A Review of Participatory Agricultural Research and Development in South Africa and KwaZulu Natal.

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SUMMARY

Globally, it is accepted that Participatory Agricultural Research and Development can play a significant role in reducing rural poverty, food insecurity and malnutrition. The international development community is giving increased attention to agricultural innovation processes and systems that lead to outcomes at scale. Inclusive multi-dimensional and multi-stakeholder learning processes are seen as important. Smallholder family farmers become more central in the design and implementation of research processes as partners in planning and implementation processes.

Key trends or changes in Participatory Agricultural development thinking are moving from:

- Increase in production to improvement in local livelihoods
- Technology transfer to local innovation development
- Beneficiaries of projects to influential stakeholders within programmes
- Technology transfer to co-development of innovation systems
- Functional participation to empowerment and
- Applied and adaptive research to strategic and pre-adaptive research.

In South Africa different participatory approaches and processes have developed primarily through North-South partnerships and include methodologies such as PRA/PLA (Participatory Rural Appraisal/Participatory Learning and Action), FPR (farmer Participatory Research) and FSR (farming Systems Research and Extension), PTD (Participatory Technology Development) and PID (Participatory Innovation Development), PAR (Participatory Action Research), CBNRM (Community Based Natural Resource Management), SLA (Sustainable Livelihoods Analysis) and other gender and stakeholder analysis methods such as AKIS (Agricultural Knowledge Information Systems) and RAAKS (Rapid Appraisal of Agricultural Knowledge Systems). Most of these methodologies have been introduced in KwaZulu-Natal through Non Government Organisations and researchers associated with Universities, Parastatal Agricultural Research Institutions and Corporate Social Investment bodies. Although some of the rhetoric has filtered into government programmes through these channels, implementation and funding from government sources invariably do not include these approaches.

There are two basic trends in terms of Participatory Research and Development (PR&D) in Kwazulu-Natal, for the few organisations that consciously work in this field:

- 1. *Participatory Innovation Development*; primarily NGO based and supported through international donor funding or CSI based and supported through for example Grain-SA and Wesbank. The latter is only now (the last 2-3years) coming to the fore as this sector finally rises to the challenge of providing meaningful support to smallholders. To a lesser extent the Parastatal Research Institutes have dabbled in the process.
- Participatory Action Research; this research paradigm appears to have become primarily, the domain of the Universities with both UNISA and UKZN focussing on these processes quite strongly. This 'learning' paradigm is one that can suite universities better in terms of the scope and scale of projects that they can confidently tackle through supporting pre-and post-graduate students.
- For those organisations that also have an advisory/extension role (Universities and Colleges, Parastatal Research Institutes and Non Government Organisations) Agricultural Innovation Systems and Sustainable Livelihoods Approaches have come to the fore.
- Mostly the emphasis on participatory work will be led through specific projects or programmes, often donor funded and led by individuals with a strong vision and commitment to such processes.

Participatory Agricultural Research and Development is almost entirely absent from Government Departments and extension, outside of sporadic donor funded projects, despite policy and programmatic rhetoric

- Given the disparity between the commercial and smallholder family farming sector and the extreme politicisation and fragmentation of the government sector nationally, provincially and locally, it is proposed that research, education, the private sector and non government institutions work together in multi stakeholder partnerships to provide a home for Participatory Agricultural Research and Development, until the political will shifts more towards providing meaningful support to rural dwellers in South Africa. A concomitant focus on the growing of local organisations and movements with the ability to lobby and advocate for change is required. There are already a few working examples of such partnerships.
- Specific actions required in policy development throughout the spectrum of stakeholders at local, provincial and national level include: Convincing donors, organisations and governments to change the way they fund agricultural research; supporting innovation platforms and other multi-stakeholder alliances at different levels; developing innovation brokerage capacity; strengthening the pivotal role of agricultural advisors and to integrating the innovation systems approach into education.

INTRODUCTION Global trends

Global experience shows that new ways of thinking about and doing agricultural research and development are required. The basic paradigm shift is one of moving away from the idea that research and development is a process of generating and transferring modern technology to 'farmers'. And then moving towards seeing the idea as an inclusive multi dimensional learning process that:

- Works from a holistic perspective that includes biophysical, socio-political and economic perspectives in agriculture AND natural resource management;
- Draws upon diverse source of knowledge from local to global ;
- Provides for meaningful participation of user groups in the process of investigating improvements in local situation;
- And builds synergy between local capacities, resources and innovations by
 - Providing decision support tools and information that enables various types of users to make strategic choices and actions and
- Which results in a wide range of knowledge products (technological through to socio-political) for generating, sharing, exchanging and utilizing knowledge.

These global trends are reflected also in trends in Participatory Agricultural research in South Africa, albeit in a much more haphazard way.

Local people become, not beneficiaries, but stakeholders or actors who provide key inputs into the process:

- They have complementary roles in defining research priorities
- They take on the adaptive/ applied testing (informal modes of experimentation) of promising new innovations and for dissemination through their social networks for co-development of new innovations
- Learning becomes more experiential and ways of externalising tacit knowledge are found. (Hoffmann, Probst, & Christinck, 2007)

- This has meant a growing interest in the use of participatory approaches in natural resource management, agriculture and rural livelihoods, that collectively can be seen as participatory research and development striving for meaningful participation in the process of seeking improvements in local situations.
- These approaches are more likely to be able to deal with 'second generation issues' such as diverse biophysical environments, multiple livelihoods goals, rapid changes in local and global economics and the drastic decline in resource investment for the formal research and development sector. (Gonsalves, et al., 2005)
- The mid to late 1990's saw a global trend towards meaningful farmer participation in agricultural research and development and methodologies such as Farming Systems Research and Participatory Rural Appraisal (PRA), developed in the 1970's and 1980's, were incorporated into methodological frameworks such a Farmer Participatory Research, Participatory Learning and Action, Farmer Field Schools, Participatory Innovation Development and Action Research. The frameworks take political, social- cultural and ethical issues into account and place the priorities and processes of farmers centre stage. (Sutherland, 1998). Subsequently, Sustainable Livelihoods frameworks and other frameworks to attempt to incorporate the economic elements of situations more overtly, have also been developed. These development processes provide a *framework* that helps in understanding the complexities of poverty and a set of *principles* to guide action to address and overcome poverty
- More recently there has been a greater focus on institutional and organisational aspects of Participatory Agricultural Research to assess progress and impact, in terms of concerns such as partnership, capacity building on all levels, as well as issues of scale (scaling up and scaling out). It has also meant an increased focus on the impact of participatory research on rural development indicators such s poverty reduction and sustainability. (Becker, 2005) (De Leener, 2003) (Waters-Bayer, Van Veldhuizen, Wettasinha, & Wongtschowski, 2005) (Guendel, Hancock, & Anderson, 2001).

Key themes and assumptions in Participatory Agricultural Research

- These themes have emerged as different organisations (Research institutes, Universities, Non Government Organisations (NGOs) and to a lesser extent Government Organisations) grapple with the real issues of increasing productivity and sustainability for rural dwellers world wide, mostly in the developing Southern nations and mostly in partnership with more developed Northern countries. These themes include the following:
 - Pro-poor targeting
 - Conservation and sustainable use of natural resources
 - Development of uplands and other lessfavoured areas
 - Local governance, decentralization and citizens' rights
 - Equity for women and other marginalized socio-economic groups
 - Trade globalization and supply chains
 - Migration and rural-urban dynamics
 - Property rights and collective action
 - Agriculture and human health
 - Multi-stakeholder partnerships

From increase in production... to improvement in local livelihoods
From technology transfer to local innovation development
From beneficiaries... to influential stakeholders
From technology transfer.... to co-development of innovations
From functional participation... to empowerment
From applied and adaptive research ...to strategic and pre-adaptive research

- Local capacity development and
- Organizational learning and change

These themes are being explored largely using the following two basic assumptions:

OVERALL ASSUMPTION 1: New technology is the key leading factor in the process of desired social change

OVERALL ASSUMPTION 2: Increased yields or production is the underlying goal of all agricultural research and development

Because the themes that have emerged from working in the sector have by necessity broadened to also encompass social, political, cultural and natural resource management concerns, these basic assumptions now appear to be somewhat flawed and can lead to a mismatch between programme intentions and outcomes. It can be argued that a large portion of the failure of Participatory Agricultural Research to have a sustained impact in more marginalised rural communities stems from this mismatch. The other major contributing factor is the inability of governments in developing nations to put appropriate policies, strategies and processes in place to provide an enabling environment.

The new basic assumptions that are emerging through consolidated internal and external review of programmes are:

OVERALL ASSUMPTION 1: Meaningful participation of user groups in the process of investigating improvement in local situations.

OVERALL ASSUMPTION 2: Increased livelihood diversity, resilience and security is to be the underlying goal of all agricultural research and development.

- Now, concepts such as strategic and pre-adaptive participatory research become important as does the idea of best practise scenarios and options and the mainstreaming of cross cutting issues and themes. In many ways these concepts are still in a developmental phase and are not as yet integral in existing institutional and research cultures.
- The development of methodological frameworks and processes to encompass the above themes and goals has followed two broad tracks/lines depending to an extent, on the type of institution at work and their overall aims: researcher and innovation. (Brock & Pettit, 2007)
- Participatory Action Research (PAR) is an approach to research in communities that emphasizes participation and action. It seeks to understand the world by trying to change it, collaboratively and following reflection. PAR emphasizes collective inquiry and experimentation grounded in experience and social history. Within a PAR process, "communities of inquiry and action evolve and address questions and issues that are significant for those who participate as co-researchers" (Reason & Bradbury, Introduction, 2008) PAR contrasts with many research methods, which emphasize disinterested researchers and reproducibility of findings.
- PAR practitioners make a concerted effort to integrate three basic aspects of their work: participation (life in society and democracy), action (engagement with experience and history), and research (soundness in thought and the growth of knowledge) (Chevalier & and Buckles, 2013).
- This provides academic flexibility and rigour as well as providing a framework to easily include the socio-political and cultural aspects of a research process. It is by nature primarily a method of social enquiry and has self transformation and empowerment as an underlying goal. Participatory Rural Appraisal (PRA), experiential

learning and indigenous knowledge facilitation techniques fit in well as facilitation methodologies, as do methods such as photo voice, community theatre and role plays.

