

1 Overview – an introduction to ARD

1.1 *The challenges for agricultural research in South Africa*

The world is changing fast, and the ability to adapt to changing economic, climatic and political conditions is a determining factor in the fate of nations. Furthermore, the global economy has suffered drastic shocks during the past 2 years, and is experiencing the most uncertain period since World War II. A collapse in demand for consumer goods and growing unemployment in many countries is creating doubt to the long-term health of the world's economic engines.

This situation has a direct bearing on the global agricultural sector. After recent food price spikes, the crisis is currently abating somewhat, but the future trends are likely to be upwards. World demand for food products is being led by the growing demand from countries such as China and India, with their huge populations, growing prosperity and demand for improved and more varied diets. The increasing use of biofuels, especially the 1st generation biofuels that use current crops such as sugar cane, maize or oil palm to produce ethanol or biodiesel are further reducing food supplies. The continuous internationalization of markets and climate change are further adding to volatility in food markets.

Sub-Saharan Africa is the only major region of the world where poverty levels are not decreasing: about 50% of the region's population lives on less than US\$ 1.25 per day in 2005, a percentage that was little different than in 1981. At the same time, current growth rates imply a doubling of the Africa's population by 2050, to about 2 billion people. Ensuring food security for this growing population, and providing economic growth to reduce these levels of poverty will require ever-greater effort. In the face of these challenges, it can be argued that investment in the agricultural sector has been insufficient, with decades of relative policy neglect and underinvestment in agricultural science, rural infrastructure, and rural institutions. Nevertheless, there has been a recent resurgence in interest and funding: agriculture is increasingly becoming a priority on the world's agenda.

At the same time, it is increasingly recognised that development is about more than economic growth, and that agriculture is about more than food production. The landmark report of the Brundtland Commission to the United Nations in 1987 emphasised the concept of sustainable development, recognising that economic growth needs to be balanced with careful natural resource use and equitable distribution of benefits to the different social groups. More recently, in 2002, the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), initiated by the World Bank and the FAO, emphasised the "multifunctionality" of agriculture, recognising that it not only produces commodities (such as food, feed, fibre, agrofuels, ornamentals and medicinal products), but also has non-commodity outputs such as ecosystem functions, landscape amenity and cultural heritages.

Globally, agricultural science has an impressive track record in improving production and food supply. However, despite the improvements seen in larger-scale and commercial agriculture, adoption of technology in the more small-scale farming systems typical of much of Africa has been disappointing. Moreover, the changes that have occurred seem to have had little impact in terms of reducing rural poverty, reversing ecological degradation, or redressing the inequalities of society.

These issues are critical in South Africa, as the country tries to promote economic growth with equity. Unfortunately, attempts so far to develop agriculture in the "2nd economy" through land reform programmes and accompanying policies have not always had the desired social, economic or environmental outcomes.

The reasons for this lack of progress in promoting sustainable development through agriculture are complex, in South Africa as elsewhere, and go beyond the availability of technology itself to include the interaction of this technology with a host of socio-economic and political factors and how these interact in turn with the livelihoods of rural people.

This disappointing experience of the last half century has led to a rethink of the way in which agricultural research is conceptualised, organised and implemented. The “pipeline” or “transfer of technology” model, where research is seen as the source of new technology, which is then transferred to the farmers by extension services, is now increasingly seen as inadequate. Instead, a range of more participatory, collective and systemic approaches have emerged, that are aimed at better integrating agricultural research with development. In this resource book, these approaches are collectively called “Agricultural Research *for* Development” (ARD, or AR4D), as opposed to the more traditional agricultural research *and* development (R&D).

These evolving ideas integrate many concepts and approaches, including farming systems research (FSR), agricultural knowledge and information systems (AKIS), farmer participatory research (FPR), participatory technology development (PTD), stakeholder analysis, livelihood systems, value chain approaches, and innovation systems, among others. All of these ideas and approaches seek to integrate the contributions of different disciplines, the perspectives and knowledge of different stakeholders, the different levels of intervention (farm, community, district, etc.), as well as balance the different outcomes of development (economic, social and agro-ecological). They recognise the need to involve other actors in research, including NGOs, civil society, producer associations, the private sector, universities, etc., as well as government organisations, to respond to the challenges of innovation.

These experiences with participatory, multi-stakeholder processes, as well as the experience in developed countries has led to the current emphasis on “innovation” and “innovation systems” as ways of rethinking agricultural research and development. By “innovation system”, we refer to “*...networks of organisations or actors, together with the institutions and policies that affect their innovative behaviour and performance, that bring new products, new processes and new forms of organisation into economic use*” (Hall, Mytelka and Oyeyinka, 2006).

