

*AGRICULTURAL KNOWLEDGE  
AND INFORMATION SYSTEMS  
FOR RURAL DEVELOPMENT (AKIS/RD)*

**STRATEGIC VISION  
AND  
GUIDING PRINCIPLES**



Food  
and  
Agriculture  
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## PURPOSE

This document has been prepared by the staff of the Food and Agriculture Organization of the United Nations (FAO) and the World Bank concerned with agricultural education, research and extension – and their integration into Agricultural Knowledge and Information Systems for Rural Development (AKIS/RD) – where rural people, especially farmers, are partners, not simply recipients. It is intended as a vehicle for sharing ideas and principles with the various stakeholders addressing the causes, and seeking solutions, for rural poverty. It has four main purposes:

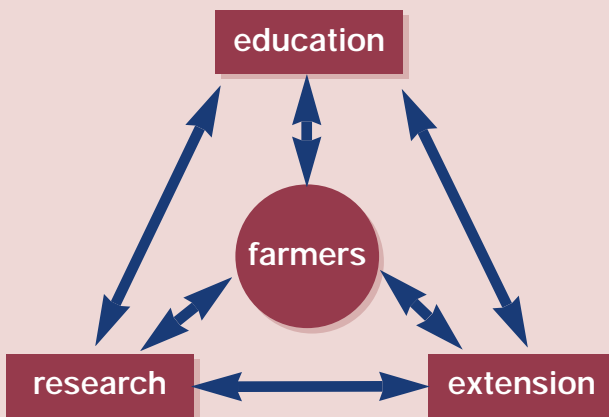
1. To set forth a shared vision for an integrated approach to agricultural education, research and extension which would respond to the technology, knowledge and information needs of millions of rural people, helping them reach informed decisions on the better management of their farms, households and communities.
2. To facilitate dialogue with decision-makers, both in governments and in development organizations, ensuring that proposals for investment in Agricultural Knowledge and Information Systems for Rural Development (AKIS/RD) are well founded and receive due consideration.
3. To provide the staff of FAO and the World Bank, and their counterparts in client countries, with a common set of principles to guide their work in agricultural education, research and extension.
4. To ensure synergies from complementary investments in education, research and extension, resulting in more effective and efficient systems.

## WHAT IS AN AKIS/RD?

An Agricultural Knowledge and Information System for Rural Development links people and institutions to promote mutual learning and generate, share and utilize agriculture-related technology, knowledge and information. The system integrates farmers, agricultural educators, researchers and extensionists to harness knowledge and information from various sources for better farming and improved livelihoods. This integration is suggested by the “knowledge triangle” displayed below.

Rural people, especially farmers, are at the heart of the knowledge triangle. Education, research and extension are services – public or private – designed to respond to their needs for knowledge with which to improve their productivity, incomes and welfare and manage the natural resources on which they depend in a sustainable way.

A shared responsiveness to rural people and an orientation towards their goals ensures synergies in the activities of agricultural educators, researchers and extensionists. Farmers and other rural people are partners within the knowledge system, not simply recipients.



## **THE CHALLENGE IS DAUNTING**

### **MOST POOR PEOPLE DEPEND ON AGRICULTURE**

More than 1.3 billion people worldwide live in poverty – nearly three-fourths of them in rural areas. Virtually all depend directly or indirectly on agriculture for their livelihoods. Many are farmers or pastoralists, while others eke out a living from forestry or fishing. Others are landless. With few assets, their economic activities are small in scale. The productivity of their labour – a key determinant of their income – is low. If the root causes of rural poverty are not addressed, an ever-increasing number of poor rural people will hover on the edge of subsistence, with few, if any, avenues to a better life.

### **FOOD NEEDS CALL FOR STEADY GROWTH IN AGRICULTURAL PRODUCTION**

Today, more than 80 low-income developing countries suffer from chronic food deficits, and about 800 million people live in hunger. By 2025, the world's population may exceed 8 billion and food needs in developing countries may nearly double. To the extent that extra food and other raw materials can be produced competitively by small farmers within food-deficit countries, this has the triple benefit of increasing supplies, reducing rural poverty and improving household food security. If unmatched by increases in food production, mounting demand for food will raise prices and aggravate food insecurity worldwide while swelling the ranks of the hungry.