- **Participatory Innovation Development (PID);** is an approach to learning and innovation that is used in international development as part of projects and programmes relating to sustainable agriculture. The approach involves collaboration between researchers and farmers in the analysis of agricultural problems and testing of alternative farming practices.
- It has developed out of methodologies such as Farming Systems Research and Extension, PRA and PLA (participatory learning and action) and Indigenous Technical Knowledge Systems and incorporates further methodologies such as Farmer Field Schools.
- This approach enables the research and development community to respond to locally defined problems and to find solutions that build upon local knowledge and are consistent with local resources and contexts. Moreover, by involving farmers as the users of the research process, it is more likely that farmers would share and use (new) knowledge.
- Local innovation in agriculture and natural resource management goes beyond technologies to socioorganizational arrangements such as new ways of regulating the use of resources, new ways of community organization, or new ways of stakeholder interaction. The term Participatory Innovation Development (PID) embraces this broader understanding of joint research and development and is now being used alongside, or in place of PTD (Participatory Technology Development).

The interplay between research, extension and farmers

- Traditionally, a rather linear approach of policy development-research-extension-farmers has been implemented and promoted. This approach largely still works well for the conventional farming sector albeit with a number of feedback loops, designed for incorporation of farmers and extension perspectives back into research and policy. Political and agri-business imperatives provide strong motivation for the success of this process.
- However, in the smallholder agriculture sector, neither the political nor agri-business imperatives hold much sway and the linear model of technology transfer has failed repeatedly and at a large scale.
- More circular and flexible models have been developed and the overall trend in both PAR and PID has been for researchers and farmers to interact a lot more and a lot more directly. Extension, from a government and public institution perspective has developed alongside to become more educational and participatory and methods such as FFS (Farmer Field Schools) and PTD (Participatory Technology Development) have been included-although mostly on project or programme levels, rather than as an integral part of the extension service. Many research and development organisations have tended to combine research and extension into one component ushering in multi-disciplinary approaches and research as well as capacity building for researchers in the fields of participation and facilitation. Agri-business to some extent has followed suite. Government extension services, especially in the beleaguered South are still widespread but fundamental questions about their role and ultimate usefulness are the order of the day. (Leeuwis & Van den Ban, 3rd Edition).



FIGURE 1: THE INTERPLAY BETWEEN RESEARCH EXTENSION AND FARMERS, INDICATING ASSOCIATED METHODOLOGIES.

HISTORY OF PARTICIPATORY AGRICULTURAL RESEARCH IN SA-KZN

- Different participatory approaches and processes developed in North-South partnerships include PRA/PLA (Participatory Rural Appraisal/Participatory Learning and Action), FPR (farmer Participatory Research) and FSR (farming Systems Research and Extension), PTD (Participatory Technology Development) and PID (Participatory Innovation Development), PAR (Participatory Action Research), CBNRM (Community Based Natural Resource Management), SLA (Sustainable Livelihoods Analysis) and other gender and stakeholder analysis methods such as AKIS (Agricultural Knowledge Information Systems) and RAAKS (Rapid Appraisal of Agricultural Knowledge Systems).
- All have been introduced in South Africa and KZN primarily through NGOs and researchers associated with Universities, parastatal Agricultural Research Institutions and Corporate Social Investment bodies. Although some of the rhetoric has filtered into government programmes through these channels, implementation and funding from government sources invariably do not include these approaches or do so as short term, more localised project based interventions, usually at the behest of Northern funding partners.
- A selection of participatory research methodologies will be explored below, with examples of their use in South African institutions to illustrate their applications in the last 20 years.

Participatory Rural Appraisal (PRA) and Sustainable Livelihoods Analysis (SLA)

PRA is 'a growing family of approaches and methods to enable local people to share, enhance and analyse their knowledge of life and conditions, to plan and to act' (Chambers, 1993)

- A key feature of PRA is its holistic approach, in which the interaction between different elements in complex people-environment relationships is an important focus. A common thread in all these methodologies is their recognition of important inter-linkages between different elements of rural livelihood and production systems. Unlike earlier methodologies, PRA recognizes that indigenous people are capable of identifying and expressing their needs and aspirations themselves and in their own way, such that the role of the researcher is changed to that of a listener, learner, catalyst and facilitator.
- A comment made by University based researchers, indicate the trend in South Africa in the early 90's. "Despite the growing international interest in PRA, there has been remarkably little research and writing on this topic in South Africa and there is little, if any, evidence of explicit PRA work being done". (Binns, Hill, & Nel, 1994). This has changed somewhat since then, in that PRA/PLA has become a common methodology taught at University level to students in community development, within a number of different disciplines and sectors. It is promoted as a methodology for garnering community participation and support, mostly in situation analysis/ needs assessment processes and for initiating involvement and research so basically as an information gathering tool. See the table below for a selection of examples that illustrate this point.
- SLA is a framework for analysing sustainable livelihoods, defined here in relation to five key indicators. The framework shows how, in different contexts, sustainable livelihoods are achieved through access to a range of livelihood resources (natural, economic, human and social capitals) which are combined in the pursuit of different livelihood strategies (agricultural intensification or extensification, livelihood diversification and migration). Central to the framework is the analysis of the range of formal and informal organisational and institutional factors that influence sustainable livelihood outcomes (Scoones, 1998). The PRA methodology is central to the application of this framework in community situations.

TABLE 1; EXAMPLES OF USE OF PRA (PARTICIPATORY RURAL APPRAISAL) AND SLA (SUSTAINABLE LIVELIHOODS ANALYSIS) FOR RESEARCH PURPOSES.

Year	Organisation	Title	Aim	comments
	and			
	methodology			
1995	University of Witwatersrand (WITS)	Development, research and participation: Towards a critique of participatory rural appraisal methods. Jonathan Stadler . Development Southern Africa. Vol. 12, Iss. 6, 1995	A critique of PRA comments on the context within PRA	processes and methodologies He methodological weakness of social
2002	Agricultural Research Council	Raising livestock in resource-poor communities of the North West Province of South Africa - a participatory rural appraisal study. Vol 73 No 4. Pges 177-184. Journal of the South African Veterinary Association	Tto obtain information on the challenges owners face in raising livestock in these areas and to evaluate the livestock owners' level of knowledge of internal parasites in their animals.	Questionnaires, PRA survey: There were some difficulties in using the participatory methods since it was the first time that the facilitators and the communities had been exposed to them. Many communities had difficulty in dealing with the concept of finding solutions within the community, which is such an integral part of participatory methods
2008	Agricultural Research Council:	<u>A facilitated process towards finding</u> options for improved livestock production in the communal areas of Sterkspruit in the Eastern Cape province, South Africa. WM	Interviews and focus stakeholder process f production. Due to lir common agenda for a	group discussions; Multi or options to improve livestock nitations in research agenda, no action agreed to.

		Goqwana, C Machingura, Z Mdlulwa, R Mkhari, O Mmolaeng, AO Selomane . African Journal of Range & Forage Science Vol. 25, Iss. 2, 2008	
2009 - 2011	University of South Africa (UNISA):	<u>Community group environment for people</u> <u>participation and empowerment.</u> Diale, Nkgodi, Race.	The data was collected through participants observation Participatory Rural Appraisal techniques , community groups, documents reviews, and groups and individual interviews This study explores participatory development methods which may be engaged with a smaller community interest group to create an environment conducive to free and effective participation towards empowering more participants in rural communities The study found that: interest groups are more common, accessible and empowering in rural communities than organisational linkage structures.
2011	University of Pretoria (UP)	Towards redesigning the agricultural extension service in South Africa: views and proposals of smallholder farmers in the Eastern Cape. JA Van Niekerk, A Stroebel, CJ Van Rooyen, KP Whitfield, FCJ Swanepoel .South African. Journal of Agricultural . Extension. Vol 39 no.2 Pretoria 2011	The research used a Logical Framework Analysis (LFA) enquiry, including PRA methods to determine the problems smallholder farmers face as well as the causes and effects of their problems.
2014	University of Kwazulu Natal (UKZN).	Exploring the Role of Agricultural Extension in Promoting Biodiversity Conservation in Kwazulu-Natal Province, South Africa Kamal Adekunle and Abdu-Raheem . Agroecology and Sustainable Food Systems www.tandfonline.com	SSI's (semi-structured interviews) with different stakeholders used to determine KZN extension service contribution to promoting biodiversity Assessed extension as typically technology transfer with no content in NRM, Diversity
1999	Rhodes University (RU)	Empowerment for development: Taking participatory appraisal further in rural South Africa Nicole Motteux, Tony Binns, Etienne Nel, Kate Rowntree. Development in Practice Vol. 9, Iss. 3, 1999	Critique of PRA in the context of catchment management and Land Care.
2013	ACCI (African Centre for Crop Improvement) UKZN	Potato production in Kenya: Farming systems and production constraints. Jane Muthoni, Hussein Shimelis and Rob Melis Journal of Agricultural Science 5:182-197. <u>Preferences and constraints of maize</u> farmers in the development and adoption of improved varieties in the mid-altitude, sub-humid agro-ecology of western <u>Ethiopia.</u> W. Abera, Shimelis Hussein , J. Derera, M. Worku and M.D. Laing. African Journal of Agricultural Research 8: 1245- 1254. <u>Farmers' desired traits and selection</u> <u>criteria for maize cultivars and their</u> implications for maize breeding: A case <u>study from South Africa.</u> Sibiya, J., Tongoona P., Derera, J., and Makanda I. Journal of Agriculture and Rural Development in the Tropics and Subtropics 114(1):39–49.	PRA component/chapter for all PhD 's in breeding trough the ACCI. (2003-2014) PRA and SLA methods used for assessment, selection criteria, breeding priorities etc.
2001	Rhodes University	The role of land-based strategies in rural livelihoods: The contribution of arable production, animal husbandry and natural resource harvesting in communal areas in South Africa. Charlie M Shackleton, Sheona E Shackleton, Ben Cousins Development Southern Africa_Vol. 18, Iss. 5, 200	SLA, and PRA techniques employed to Uses a livelihoods perspective to analyse land based strategies.