“Innovation” focuses on the application of knowledge (rather than the knowledge itself), on the process (rather than the product), and on the interactive learning between actors and the institutional and policy context that influences their innovative behaviour and performance. This view of innovation recognises that institutions – the habits, practices, rules, laws and policies that regulate the relations and interactions between individuals and groups - influence innovation and need to be addressed when improving innovation and innovation systems. It also recognises the conclusion above that the introduction of more participatory approaches to research is often ineffective unless the habits, practices and incentives of scientists are also changed.

Our view of ARD in this resource book is therefore similar to the concepts of facilitating “rural innovation” processes as promoted by UNU-MERIT, ISNAR, the World Bank, IFAD, KIT and CTA, among others, and the concept of “Integrated Agricultural Research for Development” or “IAR4D” as being promoted by FARA in Africa (especially in the “Sub-Saharan Africa Challenge Programme) as well as initiatives in Kenya and Uganda. It is also very similar to approaches such as “Integrated Natural Resources Management” and “Enabling Rural Innovation” practiced by CGIAR institutes and partners in Africa and elsewhere.

This resource book is an attempt to sum up and bring together these different ideas, concepts and research approaches. It is based on the principle that such integrated approaches are vital for the development of South African agriculture – including both the more commercial, large-scale sector and especially the smaller-scale and emerging agriculture that is found in communal areas and land reform programmes. As such, the book is intended to be of use to

not only agricultural researchers, but also to provincial agricultural departments and other stakeholders. Above all, it is intended to promote the individual and organisational behaviours that allow the integration of stakeholder concerns, knowledge and action around themes of mutual interest.

As seen in the above, ARD brings together a number of trends, ideas and approaches in agricultural research and rural development. It is about innovation – bringing new products or processes into economic use – as an outcome, rather than just about information or technology as products. It integrates research within the broader and more complex development process, rather than regarding it as stand-alone process, or the starting point for agricultural development.

Nevertheless, we do not see ARD as a fixed method or specific process that can be compared or substituted for “conventional” research. Rather, we see it as a set of 6 principles that, when taken together, improve the effectiveness and impact of agricultural research:

1. ARD improves participation through partnerships;
2. ARD promotes learning through collective action;
3. ARD explores complex livelihoods through systems thinking;
4. ARD uses a mixture of qualitative and quantitative research methods;
5. ARD analyses agricultural systems and research and development outcomes from ecological, economic and social perspectives;
6. ARD integrates technology, policy and institutional change.

These 6 principles of ARD could undoubtedly be packaged differently, as there is considerable overlap between them. No doubt also that others could have included additional material or placed more emphasis on certain topics that we do include in this resource book. In that sense, this resource book should be seen as “a work in progress”. ARD as evolving, and new ideas and experiences will undoubtedly enrich future appreciation of ARD in South Africa and elsewhere.

References and further reading

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World Bank, 2006. Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems. The International Bank for Reconstruction and Development / The World Bank, Washington, DC. Available at: http://siteresources.worldbank.org/INTARD/Resources/Enhancing_Ag_Innovation.pdf

1.2 Outline of this resource book

Chapters 2-7 of this resource book explore each of the 6 ARD principles in turn:

Chapter 2 focuses on improving participation through partnerships.

- Section 2.1 gives a brief overview of the increasing importance of participation and partnerships in applied agricultural research.
- Section 2.2 then explores in more detail the concepts of stakeholders, participation and partnerships.
- Section 2.3 goes on to look at the requirements for stakeholders to come together in equitable and functional partnerships.
- Section 2.4 looks in more depth at the nature of teams, including the specific challenges of multidisciplinary research teams, and also considers the facilitation and leadership of such teams and teamwork.
- Section 2.5 recognises that conflict is inevitable in any partnership, and hence reviews the causes of conflict as well as the ways of dealing with this.

Chapter 3 focuses on learning through collective action.

- Section 3.1 gives an overview of the increasing role that mutual and experiential learning plays in research.
- Section 3.2 reviews a few learning theories that we think are especially relevant to ARD: these include adult learning, experiential learning and action research.
- Section 3.3 looks at the specific experience of ICRA has in organising learning programmes in ARD: the competencies we think are necessary, the essential elements of such programmes, and the way in which these elements can be put together to make a practical programme.
- Section 3.4 assesses the experience to date of organising ARD learning programmes in South Africa, and the integration of these into ongoing research and development programmes of the Agricultural Research Council and Provincial Departments of Agriculture.

Chapter 4 focuses on exploring complex rural livelihoods through systems thinking.