### **IMPROVING RURAL INCOMES AND RAISING AGRICULTURAL PRODUCTION WILL OFTEN REQUIRE AGRICULTURAL INTENSIFICATION**

In most countries there is little room for the horizontal expansion of farming. Hence increasing the incomes of smallholder farm families will depend crucially upon raising agricultural productivity. This will have to come primarily from intensification of production on lands now being used. Where expansion does occur, it will be

increasingly on to less-favoured lands – lands often remote, environmentally fragile, and of limited productive potential. Consequently, production (and productivity) on existing agricultural lands will nearly have to double in the next 25 years if the anticipated growth in demand for food is to be met largely from within developing countries. This can only be accomplished through a combination of technological innovation, improved farming skills and increased capacity of rural institutions (including farmers' organizations) to face the challenges of production, profitability and sustainability. Without this, rural poverty and hunger will worsen.

### **AGRICULTURAL INTENSIFICATION MUST BE BALANCED WITH ENVIRONMENTAL SUSTAINABILITY**

Expanding the output of the land through intensified crop, forestry and livestock practices will often have adverse environmental consequences, such as deforestation, soil nutrient or groundwater depletion, chemical and waste pollution, and loss of genetic diversity. Farmers and rural people in general will have to pay greater attention than in the past to the sustainability of production and to the broader environmental impact of their agricultural activities. Where intensification threatens the natural resource base, safeguards and resource replenishments will have to accompany production.



### **RURAL PEOPLE ALSO LOOK TO KNOWLEDGE AND INFORMATION SYSTEMS FOR GUIDANCE ON HOW TO BRING ABOUT GENERAL IMPROVEMENTS IN THEIR LIVELIHOODS**

Often extension workers are the only outsiders working with rural communities and hence they are looked to for advice, not only on farming technology but also on other issues of topical concern such as nutrition and health (including HIV/AIDS), population, com-

munity organization, finance, marketing, off-farm employment and many other issues affecting rural living standards. How far each element of an AKIS/RD moves beyond agriculture in responding to requests depends on the strength and accessibility of more specialized services.

### FOR PEOPLE LIVING IN THIS ENVIRONMENT, KNOWLEDGE IS KEY

The challenges ahead will bring the need for new technologies, new skills, changed attitudes and new ways to collaborate. But technologies will be fully exploited only if the knowledge of how to put them to use is widely disseminated. A billion poor farmers make decisions on their farms every day. They range from groups of women raising silkworms in China, to herders managing communal grazing lands in the Sahel, to pensioners growing potatoes on dacha farms in Russia, to apple growers bargaining for better prices in Turkey, to *campesinos* maintaining their own land races of maize in Mexico. Farmers such as these possess valuable skills and knowledge, but traditional farming systems by themselves cannot generate all the skills, information and knowledge required for intensification of production, stewardship of the land and increased integration into markets. Farmers acting on their own – many of them remote and difficult to reach – are ill-equipped to avail themselves of opportunities of which they may not even be aware.



### FARMERS CANNOT MEET THESE CHALLENGES ON THEIR OWN

Doubling agricultural productivity in an environmentally sustainable way in 25 years poses a formidable challenge. To make it possible for a billion farmers to do this on their own farms is a daunting task. For reasons now well understood, meeting the challenge will require collective action by all AKIS/RD partners, under-



pinned by vigorous leadership, initiative and adequate funding. Such initiatives have been undertaken in virtually all countries in recent decades in the form of large public AKIS/RD investments in agricultural education, research and extension. These investments have yielded technological breakthroughs in agricultural productivity, but they are now faced with new challenges and opportunities for raising their effectiveness.

## **TECHNOLOGICAL RESPONSES TO THE CHALLENGE HAVE EMERGED**

### **AGRICULTURAL PRODUCTIVITY AND GLOBAL FOOD PRODUCTION HAVE GROWN STEADILY**

Since the 1960s alone, cereal yields, for example, have nearly doubled globally while world food production has increased by 80 percent – more than half of this coming from developing countries. Such gains have been made possible by scientific advances, which have led to improved crop varieties and animal breeds and better water and soil management practices. Scientific work towards the development of integrated approaches to pest and disease control, and farming systems compatible with their agroecological settings, have contributed to the sustainability of the productivity gains.