2013	Dept of Agric economics, University of free State (UFS).	Exploring social capital of emerging farmers from Eksteenskuil, South Africa Henry Jordaan, Bennie Grové . Vol. 30, Iss. 4-05, 2013 (based at the University of Malawi), and Dr Chrispen Sukume (Zimbabwe. : An example of the participatory research, and multi stakeholder partnership processes currently being conducted at PLAAS (Programme for Land and Agrarian studies based at the University of the Western Cape.	Using the SLA and framework to assess social relations among smallholders in a specific context
2013	PLAAS (Progamme for Land and Agrarian Studies) University of the Western Cape (UWC)	Space, Markets and Employment in Agricultural Development. Prof Andries Du Toit ; Dr Ian Scoones (IDS Sussex, UK) and Prof Ben Cousins, David Neves (dneves@plaas.org.za) Dr Ephraim Chirwa	Programme and institutional partnership approach within a broad SLA to analysis

The two summaries below give a good indication of the use of PRA in a research context, in KZN and applied to maize as a crop:

1. Use of PRA methods and surveys to glean information about farmers desired traits and selection criteria

Adoption of hybrids and improved varieties has remained low in the smallholder farming sector of South Africa, despite maize being the staple food crop for the majority of households. The objective of this study was to establish preferred maize characteristics by farmers which can be used as selection criteria by maize breeders in crop improvement. Data were collected from three villages of a selected smallholder farming area in South Africa using a survey covering 300 households and participatory rural appraisal methodology. Results indicated a limited selection of maize varieties grown by farmers in the area compared to other communities in Africa. More than 97% of the farmers grew a local landrace called *Natal-8-row* or *IsiZulu*. Hybrids and improved open pollinated varieties were planted by less than 40% of the farmers (Sibiya, Tongoona, Derera, & Makanda, 2013. Vol. 114 No. 1)

for maize varieties.

2. Use of PRA and SLA (sustainable livelihoods analysis) in a study boy the ARC to ascertain the effect of land degradation in Emmaus (Bergville) on local livelihoods.

Focus group discussions, community mapping, transect walks and livelihood assessments were used as part of the LADA-L(Land degradation assessment- local – developed by the FAO) process for mapping of land use and degradation.

The main land use systems (LUS) assessed were grassland and cultivated subsistence and the main problems in the area as indicated by the land users are a lack of domestic water supply, a reduction in quality of grazing and a loss of soil fertility. The effect of land degradation on human livelihoods is a reduced potential for crop production and the keeping of good quality livestock in the area to supplement food security.

Current sustainable land management practices in the area include the implementation of conservation agriculture, water harvesting and liming by some individuals. Many individuals are deterred from practicing agriculture due to the labour and cost intensity required, as well as due to a lack of financial returns and incentives.

Harvested grain used to last for a whole year, but the current harvests only last for about three months. Late plantings caused by not having money (inputs) and own equipment for those who practice SLM/CA causes yields to drop in combination with perceived erratic and unreliable rainfall.

Liming of communal fields and soil sampling has enabled SLM/CA farmers to use fertilizers efficiently and land users saw improvement of yield (Stronkhorst, Maphumulo, Trytsman, Breytenbach, Lotter, & Mpanza, 2010).

Application of the methodology in it's more intended form, as a community planning and action methodology that promotes self direction and empowerment is much more rare. NGOs using this approach in South Africa also work primarily with the methodology as an information gathering and planning tool in the initial stages of projects; thus a more development orientated application. Work with the methodology is more flexible in this sector and has been used for many different themes such as;

- Community level planning and decision making for the Community Work Programme (run by the Department of Co-operative Governance and Traditional Affairs) and implemented by NGOs nationally.
- Community based strategies for disaster risk reduction linked to NGOs such as NCC (National Council of Churches) and local municipalities and supported by Oxfam International.
- Community level climate change adaptation strategies; supported by NGOs such as EMG (Environmental Monitoring Group) in partnership with SANBI (South African Botanical Institute) and supported by the EU (European Union)
- Integrated water resource management planning at community level implemented through AWARD (Association of Water and Rural Development) supported by CIDA (Canadian International Development Agency) and others; to name but a few.

As can be seen the applications are generally more on a programmatic design level in complex multi stakeholder environments rather than commodity or crop specific applications.

Participatory Research and Extension (PRE)

This approach, with attendant principles and processes can encompass a number of different methodologies.

The following five processes are considered important and are central to PRE approaches:

- A focus on marginalized groups,
- Concerns about the environmental degradation,
- Building of civil society,
- Valuing of farmers experience and
- A focus on constructivism.

In essence a linear technology development and transfer approach is still supported, but more emphasis is given to types of participation, stakeholder involvement, the role of the facilitators and different learning strategies. This would then theoretically enable the approach to be workable with widely different clientele and different local conditions. (Ton, 2005)

In South Africa the terminology and approach has been taken on board in the development of policy for Agricultural Research and Extension within the Department of Agriculture, through a commissioned study, with financial support from the Netherlands.

Broadly the PRE principles are seen to be applicable to a number of different extension approaches, which can be applied in different conditions across South Africa. These include:

- *Technology transfer;* which is seen as relevant and important. Organisations developing technology and innovations have a responsibility to diffuse them. This should include collaborative diagnosis of farmers conditions and needs, training of extension officers and on farm training of farmers.
- Participatory approach; which builds on farmers' own capacities and their ability to organize themselves into groups to identify needs and priorities, plan extension programmes/projects, implement and evaluate. This approach is recommended for implementing a multi-sectoral, client-focused, coordinated, demand-driven and participatory extension service. This should include collaborative diagnosis of farmers' conditions using participatory methods, on farm trails and dissemination of innovations.
- *Advisory approach;* which is easily achievable in the highly commercial farming sector where farmers have achieved a high level of competence, are able to identify their own problems and are innovators. The private sector is encouraged to offer this service because of resources availability and efficient service delivery processes. (Agriculture., 2005).
- These approaches serve to highlight the difficulties the Government is facing in providing a systematic and coherent service to farmers, as well as an inability to integrate the concepts of placing farmers centre stage in any agricultural research and development process. Provincial extension services have been plagued with high levels of inefficiency and a lack of direction. The necessary linkages with research and farmers are not happening. The following quotes are indicative.
- 'The near collapse of the extension services in the Limpopo Department of Agriculture, particularly evident in its failure and its ability to respond to the needs of small scale farmers calls for an urgent and holistic intervention in terms of appropriate approach and policy.' (*Zwane,E.* 2009).
- 'The poor performance of public extension services and their narrow focus in the delivery of technical packages,...is a major contributor to the ineffective dissemination of conservation agriculture technologies amongst smallholders. In the last two decades, several alternative approaches have been developed or rediscovered (like action-research) that have been adapted to integrated natural resource management and sustainable agriculture technology development. Despite these conceptual advancements and the better understanding of rural livelihood systems and the introduction of suitable agricultural technologies, the key challenge often faced by research and extension practitioners remains the operationalisation of these concepts in practice' (Ficarelli, Chuma, Ramaru, Mruwira, & Hagmann, 2002)

There has been a trend globally and much more so in South Africa, to side-step the role of extension in agricultural research and development or more commonly to incorporate the extension aspects of a programme directly into the research-farmer relationships. The methodology development around farming systems R&E and farmer innovation attest to this.

Farmer Participatory Research (FPR)

- Farmer Participatory Research refers to the active involvement and participation of beneficiaries (farmers) and other stakeholders in the agricultural research process. This approach evolved as a response to earlier agricultural research methodologies (on-station research and Farming Systems Research) that were found to be unsatisfactory in producing appropriate and sustainable research results for the target beneficiaries.
- A common classification used to identify the various types of participation in agricultural research is provided by Biggs (1989): contractual – where researchers contract with farmers to obtain land and services; consultative - where researchers consult farmers about their problems and then develop solutions for them; collaborative - where researchers and farmers collaborate as partners in the research process; and collegiate - where researchers work to strengthen farmers' informal research and development systems, and where farmers are given scope to apply their initiative and specialised knowledge throughout the research process.
- FPR represents an attempt to move towards collegiate research, recognising farmers as innovators and experimenters, and treating them as active and equal partners with researchers and extensionists (rather than merely passive end-users of technologies). The aims and objectives of FPR include the following:
 - Increase the understanding of the complexities and dynamics of local agricultural and socio-economic systems;
 - Identify priority problems, constraints and opportunities;
 - Identify, develop, test and implement new technologies and techniques (based on the knowledge and research capabilities of local communities and institutions; and
 - Stimulate and strengthen the experimental capacity of farmers to analyse their situations and develop relevant, feasible and useful innovation (Farm Africa-Ethiopia), 2001)

The literature documents a wide array of methods that can be used to facilitate a FPR approach to agricultural research and it is now commonly appreciated that a combination of methods is the most beneficial in providing a holistic approach to FPR. Methods include:

- Participatory on-farm trials
- Group/community meetings/workshops/discussions
- Case studies with individual households/farmers
- Study tours (to other farmers' fields and research stations)/exchange visits
- Participatory Rural Appraisals (PRAs).

Farming Systems Research and Extension (FSR&E)

FSR&E has been used within a broader concept and approach of farmer support and participatory on-farm trials in South Africa, in a number of cases (Stilwell & Van Rooyen, 1999).

- FSR&E as an approach was developed in the 1970's. The origins are many and varied, but basically was a response to changing from top-down research agendas (set by research scientists) and a away from solely research station based agendas, to include farmers' agendas and localised experimentation. FSR tended to focus on technology development within specific disciplines and as such has mostly been used by agricultural research institutions and stations. The systems thinking underlying FSR has often been underplayed or misunderstood in these environments.
- The approach has developed, so that today it is a process that seeks understanding of the whole farming system, at various scales (or hierarchies that include farms, agribusiness systems models and partnership models), from the individual farm enterprise up to large regions or areas and then identifies and shapes development opportunities for sustainable production with farmers, involving a wide range of disciplines and stakeholders (Packham, Petheram, & Murray-Prior, 2007).
- An analysis of the approach in South Africa, in the late 1990's concluded that FSR&E should have as its ultimate goal, the promotion of economic, social and structural change induced by technological transformation at all levels in the rural community. It has however been limited in application since then and has in some ways been superseded by participatory technology and innovation development methodologies; which, according to peoples' perceptions, have more flexibility to include the socio-cultural and economic aspects in terms of community level organisation and stakeholder involvement.
- A point in case is a research programme managed by the ARC- ISCW (Agricultural Research Council, Institute of Soil, Climate and Water), between 2003-2006. The programme focussed on the development and implementation of sustainable land management practices in the Bergville district of KZN, under the auspices of the then LandCare programme of the Department of Agriculture. The two primary activities of the programme consisted of setting up grazing management plans for the communities involved and the investigation and use of conservation agriculture principles in field cropping.
- The research was conceptualised as having hard and soft systems platforms. For the prior a FSR&E approach was used (with research and farmer based adaptive trials on site) and the soft systems platform gave attention to action research methodologies, tools and techniques (including farmer-to farmer extension approaches) to capacitate stakeholders to manage their land in a sustainable way. The core model was based on the action learning cycle of diagnosis, planning, action and reflection (Smith, Trytsman, Bloem, Everson, & Mthethwa, 2005).

