraints to farmer learning is the absence of farmer learning and development forums to drive local learning processes. Such forums can tap into the local knowledge possessed by the farmers in the area, as well as by other people such as agricultural, business and environmental experts. Farmers could establish local learning forums to share innovations, knowledge and experiences; to build a voice and lobby for supportive policies; to seek input from other development actors; and to connect and coordinate local learning and development processes. Furthermore, such forums could help to set the agenda for needs-driven research. Such a forum would 'funnel the drizzle' of farmers working in isolation and serve to improve their collective effectiveness. The role of the government here would be to provide an enabling environment for farmers to establish such structures and systems.

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