These improvements have reduced poverty for some rural people while providing affordable food for the urban poor and limiting environmental degradation. Further scientific advances are expected – stemming, for example, from biotechnology.

## THE CHALLENGE HAS BEEN ONLY PARTLY MET

### MANY FARMERS FAIL TO BENEFIT FROM TECHNOLOGICAL AND OTHER ADVANCES

In too many countries, the productivity and incomes of the poorer farmers have stagnated or even decreased. This can be traced to a number of causes, such as poorly functioning markets for inputs, products, or credit: it is not solely due to a lack of investment in education, research or extension. But it does seem to be true in general that the existing AKIS/RD institutions have not realized their full potential.



### THE AKIS/RD INSTITUTIONS HAVE NOT BEEN RESPONSIVE ENOUGH IN ADDRESSING THE PROBLEMS AND OPPORTUNITIES FACING FARMERS

This, together with related shortcomings in the existing AKIS/RD institutions, has become increasingly clear in light of the advances described above. For example:

- Farmers' needs do not sufficiently drive the orientation of research and extension, and labour market requirements are not adequately translated into curriculum design in agricultural training institutions. Some AKIS/RDs are therefore not as relevant to the rural poor as they should be.
- The know-how and technologies that are produced by AKIS/RDs, even when relevant, are not widely taken up by farmers, suggesting a lack of effective transfer. Concerns over cost-effectiveness mean that public research and extension services have trouble ensuring their financial sustainability.

- Public decision-makers are often unaware of the actual results achieved and the long-term resource allocations needed. Many public decision-makers are frustrated by the disappointing levels of coverage – of actual face-to-face contacts between farmers and extensionists and researchers. However, the same decision-makers often constrain outreach programmes through budget cuts that further limit coverage.
- In many settings, the quality of human capital in AKIS/RDs is low, suggesting that investments in human capital formation are inadequate and that the training and educational institutions themselves are insufficiently responsive to changing demands.
- A lack of systematic collaboration among educators, researchers, extension staff and farmers has limited the effectiveness and relevance of support services to the rural sector.

## NEW OPPORTUNITIES EXIST FOR RAISING AKIS/RD EFFECTIVENESS

**ADVANCES IN THE AGRICULTURAL SCIENCES ARE CRUCIAL, BUT OTHER ADVANCES ARE ALSO NEEDED**

Recent accumulations in human, social and institutional capital have combined with important advances in the social and natural

sciences to expand our potential for meeting the challenge. Three areas of progress provide the key: the changing relationships between governments and people; the revolution in information and communication technologies; and new concepts of learning and problem solving.



## RELATIONSHIPS ARE CHANGING BETWEEN GOVERNMENTS AND PEOPLE

Worldwide, political and institutional developments are fundamentally altering the relationships between government and people.

- With increasing ***economic liberalization***, governments no longer provide services that can be more effectively – and efficiently – offered by the private sector or civil-society organizations. The public sector is now concentrating on creating a policy and regulatory environment that catalyses private sector initiative, as well as on improving the quality of services that only governments can offer.
- Through ***democratization and decentralization***, governments are becoming more accountable to their peoples; local authorities and a wider range of community members are gaining a stronger voice in setting priorities for government actions.

These developments can contribute to the potential for farmers (particularly the poor) to have more dependable access to inputs and better options for marketing their outputs. They also provide greater opportunities for farmers and their communities to articulate their demands about the nature of services provided to them by the public sector.

## COMMUNICATION AND INFORMATION TECHNOLOGIES ARE ADVANCING RAPIDLY

New developments in communication and information technologies are making it possible to share information widely, quickly and cheaply.

- Except in extremely remote areas, most rural people have access not only to national radio, but increasingly to local community-based radio stations.



- Access to telephones has increased spectacularly, particularly in very poor countries. Consequently, verbal and visual forms of communication are ever easier to establish and exploit. In this sense, rural people are becoming much less isolated from each other and from access to sources of advice and information.
- Rapidly increasing numbers of education, research and extension institutions have fax and access to the Internet. This is reducing the isolation of professionals, allowing easier sharing of knowledge. The information technology revolution is starting to expand access for rural people to written and electronic forms of information and communication, including distance learning systems.