The following quote summarises one of the main recommendations from this participatory research process:

"In general, the use and or development of conservation agriculture principles and practices are strongly recommended for any (MaizeO cropping and mixed farming enterprise due to the favourable impact it has on soil health, farming profitability and social well being" (Smith, Trytsman, Bloem, Everson, & Mthethwa, 2005).

Participatory Technology (PDT) and Innovation Development (PID)

- The following statement in a recent publication in the agricultural development and extension field, sums up the imperative for working with these approaches:
- "Scientists are being challenged to re-consider that their role in technology development is through innovation and a complex process involving a reorganization of social relationships, not just technical practice. In this context, technology shifts from something to be applied to something leveraged for networking and organizing. To ensure the future, the idea of sustainability as a dynamic process rather than an endpoint

offers a route for understanding and engagement between research, policy and personal spheres. For both research and extension agendas; in considering traditional agriculture in the context of economic development we have to create the capacity to co-operate in a way that opens up the possibility of social change; a way of interacting that preserves and creates new forms of social cohesion (Caister, K. 2013). Researchers ...will come to understand that attitude, environment and relevant issues, not specific tools, achieves participation". (Caister, Green, & Worth, 2012).

- Participatory technology development (PTD) is an approach to learning and innovation that is used in international development as part of projects and programmes relating to sustainable agriculture. The approach involves collaboration between researchers and farmers in the analysis of agricultural problems and testing of alternative farming practices. It has it's origins in FSR&E, indigenous technical knowledge and PRA. PTD facilitators are usually researchers, sometimes consisting of a team that includes both biological and social scientists. While PTD is closely linked to research, it often crosses the boundary into agricultural extension because it involves learning activities with farmers. One of the leading authorities on this process is the *Centre for learning on sustainable agriculture - ILEIA* based in the Netherlands. ILEIA has described PTD as "a process between local communities and outside facilitators which involves:
- Gaining a joint understanding of the main characteristics and changes of that particular agro-ecological system;
- Defining priority problems;
- Experimenting locally with a variety of options derived both from indigenous knowledge ... and from formal science, and
- Enhancing farmer's experimental capacities and farmer-to-farmer communication" (Reijntjes, Haverkort, & Waters-Bayer, 1992)

Local innovation in agriculture and natural resource management goes beyond technologies to socioorganizational arrangements such as new ways of regulating the use of resources, new ways of community organization, or new ways of stakeholder interaction. The term Participatory Innovation Development (PID) embraces this broader understanding of joint R&D, and is now being used alongside, or in place of PTD. It) is a process in which farmers and other stakeholders engage in joint exploration and experimentation leading to new technologies or socio-institutional arrangements for more sustainable livelihoods. This actionoriented approach promotes engagement in a process that strengthens the capacities of agricultural services to support community-led initiatives (Hartmann, 2009) (Wettasinha, Wongtschowski, & Waters-Bayer, 2009).

- PID offers opportunities to place smallholder farmers centre stage in the research and development field, recognising that over time, smallholder farmers have adapted and developed innovations to allow them to be productive under their own difficult environments. Development practitioners have realized the need to, not only take this knowledge into consideration but to build upon it
- The Farmer Support Group (FSG), the outreach unit of the Centre for Environment, Agriculture and Development at the University of KwaZulu-Natal uses participatory action research to facilitate farmers to identify and experiment with innovations to address their problems (Mudhara & Ngubane, Use of Innovation Support Funds to create Conditions for Smallholder Farmers to INnovate: Preliminary Insights from a Pilot in South Africa, 2009)
- FSG and partner organisations in PROLINNOVA (an international programme promoting local farmer innovation in the smallholder sector – a global partnership programme under GFAR (Global Forum for Agricultural

Research)) have endeavoured to provide greater ownership of the innovation process to smallholder farmers through, among other aspects provision of local innovation funds to farmers and promotion of local farmers' forums for planning ,implementation and sharing. Such pilot programmes are linking a more ongoing trend

- to support smallholders directly and work within their agendas and experiences (Triomphe, et al., 2013). This is an example of moving towards strategic and pre-adaptive research.
 - The FSG (Farmer Support Group) and INR (Institute of Natural Resources) worked together within the PORLINNOVA programme to manage a process of farmer level experimentation in locally identified or 'grassroots' topics, for which some funding was provided.
 - Two case studies were considered: one about developing an alternative production practice for growing potatoes, and the other about introducing a new cash crop (cherry peppers) and the establishment of a new marketing relationship.
 - One of the purposes of the study was to explore questions about the development of innovation indicators that might support policy and management concerned with this kind of innovation. The case studies are therefore located in the context of a review of existing science, technology and innovation indicators and their limitations with respect to this area of agricultural innovation. Another purpose was to identify and clarify the position of 'grassroots' innovation within other perspectives on different kinds of innovation system (or mode of innovation) in agriculture in developing countries.

The combination of case studies and broader reviews leads to two main conclusions: (1) grassroots and other participatory modes of agricultural innovation merit much greater policy attention than they have received; but (2) the base of available analysis and indicators about these approaches to innovation and their effectiveness is still inadequate to inform and support policy and management in this area (Letty, Shezi, & Mudhara, 2012).

A further example that extends the concept of farmer innovation into collaborative programmes between agribusiness and NGOs is the Grain-SA smallholder farmer innovation programme. This is a new initiative under their Conservation Agriculture portfolio and funded through the Maize Trust. It is an example of research agendas being formulated and funded through a large membership based farmers' organisation

Methodology for the GrainSA SFIP (Smallholder farmer Innovation Programme 2013-2015

- A farmer centred innovation systems research process underpins the approach which is based on working intensively with farmer learning groups and local facilitators in each of the 6 villages identified. Within the learning groups farmer innovators volunteer to set up and manage farmer managed adaptive trials as the 'learning venues' for the whole learning group. Farmer field school methodologies are used within the group to focus the learning on the actual growth and development of the crops throughout the season. New ideas are tested against the 'normal' practise in the area as the controls. Farmers observe, analyse and assess what is happening in the trials and discuss appropriate decisions and management practices. Small information provision and training sessions are included in these workshops/ processes. These are based also on the seasonality of the crop and the specific requests and questions from farmer learning group participants (Kruger, E and Smith, H, 2014).
- The adaptive trials are also used as a focus point for the broader community to engage through local learning events and farmers days. Stakeholders and the broader economic, agricultural and environmental communities are drawn into these processes and events. Through these processes platforms are developed for cooperation, synergy between programmes and development of appropriate and farmer led processes for economic inclusion. These platforms also provide a good opportunity to focus scientific and academic research on the 'needs' of the process.

such as Grain-SA. Research and facilitation capacity is brought on board mostly through universities and the Agricultural Research Council) to support agendas shaped by farmers. The recognition of the smallholder farming sector and more appropriate participatory processes for such work, is significant (du Toit, 2013).

- Linked to the latest round of reforms to the Common Agricultural Policy and the Horizon 2020 research programme, the European Union launched the European Innovation Partnership for agricultural productivity and sustainability. It aims to promote bottom-up approaches by linking farmers, researchers, businesses and other stakeholders into groups charged with finding solutions to shared problems. For this initiative to succeed, governments must opt to spend a proportion of their rural development funds on supporting grass-roots training and learning by actual farmers beyond the established partnerships with farmers' suppliers, customers and political representatives. Governments should back brokerage services that help farmers to team up with relevant researchers on their own terms, and enable them to navigate the maze of bureaucracy that will probably stand between them and this invaluable seed investment. (Macmillan & Benton, 2014).
- While South African agricultural research policy is still firmly rooted in technology transfer jargon (Agriculture, 2006), there is at least some movement in the academic and NGOs sectors to move towards learning and innovation. The box below provides a short analysis of this situation.

Post apartheid policy and socio political environment

- Hopeful statements such as the following "There is great urgency in South Africa to implement policies leading to empowerment of the people, whilst promoting rural development and establishing a basis for the sustainable use of available human and natural resources. This would represent a major departure from earlier approaches and would hopefully strengthen the ideals of democracy and transparency which are gradually developing in the 'new' South Africa". , were common in the early years after 1994. (Binns, Hill, & Nel, 1994).
- Since then, policies and strategies that enshrine principles of democracy, participation and the meaningful involvement of smallholder farmers in all aspects, have been put in place, but implementation either lags dramatically or does not follow through into methodologies and approaches for implementation that uphold the principles.