- Section 4.1 begins the chapter by reviewing how “development” has been perceived in the last half-century, and the implications of this for agricultural research.
- Section 4.2 explores the thinking behind three different “dimensions” or pillars of sustainable agricultural development: natural resource management, gender and social equity, and economic growth through linking farmers to markets. For each of these main topics, the key issues are identified in relation to desirable development outcomes that need to be considered when new technologies or policy are proposed.
- Section 4.3 then takes a closer look at “rural livelihoods”: the concept of a “livelihood”, and the sustainable livelihoods framework. Key to this framework is an understanding of the assets that form the basis of livelihoods, the external policies and institutions that shape them, the risk factors that determine vulnerability, and the strategies that rural people use to achieve desirable livelihood outcomes.
- Section 4.4 goes into more depth in the concepts of systems and systems thinking, as these critical to an understanding of the “systems approaches” common in agricultural research for development. Two types of systems thinking are contrasted: so called “hard systems” thinking and “soft systems” thinking; although these distinctions may

seem esoteric, the differences are responsible for many contemporary arguments about “science” and development.

- Section 4.5 gives guidelines on the use of diagrams to explore systems relevant to ARD. Types of diagram include concept maps, rich pictures, flow charts, sign graphs and problem-causal diagrams. These types of diagram are used as tools by many current research approaches, including those described in Chapter 6.

Chapter 5 focuses on answering research questions through qualitative and quantitative methods.

- Section 5.1 provides a brief history of methods in agricultural research.
- Section 5.2 looks at the ARD research process itself. Starting from the need to resolve complex problems, we break the process down into the formulation of research questions within a cycle of “describing-explaining-verifying”, and looking at the sources of information that are available to answer such questions.
- Section 5.3 compares and contrasts the use of “qualitative” (or “informal”) research methods with the more traditional “quantitative” (or “formal”) methods. The context where each of these methods is appropriate is discussed.
- Section 5.4 describes procedures for conducting informal interviews, with individuals or groups (focus groups, community interviews).
- Section 5.5 goes on to look at ways to co-analyse “semi-quantitative” data with non-scientists, using ranking and scoring methods.
- Section 5.6 reviews the procedures necessary to conduct a more structured and formal survey that can yield statistical inferences, and add a few notes of selecting interpreters for working in local languages.

Chapter 6 focuses on analysing agricultural systems from ecological, economic and social perspectives.

- Section 6.1 gives a brief overview of some of the research approaches that have been developed in Africa to integrate ecological, economic and social perspectives within the context of collective multi-stakeholder partnerships.
- Section 6.2 looks at the characteristics of these “agro-ecosystems”, the resource flows within and outside these systems, changes in time (short or long term) of these systems and the processes of conducting environmental assessments.
- Section 6.3 discusses the analysis of market opportunities and value chains. This section also reviews methods of financial and economic analysis, including partial budget analysis and cost benefit analysis of projects and innovations.
- Section 6.4 reviews stakeholder analysis frameworks, including gender analysis and methods of grouping farms and rural households into distinct interest or stakeholder groups. (“typology”). so that research and development measures can be better targeted.

Chapter 7 focuses on integrating technology, policy and institutional options.

- Section 7.1 gives an overview of the growing realisation that research processes need to consciously integrate technology development with policy and institutional measures, if research is to have the desired impact.
- Section 7.2 considers how “driving forces” or “macro-trends” can be incorporated into scenario planning, so that research is better targeted to the future conditions, and not those of yesterday.

- Section 7.3 takes a closer look at macro- and sectoral policy, focusing on how research can be better integrated with policy development through providing better evidence for policy makers.
- Section 7.4 reviews the experience of land reform in South Africa, within the context of different ways of thinking about land reform and its objectives. Also reviewed are the specific experiences of land reform projects conducted as part of ARD learning programmes in the last decade, which notes how these projects have experienced difficulties or conflict in many cases due to non-functional partnerships between key stakeholders, or lack of appreciation of the different interests involved.
- Section 7.5 gives a short overview of how organisations need to adapt to be able to implement ARD – emphasising measures to better share knowledge with other organisations and stakeholders, and manage their “soft” resources in a way that better manages knowledge and facilitates interaction.
- Section 7.6 describes how the different technology, policy and institutional objectives of ARD can be formulated into a logical objectives hierarchy for the purposes of project planning. Also reviewed are the basic elements of an ARD proposal and how these can better fit the needs of different financing agencies.
- Finally, section 7.7 briefly reviews different approaches to monitoring and evaluation (M&E), and how to integrate learning into these processes in addition to accountability. Building the capacity to reflect on and learn from experience is at the heart of the continuous improvement of ARD processes.

At the end of each major section (or sub-chapter), acknowledgements, references and further reading are provided. Given the limited accessibility of published books and professional journal articles, we have emphasised free resources that are available by internet. Given the widespread topics covered in this resource book, these references and further reading are by no means comprehensive; rather, we hope that readers will use these as a springboard to further explore and develop the many facets of ARD.