Racial liberalism to corporate and government authoritarianism

- There is a strong desire to see black commercial farmers working at the same scale as present commercial farmers. This vision is not coming to fruition at the scale anticipated or needed even though a number of programmes have been put into place (BEE, SEDA, land reform post settlement support and the like)
- The model of commercialisation that relies on high external input and economies of scale that is considered the only way to be globally and locally competitive is not working for the average smallholder and rural dwellers in communal tenure areas. Even though there is a socio-political imperative to support these people there is not an econo- political imperative. It is however becoming clear that smallholders can not just be 'incorporated' into the agribusiness environment as it stands.
- Prosperity—continuous and sustainable wealth creation—is an elusive goal in South African smallholder agriculture. It is possible to realise if principles and assumptions within extension can be re-shaped to strengthen the capacity of people engaged in agriculture and thereby tap the agricultural potential of rural communities. Such an approach would need to give practical expression to South Africa's policies to revitalise rural agrarian communities. Incorporating elements of livelihoods approaches and learning theory, would be a learning model that shifts i) the context and locus of learning, ii) what is learned, and iii) the learning process. The model fosters a culture of continuous reflective learning that is submitted as the highest purpose of extension. The model suggests that prosperity can be realised through engaging smallholder farmers in scientific discovery, innovation and technology development based not on what they lack, but on what they have. (Worth, 2006)

Participatory Action Research (PAR)

- Successful participatory knowledge production requires not only useful knowledge, but also knowledge produced through continuous negotiation within a specific context (Van Heck, 2003). This effectively describes a learning process. The philosophy of the participatory paradigm assumes that the natural and social worlds are part of the same complex whole. When research practice gives priority to the realities and analysis of rural problems by the people themselves, a whole new range of experiences and ways of working opens up. Attitudes and behaviour inherently have priority over method in participatory methodology and rest on three supportive pillars: power sharing, methods to doing research and behaviour and attitudes of outsiders (Chambers, 2005).
- Participatory action research (PAR) is thus an approach to research in communities that emphasizes participation and action. It seeks to understand the world by trying to change it, collaboratively and following reflection. PAR emphasizes collective inquiry and experimentation grounded in experience and social history. Within a PAR process, "communities of inquiry and action evolve and address questions and issues that are significant for those who participate as co-researchers" (Reason & Bradbury, 2008). PAR contrasts with many research methods, which emphasize disinterested researchers and reproducibility of findings.
- PAR practitioners make a concerted effort to integrate three basic aspects of their work: participation (life in society and democracy), action (engagement with experience and history), and research (soundness in thought and the growth of knowledge). It is more an orientation to social change and knowledge creation than a specific methodology. The basic tenet in participatory agricultural research then becomes that farmers and researchers jointly define the research agenda and do the 'research' together. Including farmers in setting the research agenda should move researchers towards new ways of working and thinking; producing researchable problems that include social priorities in the way that knowledge is produced. (Caister, Green, & Worth, 2012)
- This research paradigm appears to have become primarily, the domain of the Universities (Mutimba & Khaila, 2011) including UNISA and UKZN, who are focussing on these processes quite strongly. This learning paradigm is one that can suite universities better in terms of the scope and scale of projects that they can confidently tackle through supporting pre-and post-graduate students.
- The Agricultural Extension and Rural Resource Management (AERRM) academic programme within UKZN, is designed to build the capacity of extension services through the provision of training and education that is relevant to the urgent issues facing agricultural and rural development. The programme offers a powerful combination of theoretical knowledge and practical skills in agricultural extension, rural development, project management, agricultural production and farm economics and management. PAR is the main supporting research framework for this programme (<u>http://caes.ukzn.ac.za/ news/ 11-03-08/ Agriculture Programme on the up-and-up.aspx</u>).
- A further example from UKZN, that include both PAR and PID, revolves around an integrated multi-institutional programme around improved water management in communal lands- called the SSI (Smallholder Systems Innovation programme) and is implemented through the School of Bioresources Engineering and Environmental Hydrology, with the Farmer Support Group fulfilling the extension function of the research and farmer involvement process. The overarching methodologies here are a PAR process linked to farmer innovation (Sturdy, Jewitt, & Lorentz, 2008). The program takes an integrated approach to agricultural water management: analyzing the interactions between the adoption and adaptation of water system innovations (such as water harvesting, drip irrigation, conservation farming, etc.) in a participatory manner.

- The following statement by an associated researcher from IWMI (International water management Institute) sums up the thinking;
- "Today, as opposed to twenty years ago, there is a firm understanding that technology transfer of temperate zone successes alone will not work. Instead, tailor made, site-specific adaptations, building on indigenous knowledge are required. But the magnitude of the agrarian crisis is so large that development and refinement of indigenous knowledge alone will not be enough. Instead, innovations—often alien innovations that go through a participatory process of local adaptation—are required in all fields of land-use management such as the handling of crop choice, of water, soil, livestock, and forests" (Bhatt, et al., 2006).
- Using participatory action research, cross visits and participatory monitoring and evaluation by the farmers themselves, FSG and approximately 60 farmers shared and experimented with new technologies in farming, including water conservation measures such as trench beds, cover crops and tower gardens (Mudhara, Malinga, & Salomon, 2007). The project also demonstrated that the minimum tillage technique, which the project assessed against conventional tillage, resulted in maize yield increases of 168% above those of the conventional treatments. Survey results showed that maize production per household increased significantly after the introduction of the SSI project (Kosgei, Jewitt, Kongo, & Lorentz, 2007).
- Again, there is a mismatch between what is happening in institutions and what Government processes know and think. In a very recent report on education and training in Agriculture they make the following summative statements: "There is a need that higher learning institutions train people for agriculture and rural development adding into their agricultural training packages, human sciences. Lastly there is also a need for agricultural education and training bodies which could focus on giving direction to agricultural education and training in the province (Ngcobo & Dadla, 2014)".

Maize in KZN

A snapshot of known AR&D activities related to maize production and conservation agriculture (CA) will be given to provide some insight into the scope of activities and also into the stakeholder interactions and relationships in the province. The table below summarises present projects and processes.

Organisation	Unit/ person	Research Focus	Methodologies	Stakeholders
KZNDAE: Cedara & Kokstad Research Farms (Internal funding)	SR Bezuidenhout – Agronomy	The management of cover crop residues to reduce weed growth in maize. The influence of different weed types on the growth and development of maize and sunflower	Research and demonstration projects	KZNDAE
KZNDAE: Cedara/ Potshini (Internal funding)	S Madiba - Farming Systems Unit	Plant spacing in dry land CA maize	Research and demonstration projects	government, participant farmer,
KZNDAE: Cedara/ Karkloof, Loskop, (-2020) (Internal funding)	GR Thibaud - Soil Science	Soil acidity interactions with no-till. Tillage effect on N requirements	Research and demonstration projects	government, participant farmers, No till Club,

TABLE 2: PRESENT AGRICULTURAL RESEARCH AND DEVELOPMENT PROJECTS IN KWAZULU NATAL.

KZNDAE: Kokstad , Cedara & Dundee Research Farms (-2020) (Internal funding)	N Mtumtum - Agronomy	Short and long season-season maize cultivar trials	Research and demonstration projects	government, Seed companies, ARC- Grain Crops Institute(GCI)
KwaNalu – (Missouri University)	Lima Rural Development Foundation	Potential of GM Maize to increase food security in smallholder farming sector	Farmer based adaptive trials, learning platforms	Missouri University, private sector, participant farmers, farmers groups and organisations, NGOs, KZNDAE
GrainSA (internal funding)	Mahlathini Organics	Conservation Agriculture Smallholder Farmer Innovation Programme	PID – farmer led adaptive trials, Farmer Field Schools, Learning platforms, Participatory Value Chain Development	Private sector, participant farmers, farmers groups and organisations, NGOs, KZNDAE parastatal research institutes, Agribusiness, Universities
GrainSA (internal funding)	Provincial and regional coordinators.	Emergent farmer support programme	Study groups, farmer level adaptive trials,	Participant farmers, farmers, farmers groups and organisations, private sector, KZNDAE
SAB (South African Breweries)	Commercial farmer mentors	Production of yellow maize by smallholder farmers for contractual agreements with SAB	Mentorship programme with commercial farmers,	KZNDAE, private sector, participant farmers, Agri- business
Agricultural Research Council: Grain Crops Institute	Charity Mapumulo	Sustainable Land Use management project; LandCare - including CA	Facilitation of group based activities in Msinga area	KZNDAE, participant farmers farmer groups and organisations
UKZN: Bill Gates Foundation (AGRA)	ACCI – Prof Derera	Breeding of maize hybrids appropriate for CA in smallholder farming systems in Southern Africa	Research station based breeding research programme	Start up Phase;
UKZN: Water Research Commission (WRC)	Agronomy, Hydrology, Cedara, Farmer Support Group	Adaptation and adoption of CA in KZN – Bergville region (MSc in progress) and other studies	Social survey and focus group discussions	Participant farmers, UKZN and KZNDAE staff, NGOs,
KZNDAE: Cedara- FAO COMESA	Bright Mashiyane	National CA Task Force linked to regional SADC CA working group	Awareness and training –materials; Some inputs for existing CA initiatives	DAFF, KZNDAE, ARC, Grain-SA
KZNDAE- Extension Officers	Bergville	Demonstration of CA implementation using GM maize	Farmer level demonstration trial	KZNDAE, farmer groups and organisations,
No Till Club	Bergville	Present focus areas are soya beans, cover crops. Support is provided by the Protein research Foundation, Grain Sa and Agribusiness.	Farmer led research with assistance from researchers linked to ARC and KZNDAE	Government, parastatls, agribusiness, commercial farmers

A summary of the organisations mentioned and their operational philosophies are provided in Appendix A

The table above demonstrates the trends mentioned in that the PR&D processes are employed mostly through NGOs and private sector organisations, some participatory processes are used for University and Parastatal research processes and very little participation is evident in government process.

Conservation Agriculture (CA)

- According to the FAO (Food and Agriculture Organisation, United Nations) definition, CA is characterized by three linked principles expected to be adopted together, namely:
- Continuous minimum mechanical soil disturbance (reduced, minimum or zero tillage [no more than 25% disturbance]).
- Permanent soil cover with crop residues or other types of organic materials [>30% at planting] and
- Diversification of crop species grown in sequences (crop rotation) and/or associations [at least 3 crops].
- This definition will be used here, although terms such as minimum tillage and no till are often used and not always within the strict confines of their definitions.

In a recent summary of conservation agriculture, in the smallholder family farming context, in sub-Saharan Africa (Stevenson, Serraj, & Cassman, 2014), the following points have been made:

- Yield increases under CA are possible but uncertain given the low average yields that pertain in these regions, and yield gains are more likely to be observed after several years.
- CA is not widely adopted in Sub-Saharan Africa and South Asia owing to a lack of economic incentive for smallholder farmers- the process of conversion to CA is not profitable over the short term planning horizons of most farmers.
- There is no clear trend for greater carbon sequestration under CA, so the potential for subsidizing farmers to adopt CA using payments for ecosystem services/carbon credit schemes seems limited in scope. There is early evidence that farmers perceive a benefit from CA adoption in regions that are prone to erratic rainfall, suggesting a potential risk mitigation role.
- CA provides other benefits, e.g. residue cover that reduces runoff and surface crusting, increased aggregate stability and water infiltration, greater total water supply and water use efficiency.
- Factors that reduce the adoption of CA include weed pressure, livestock demand for feed and the potential for increased severity of root and foliar diseases associated with residue retention.
- In South Africa and in KZN specifically, in the smallholder context, this level of critical analysis of CA is still something that stakeholders need to grapple with, as are locality specific adaptations of the system. The focus of CA, in smallholder farming systems needs to expand from physical (improved soil characteristics) and or technical (adapted equipment and machinery) considerations to include the economical and social implications as well. (Bot A & Achora, 2014)
- Conservation Agriculture was introduced in KwaZulu Natal through the Department of Agriculture as early as the 1970s and programmatically since around 1995. For a few years around the year 2000, many on site demonstrations and trials were conducted both by research staff and extension officers. The Annual report for 2000 has the following entry:
- " Multi-site research conducted throughout the Province since 1995 indicates that no-till cropping systems are well suited to small-scale maize production. This relatively low -cost system is most effective on high clay content soils and on small, sloping fields, especially in areas where timeous ploughing and discing is difficult to achieve. This new system of "planting without ploughing" was tested on 300 sites of 1 000 m² to demonstrate this practice to small-scale farmers as part of the Xoshindlala campaign."

- "These demonstrations were conducted mainly by Extension Officers, although research staff also conducted 31 demonstrations. Maize yields of 3 to 6 t/ha were mostly achieved, which is considerably higher than the very low yields usually produced with traditional maize growing methods. The optimum benefit from this system is achieved when large quantities of crop residue are retained on the soil surface. In order to simplify and speed up the planting process, popular animal draught maize planters were modified by the Department and ARC scientists from the Grain Crops Institute and the Institute for Agricultural Engineering. It was thoroughly tested at Cedara and demonstrated by Extension staff to small-scale farmers, and was found to be commercially viable. Farmers showed a keen interest in the planting without ploughing production system to plant mainly maize, but also dry beans and cotton.' . (http:// agriculture.kzntl.gov.za/ publications/ corporate publications other/ tdt annual report 2000/tdt annual report 2000.htm) accessed 7March 2014)." Despite some 1000 demonstrations during its 5-year promotion (Planting without Ploughing within the Xhosindlala campaign), however, adoption has been minimal, and few farmers today practice no till, let alone conservation agriculture (Fowler, 2004).
- This was augmented by a LandCare programme run through the ARC (ISCW- Institute of Soil Climate and Water) and funded partially by the KZNDAE 'The development and implementation of sustainable land management practices in the Bergville district of the KwaZulu-Natal Province" (Smith, Trytsman, Bloem, Everson, & Mthethwa, 2005). Four years of demonstration and farmer based trials were conducted, initially within a farming systems research and extension paradigm (FSR&E), which was broadened to a Agriculture Innovation Systems (AIS) paradigm to also include farmer level trials, farmer to farmer learning and extension, multi stakeholder platform building processes and the participatory design, testing and commercialisation of appropriate CA implements and machinery. Issues of scaling out (through the initiation of the Okhalamba farmers forum for the whole region) and scaling up (introduction and handover of the CA process to the KZNDAE extension agents) were also included.
- In contrast to the KwaZulu-Natal Department's initiative, each of these activities were carried out with a specific community and trials and demonstrations were carried out by researchers with farmers on their fields, with minimal extension involvement. This intimate relationship between farmer and researcher have led to reasonable to good levels of adoption, albeit at present in localised areas (Fowler, 2004). Recommendations at the time included:
 - In the development of all CA systems, weed scientists, entomologists and soil scientists etc should be incorporated in multi-disciplinary teams. Teamwork, interdisciplinary research and a systems approach are of utmost importance for success.
 - On farm demonstrations should be run by agronomists with practical knowledge of all aspects of the system or by technicians with a sound theoretical and practical grounding in agronomy.
 - Fencing of farmer fields may be necessary. When developing systems (which should be done TOGETHER with each target group) homogenous groups should be identified on the basis of their socio-economic conditions and culture.
- Presently Grain-SA has initiated a smallholder farmer innovation programme (SFIP) (2013-2015) through their Conservation Agriculture coordinator (a new area of focus). This programme builds on the Agricultural Innovation Systems processes initiated in the province through the ARC and KZNDAE and aims to tackle some of the more complex social, environmental and economic questions as part of the participatory innovation development process for CA. Some of the main constraints mentioned in a land management assessment conducted in 2010 include that many land users lack the finances to purchase implements and the inputs (herbicides, fertilizers, etc.) needed to practice CA and even those who currently practice CA sometimes struggle to maintain the correct level and timing of inputs. Many farmers also find CA too labour intensive and the planning and management that goes along with CA is considered too intense. A practical

constraint to the adoption of CA is the communal practice of grazing crop residues during winter which prevents the practice of mulching. Many farmers still find access to sufficient CA information a constraint. The continued implementation of CA and the adoption of CA by additional land users is one of the main suggested responses by researchers (Stronkhorst, Maphumulo, Trytsman, Breytenbach, Lotter, & Mpanza, 2010).

- KawNalu (The KwaZulu Natal Agricultural Union) has partnered with Missouri University, with funding from the Templeton Foundation to implement a PR&D project (2012-2014) as part of their attempt to answer the question, "Can GM crops feed the world?" The foundation wished to examine a new technology, particularly GM technology and how it could help small-scale farmers in KwaZulu-Natal. This project seeks to develop a model that ensures smallholders and their communities become integral to decisions made about adopting GM crops. Farmer based adaptive trials are central to the process as is building a Community of Practise which includes smallholders, their communities, scientists, agribusiness and government representatives. This approach allows emerging farmers to be at the centre of this Community of Practice as they will experiment and use GM crops in their own fields. Such participatory research creates feedback loops for researchers, farmers, extension advisors, policymakers and others involved.
- For the large scale, commercial farming sector, In the early 1980's KZN farmers, led by Messrs Anthony Muirhead of Winterton and Charles Shepherd of Bergville, started planting limited areas using direct drilling (Fowler, 2004). They spearheaded the establishment of the No-Till Club in 1997, with research and extension staff of the Department of Agriculture. The No Till club continues to expand and link with stakeholders and to do their own research and experimentation around CA practices.
- Farm-scale demonstrations (Commercial) of maize produced with conservation tillage practices have also been carried out in co-operative trials in the Karkloof, since 1999. These demonstrations have generated tremendous interest in no-till planters for maize and soya beans. The Brazilian no-tillage planter funded by the Protein Research Trust and capable of seeding maize, soya beans and wheat in ultra-narrow to conventionally spaced rows was used for row spacing, crop rotation and fertilizer placement trials. Farmers also hired this machine for no-till and ultra-close row planting in certain areas. This encouraged some farmers to purchase their own ultra-close row and no-till planters. This research is still ongoing and implementation of no-till is known in the Underberg, Ixopo, Howick and Karkloof areas. Implementation of no-till is as high as 50% of maize growers in some regions, such as Bergville.

SUMMARY OF TRENDS IN KWAZULU NATAL

There are two basic trends in terms of Participatory Research and Development (PR&D) in Kwazulu-Natal, for the very few organisations that consciously work in this field:

- 3. **Participatory Innovation Development**; Primarily NGO based and supported process through international donor funding or CSI based and supported through for example Grain-Sa and Wesbank. The latter is only now (the last 2-3years) coming to the fore as this sector finally rises to the challenge of providing meaningful support to smallholders. To a lesser extent the Parastatal Research Institutes have dabbled in the process.
- 4. Participatory Action Research; this research paradigm appears to have become primarily, the domain of the Universities with both UNISA and UKZN focussing on these processes quite strongly. This 'learning' paradigm is one that can suite universities better in terms of the scope and scale of projects that they can confidently tackle through supporting pre-and post-graduate students.

- For those organisations that also have an advisory/extension role (Universities and Colleges, Parastatal Research Institutes and Non Government Organisations) Agricultural Innovation Systems and Sustainable Livelihoods Approaches have come to the fore.
- Mostly the emphasis on participatory work will be led through specific projects or programmes, often donor funded and led by individuals with a strong vision and commitment to such processes.
- Participatory Agricultural Research and Development is almost entirely absent from Government departments and extension, outside of sporadic donor funded projects, despite policy and programmatic rhetoric. There have been a number of attempts to institutionalise participatory processes within the Department of Agriculture, both at national and provincial levels – through medium term donor funded processes such as the Participatory Extension Approach in Limpopo (funded by GIZ) (Rootman, Letty, & Stevens, 2014) and the Empowerment for Food Security programme in KZN (funded by the Flanders Intentional Cooperation Agency). Both programmes collapsed within months of withdrawal of donor support, after running for between 7-8 years, due to extreme political pressure and interference in these Departments. There is clearly a lack of political will to foster and promote participatory approaches for the smallholder family farming sector within government circles. There is also a politically motivated lack of understanding of the need for a specific focus on the smallholder farming sector, within a different framework and organising principles to the commercial farming sector.
- For the international agricultural research institutes represented in Southern Africa such as CGIAR and CIMMYT, there are a lot more examples of participatory research processes. These approaches are still not very well institutionalised and recommendations include that they should (1) create a more conducive environment for scientists to share experiences on such approaches and (2) better document their impacts on farmers' livelihoods and well-being (Lilja & Bellon, 2006). The primary assessment of such work is still through producing peer reviewed scientific publications, where research uptake and impact falls by the wayside (pers comm. B Letty, INR, 2014) Two way information flows (farmers actively involved in research) will occur only with structural adjustments in the institutions.

RECOMMENDATIONS

- Given the disparity between the commercial and smallholder family farming sector and the extreme politicisation and fragmentation of the government sector nationally, provincially and locally, it is proposed that research, education, the private sector and non government institutions work together in multi stakeholder partnerships to provide a home for Participatory Agricultural Research and Development, until the political will shifts more towards providing meaningful support to rural dwellers in South Africa. A concomitant focus on the growing of local organisations and movements with the ability to lobby and advocate for change is required.
- Research should demonstrate its value, relevance and practical utility to society and the economy. These should be expressed in a theory of change, charting out a variety of impact pathways and tools for specific target audiences (T Windham-Wright, IWMI, 2014). Much investment in Agricultural Development is made without the benefit of using improved practices and technologies, better methodologies and new lessons learned through research. (Waters-Bayer, Bernhardt, Bocock, Dugan, Lohmann, & Sanyang, 2013). Demand driven priorities and stakeholder engagement are crucial processes and must be matched with efforts to guarantee the quality of research.

Responsibility for this process lies with research and development institutions, donors and Government in terms of policy, strategies and support.

Organisations

- Performance measures in research institutes (Parastatals and Universities) still focus on producing scientific journal articles, with little or no incentive for end-user engagement and relevant research outputs. This needs to be revised. Uptake should be reflected in performance indicators across all levels of the organisation: from local project to global strategic level. Reporting on uptake activities alone is not enough, but should include a focus on uptake and impact (Salomon, 2014)
- 2. Mechanisms are needed to fill uptake gaps within the organisations by allocating a clear portion of budget to uptake, include it as requirement in project reporting and funding and giving attention to communication for uptake. Information should be targeted and packaged appropriately; taking into account language, visual aids such as photographs, video, pictures, working with mentors and local facilitators for example.
- 3. Training and capacity building of researchers in institutions is important.
- 4. Funding processes to include uptake and impact pathways are required, with flexible strategies for adaptation research.

Geopolitical considerations

- 1. Agricultural production systems need to focus more on the effective conservation and management of biodiversity and ecosystem services in order to address the twin objectives of environmental sustainability and food security (FAO, 2011).
- 2. Two major geopolitical realities have a constraining effect on peoples' thinking. Firstly, modern, intensive farming in developed countries receives very large levels of financial support and all sectors of the agricultural and food industries are linked in to this highly subsidized system to a greater or lesser extent. Secondly, there is a continuing commitment to ensuring that food prices remain low and that basic foodstuffs are affordable by all sectors of society including the poorest. These both tend to lead to a disinterest in the nature of agricultural production systems and present a very real barrier to the development of new approaches to production. However, it is increasingly recognized that an appropriate policy framework can largely overcome these constraints and, indeed, must be developed.
- 3. Crop rotations, intercropping and growing different varieties of a single crop have all been shown to have beneficial effects on crop performance, nutrient availability, pest and disease control and water management. Multi-cropping, intercropping, alley farming, rotations and cover cropping are all ways of combining crop species that have positive effects on productivity and yield stability.
- 4. There is a need to test a range of economic instruments such as payment for ecosystem services in agricultural landscapes, internalizing environmental costs and increasing the responsibility of the private sector are important.
- 5. Present research agendas aimed at increasing the effective use of biodiversity for food and agriculture, including the strengthening of local institutions and the capacity to maintain and use biodiversity through mechanisms such as farmer field schools, participatory crop and livestock improvement and locally-identified adaptation strategies, need to be supported. This needs to be underpinned by a framework that takes particular account of the needs and interests of small-scale farmers and of the rural poor and meets societal needs for a safe and healthy supply of food.

Methodologies

- Move towards recognition and transparency in underlying principles of methodologies and development frameworks and work with these organising principles, rather than focussing too centrally on methodologies. This flexibility is important for recognition of local differences in socio-political, agro-ecological and economic conditions. Overall, methodologies that include innovation systems, action research, sustainable livelihoods analysis and grounded theory show the most promise in the South African context.
- It is assumed that at present, best practise for smallholder farmers, in managing the interplay between research extension and farmers falls within the ambit of Agricultural Innovation Systems (AIS) and Sustainable Livelihoods Analysis (Worth S & Abdu-Raheem K, 2011). Organising principles that can be used to bridge the gap between research and development are the following:
 - Recognise that *innovation is an interactive process with multiple complementary dimensions*-Innovation encompasses the human element (not just technology), so that social, cultural, economic, organisational, institutional and political dimensions are all important. These processes take time and require researchers with skills to engage with this complexity.
 - *Plan for scaling* (up and out) from the outset of an intervention process- Clear impact pathways that can support or refute the evidence should be proposed and costs estimated.
 - Facilitate multi-stakeholder engagement, tailored to the specific objectives and research topics and building on existing networks rather than creating new ones- Include community members and organisations, development partners, donors, extension services, researchers, the private sector and relevant government entities. The process should be documented and feedback given should be used to make adjustments to the innovation system.
 - Focus on a *demand-driven approach* to research issues that considers the needs of different groups and give particular attention to resource poor and illiterate farmers and women work with clearly defined stakeholder groups. It may be necessary to support more marginalised groups in participatory assessment of how climatic and other changes are likely to influence their environment and livelihoods; also looking at a longer term perspective. The process of identifying demand (or streamlining demand and supply) should build on past experiences and lessons learnt about the spreading and adaptation of technology.
 - Create *open communication and learning spaces* as a facilitated two way dialogue that gives equal value to contributions of different actors, allowing free access to knowledge and encouraging the sharing of information- this requires a comprehensive and multi-faceted communication plan which includes both sharing of information and capturing of feedback within and between different stakeholder groups.
 - Take a *long term perspective* that allows innovation processes to evolve and mature- looking beyond projects. Project goals need to be linked with specific goals and strategies of national governments. Use longer term programmatic frameworks for projects to enable pro-active sequencing. Donors should commit to supporting longer term research that goes beyond but can be linked back to projects. Investment should be made to developing the capacity and functionality of the public sector.
 - **Provide incentives,** including strategic capacity enhancement for different actors involved in the innovation process.- needed to enhance the performance of multi stakeholder innovation processes and can be monetary or non-monetary (trust, confidence, respect, recognition). It could/should include capacity enhancement.
 - Recognise the need to invest in research to understand innovation dynamics, including the
 complementary dimensions of innovation. Planned as components of development interventions to
 understand and strengthen the process. This includes appropriate monitoring and evaluation systems,
 process documentation and recognising unexpected changes and outcomes. A common theory of
 change needs to be created and frequently revisited and should be able to accommodate a re-definition

of roles and tasks. This needs to provide lessons for how to strengthen innovation processes and achieve scale and should include government bodies.

Organising principles to bridge the gap between researchers, advisors 9extension and farmers are the following:

- Combine local and external knowledge and resources- including new ideas and innovations.
- Encourage access for farmers to diverse value chains; flexible engagement with both formal and informal value chains
- Support the unpredictability of innovation processes; longer term, use of open ended and iterative approaches, flexibility in activities and budgeting
- Address the multiple dimensions of innovations; Technologies are often seen as central and transferable form one context to another, but in practice they are shaped by the people using them (social, economic environmental and institutional aspects). – New ways for farmers to organise themselves and access markets, new services, new approaches to supporting innovation, new rules and policies are all neededthus enabling and accompanying organisational and institutional changes that make innovation possible.
- Encourage formation and strengthen capacities of farmer organisations (new forms of organisation that can reflect the above principles)

Role players/stakeholders

- Uptake and impact should be monitored throughout the research process (D Naidoo WRC). Measuring and attributing uptake and impact of research and its knowledge products is challenging, both short-term and long-term. Impact is sustained change over time, scaled out and up (A Sullivan ex-FANRPAN). Uptake takes place when stakeholders "become aware of and access research outputs, and the institutions, policies, systems and mechanisms that support this". Impact is made when there is evidence of a demonstrable contribution to society (Dr I Jacobs WRC).
- Research uptake processes require building relationships and partnerships, and engaging in separate but interconnected activities to get from outputs to outcomes and impact. Thus, it is important to map out the system and its stakeholders. Who are the most influential people, whose actions are most likely to bring the change we seek in the most effective way, and impacting the greatest number of potential beneficiaries?

Actions with regards to specific role players in this context include:

- Policy making processes are complex, and involve multiple actors and policy makers. Target all levels of Government, political hierarchy, and Departments.
- Intermediaries who specialize in stimulating research uptake are important to achieve impact.
- Social scientists contribute to better understanding of impact and uptake processes.
- Build on people's local practice and multiple water-needs to plan for and provide water services, using a multistakeholder action-learning approach (Dr B van Koppen, IWMI).
- Trust the stakeholder engagement process and ensure it remains flexible. (Salomon, 2014)
- Focus on achieving change and practical solutions, Research can be a catalyst not everything can be or needs to be measured and
- Distribute responsibility for impact and uptake across partners (E Weight, IWMI)

ACTIONS FOR CHANGES IN POLICY

1. Convince donors, organisations and governments to change the way they fund agricultural research to: Be process oriented, be demand driven, be inclusive of participatory activities, include multiple stakeholder engagement, include monitoring and evaluation, work across longer time spans (~10yrs) – programmatic vs projects and with an emphasis on uptake and impact.

- Support innovation platforms and other multi-stakeholder alliances at different levels: From local to national – include smart and decentralized financial support to local alliances of stakeholders to strengthen their innovation capacity.
- 3. Develop innovation brokerage capacity: Trained 'brokers' can facilitate the interactions between stakeholders at key stages; encouraging joint reflection on constraints and opportunities and sharing of knowledge resources and responsibilities.
- 4. Strengthen the pivotal role of agricultural advisors; giving them explicit mandates for brokering and increased capacity, including renewed investment from donors and
- 5. Integrate the innovation systems approach into education; for preparation of current and future researchers and rural advisors. Close interaction between educational institutions and farmers on the ground is important. Thus community engagement aspects of research need a much stronger, incentivised focus. (Waters-Bayer, Triomphe, & Oudwater, 2013)

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APPENDIX A: Operational philosophies of a cross section of AR&D Organisations in KZN.

UZKN

Presently there are literally thousands of papers and dissertations linked to Universities in South Africa that mention participatory research in Agriculture. A closer look may however indicate the following trends:

- There is a strong tendency towards choosing research frameworks that require random sampling for studies within regions and then locally and then to
- Administer structured questionnaires that can be analysed statistically, albeit with SPSS (statistical package for social sciences) or similar packages.

This is put forward as participatory research and in a number of instances may be the only form of participation' in the study, even though the papers and reports may analyse farmer participation in 'empowerment' terms. Two examples:

- K. K. S. Nxumalo and O. I. Oladele. 2013 Factors Affecting Farmers' Participation in Agricultural Programmes in Zululand District, Kwazulu Natal Province, South Africa. Department of Agricultural Economics and Extension, North-West University, Mafikeng Campus, South Africa. Journal of Social Science 34(1):83-88 (2013).
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A similar trend is found in the use and implementation of PRA (participatory rural Appraisal; where PRA methodologies are used primarily as a way fro researchers to gather information from farmers in a more participatory manner.

The UKZN AFRICAN CENTRE for CROP IMPROVEMENT (ACCI) is a point in case. It is located within the School of Agricultural, Earth and Environmental Science and was established in 2001 to train African plant breeders in Africa in the area of African food security crops. It is an applied PhD programme in plant breeding The focus of the PhD theses is on the applied breeding of key food crops such as sorghum, cassava and cowpeas for increased disease and drought tolerance, and improved yields and quality, with the aim of improving food security in 12 African countries, including Ethiopia, Kenya, Mozambique. The students are expected to include a chapter on PRA as a minimum requirement, but hopefully to embark on more extensive participatory breeding processes within their studies. They are provided with specific training and some funding to include this participatory element into their work.

PARASTATAL RESEARCH INSTITUTIONS

- **The Agricultural Research Council (ARC)** and it's associated Institutes such as the Grain Crops Institute (GCI) and the Institute of Soil Climate and Water(ISCW) have the following overall brief:
- To ensure that technological innovation flows from researchers- extension to farmers and must therefore actively interact with farmers and extension agents. Thus research programmes are to be planned in collaboration with extension services and farmers, technical back up is provided, training of trainers is incorporated as are small business development principles. The, knowledge generated is made widely available. (Agriculture., 2005)

In accordance with the need to focus on national development priorities, the ARC conducts agricultural research and development and drives technology development and dissemination in order to:

- promote sustainability and equitable economic participation in the agricultural sector;
- promote agriculture development and growth in related industries;
- facilitate sector skills development and knowledge management;
- facilitate and ensure natural conservation;
- promote national food security; and
- contribute to a better quality of life.
- •

None of the 11 Institutes are based in KZN, but research work is carried out in the province.

The overall paradigm here is thus still one of technology transfer, albeit with a vision for greater involvement and participation of farmers. The ISCW promotes sustainable use and management of the agricultural natural resources through research, technology development and technology transfer. One of the focus areas, Soil Health and Remediation concentrates on applying an understanding of the soil system including the physical, chemical and biological processes to sustainable yet productive agricultural systems. The applied research focuses on issues such as CA, water harvesting, carbon management, green manure, sustainable wetland utilization and degradation (erosion) monitoring. Cutting-edge approaches to research methodology are used such as Participatory Action Research.

The Water Research Commission (WRC) is based in Pretoria. It boasts an impressive array of research focus areas and many publications and has included the development and use of many different participatory research processes along with also doing highly technical and scientific work. Research teams are drawn from the Universities, Research Institutes and government by in large. Of late a few NGO base personnel have also been included.

Some examples of recent publications include:

- Denison J, Manona S (2007) Principles, approaches and guidelines for participatory revitalisation of smallholder irrigation schemes, volume 1 – a rough guide for irrigation development practitioners. Research Report No TT 308/07. Water Research Commission, Pretoria
- Du Plessis FJ, van Averbeke W, van der Stoep I (2002) Micro-irrigation for smallholders: guidelines for funders, planners, designers and support staff in South Africa. Research Report No TT 164/01. Water Research Commission, Pretoria
- 3. Schoeman G, Magongoa B (2004) Community identified performance indicators for measuring water services. Research Report No. TT 228/04. Water Research Commission, Pretoria
- 4. Denison J; Smulders H; Kruger E; Ndingi H; Botha M. (2010) Water Harvesting and Conservation Volume 2 Part 3: Facilitation Manual. Research report no TT 495/11. Pretoria
- 5. Du Toit D; Pollard S. (2010). Public participation in the drafting of catchment management strategies made simple. WRC report No TT 455-10. Pretoria
- 6. Lotz-sisitka H; Burt J. 2006.A critical review of participatory practise in integrated water resources management. WRC report no. 1434/1/06

7. Stimie, CM; Kruger, E; De Lange, M; Crosby, CT. (2010) Agricultural water Us in Homestead gardening Sytems for facilitators and food gardeners; main Report> Volume 1. Research Report No.TT 430/09. Pretoria

NON GOVERNMENT ORGANISATIONS

Tshintsha Amakhaya

- Tshintsha Amakhaya (TA) is an action learning platform of civil society organizations (10 throughout SA inlc for example AFRA, TCOE,FSG, SCLC etc) that supports local community struggles in land and agrarian reform. Through action research, campaigns, and building active citizenry, Tshintsha Amakhaya seeks to enhance rural people's capacity to secure and realize their livelihoods and rights, and to promote alternative models of land tenure and agricultural production for household food security and national food sovereignty. Through action research the TA partners involving CSOs and their constituencies generate an agenda for joint action, movement building, and lobbying & advocacy.
- The collaborative process in Tshintsha Amakhaya involves three iterative stages of action learning: starting with phase 1 Baseline research to understand rural realities, followed by phase 2 Implementation and advocacy of alternative forms and arrangements for land and agrarian transformation; and concluded with phase 3 Reflection on impact.
- The aim of the study was to identify priorities for joint action on land access and agricultural production amongst constituent communities. For this purpose, the survey zoomed in on access to land, income, food consumption, livestock keeping, crop farming access to water, agricultural support, farm worker conditions, evictions and levels of organisation.
- "the Agrarian Household economy a publication from large baseline study(1743 households acorss five provinces) recommends: This publication argues that while government and private sector resources are going into building a Black commercial smallholder sector to feed into formal agri-food value chains, this is likely to benefit only a small minority of producers. Instead government should focus on improving agricultural production for household use and sales to local markets by learning from and strengthening local distribution systems. Support also requires welfare interventions for households that are often or always hungry. The rural poor need improved access to grazing land, better livestock management and fodder production, intermediate processing and storage technologies, and participatory systems for sharing knowledge and learning. Government should also tackle the basic conditions of employment in rural areas, particularly farm dwellers. See more at: http://www.plaas.org.za/bibliography/rural-households-tshintsha#sthash.nL425zQj.dpuf

Farmer Support Group

- Farmer Support Group (FSG) is a research, community development and outreach unit within the School of Agricultural Earth and Environmental Sciences (SAEES) at the University of KwaZulu-Natal. FSG places emphasis on addressing the needs of resource-poor farmers, other land users and development practitioners in sustainable agriculture, food security, natural resource management, institutional development and entrepreneurship. The unit is recognized internationally for its expertise in community participatory approaches, (such as PID) appropriate technology and indigenous knowledge creation. In this capacity, it facilitates networking and capacity-building, sustainable land management and improvement of the livelihoods of smallholder farmers. FSG's projects focus on issues of food security, innovation, natural resource management, and entrepreneurship development (business and marketing).
- PID advocates for the building on and scaling up of farmer-based development. It starts by discovering how farmers experiment on their own to develop and test new ideas. Understanding local innovation transforms

how research and extension agents view local people. This experience stimulates interest in joint action and analysis leading to mutual learning. Local ideas are further developed in a participatory process that integrates IK and scientific knowledge (Mudhara M., 2010)

GOVERNMENT POLICY AND STRATEGIES

- Training and skills development come up in Agriculture and the development context almost continually. There is however an understanding that 'training' should have an immediate impact on creation of 'jobs' and the 'business of agriculture' meaning that training is 'judged' more in terms of access to Agricultural resources than in terms of learning outcomes and impacts. The following comment in a recent report is indicative
- 'There was a big gap in terms of practical knowledge and skills in most providers of agricultural education and training. This gap was mostly related to the fact that the majority of clients did not have adequate access to resources to sustain agricultural development.' (Ngcobo & Dadla, 2014)
- The extension service or system in the province is faced with major problems, such as lack of commitment and little motivation from the staff. Educators at high schools also raised these problems. They also highlighted the fact that agriculture was not recognized as a major science subject by the Department of Education. Furthermore, there are no explicit policies and institutional arrangements to address agricultural education and training in a holistic way
- There is some level of very literal understanding of roles and functions and continued complete separation of research ,extension and farmers. There is still a strong tacit understanding of knowledge creation by 'others' to be provided 'appropriately' to farmers so that they can 'graduate' to a more commercial level. The following statement indicates:
- 'Furthermore, the respective institutions designed their course programmes with little to no participation by and consultation with the targeted clients and other role players. This approach had a negative impact when the clients ventured into areas outside the institutions. In cases of students, it is difficult for them to adapt in practical situations (real life experience) because most institutions of higher learning concentrate more on theoretical aspects than on practical aspects' (Ngcobo & Dadla, 2014)

Kzndae: Directorate Research and Technology Development

- The Directorate: Research and Technology Development performs one of the line functions of the KwaZulu-Natal Department of Agriculture and Environmental Affairs within the vision and mission of the Department.
- The outputs in terms of research and technology development and transfer (Key Responsibility Areas) of the Directorate are performed by the following Sub-Directorates:
- Crop Production with Divisions Agronomy, Horticulture and Crop Protection
- Farming Systems Research
- Analytical Services
- Animal Science Services
- Grass & Forage Science Services
- KZN Agricultural Farms
 - Inland Farms (Cedara, Dundee(Varied, including Maize cultivar trials spacing in min till systems, grain legume trials and demos) & Kokstad)
 - o Coastal Farms (Owen Sithole College of Agriculture, Bartlow Combine (Nguni) & Makhathini (cotton))
- Juncao Mushrooms

The research and demonstration trials are conducted on six Research Stations, as well as on-farm in various rural communal areas. The customers of research are farmers, extension officers, agrochemical firms and home-gardeners, NGOs, universities, the ARC, companies and organized agriculture.<u>http://www.kzndae.gov.za/en-za/agriculture/researchandtechnologydevelopment.aspx</u>. Accessed 7 March 2014)

KZNDAE: Farming Systems Research

- The Farming Systems Research (FSR) Section assesses the farming systems practiced by small-scale farmers and the constraints which apply to these systems. The Section then has the responsibility of conducting research so as to effect improvements to these systems, with the ultimate goal being of enhancing food security and the profitability of farming operations. The research conducted is demand-driven and carried out within communities, with farmers involved in the planning and management of the trials. The strength of the Section is based on in its bottom-up, rather than top-down approach. The Section works in close co-operation with Extension personnel, Veterinary Services staff, on-station researchers and the private sector.
- Their terminology differs slightly different from the rest in being more responsive to farmers within the same overall framework. They talk about demand driven on farm trials, do diagnostic surveys and emphasise that research-extension-farmer linkages are vital for successful technology development and transfer