These developments are providing everyone within the broad AKIS/RD – rural people as well as those who seek to assist them – with a steadily growing capacity for gathering, sharing and exploiting information available beyond their institutions, communities and immediate environs. Along with these developments, however, comes a danger of *unequal access* -- rural areas are less served than urban areas, and rural women in particular have less access to new information and communication technologies.

### NEW CONCEPTS ARE EMERGING FOR PARTICIPATION IN LEARNING AND PROBLEM SOLVING

A range of participatory methods and tools has been developed to



help rural people to diagnose problems, gather information, explore options, and commit themselves to action, often collective action. Education and training are no longer seen simply as processes of transferring knowledge or information, but rather as means to empower people to become critical thinkers and prob-

lem solvers who are better able to help themselves, but also better able to engage with others in order to learn, share information and address problems and priorities. This is very important for farmers whose ability to cope with the unpredictable is often the key to survival.

## **AGRICULTURAL KNOWLEDGE AND INFORMATION SYSTEMS NEED TO SEIZE THESE NEW OPPORTUNITIES TO ADDRESS THEIR SHORTCOMINGS**

**BUILDING ON THESE INSTITUTIONAL AND PEOPLE-ORIENTED ADVANCES AND DEVELOPMENTS, IT IS NOW BECOMING CLEAR HOW AKIS/RDS MIGHT RESPOND DIRECTLY TO THEIR SHORTCOMINGS**

Education, research and extension institutions, particularly in the public sector, have been slow to exploit the potential of economic liberalization, democratization and decentralization. Thus research and extension agendas have not responded sufficiently to new market opportunities for added value or product diversification and increased input availability. Similarly, the social and economic sciences are still missing from the curricula of many agricultural training establishments. Very few extension and research institutes have been proactive in exploiting advances in communication and information technology, for example by using them to establish links to each other, to the outside world and to farmer organizations. Too many retain top-down systems of management, teaching and interaction with their clients, with little room for meaningful participation by farmers in guiding the direction of the programmes. “Talk and chalk” remains the usual mode of teaching at institutes for agricultural education, while curricula tend to be narrowly focused on farming technologies, rather than the broader needs of rural sector

society. Few agricultural education programmes have incorporated new, participatory concepts of learning and problem solving.

### **IF AKIS/RDs STICK TO “BUSINESS AS USUAL”, SUPPORT FOR THEM COULD BE THREATENED**

Although governments have continued allocating resources to support public agricultural research and extension programmes, many have been frustrated by the perceived failure to alleviate the ongoing plight of poor farmers. Even if governments give due priority to meeting the challenge of rural poverty, their confidence in research and extension programmes will understandably wane without clear evidence that they are having a visible impact. Moreover, as public resources continue to flow and the associated opportunity costs mount, issues of accountability within these programmes will loom ever larger, ultimately threatening their support.

### **BUILDING ON THE ADVANCES DESCRIBED ABOVE, AKIS/RDs CAN NOW BE TRANSFORMED**

Despite past shortcomings, AKIS/RDs can help rural people improve their livelihoods, and it is becoming ever clearer how they can be designed to do so better. Today, through advances in agricultural technology, in rearranged public/ private responsibilities, in information and communication technologies, and in methods of participatory learning, AKIS/RDs can help the rural poor to benefit more than ever from agricultural research, extension and education programmes. The following sections offer a strategic vision for what



might be accomplished through AKIS/RDs, together with principles and guidelines for realizing the vision.



## THE STRATEGIC VISION ...

Ideally, farmers of all types would have the capacity – in terms of knowledge, skills, attitudes, information and technologies – and motivation to run their farming enterprises productively, profitably and sustainably, contributing to the emergence of a rural society no longer plagued by poverty and food insecurity. Their capacity to do this would be supported by an AKIS/RD which would:



- accurately identify constraints and opportunities faced by male and female farmers and herders and their wider communities, engaging scientific methods to generate appropriate and sustainable economic, social and technological responses;
- help rural people, particularly farmers, marshal social skills and technologies to augment their productivity, manage their natural resources sustainably, raise their incomes, collaborate effectively with one another in addressing their common problems, and become meaningfully involved with all major stakeholders in determining the process of further technology generation and adoption;
- enable governments to carry out activities for the public good – for example, ensuring food safety, conserving the environment, reducing poverty and promoting education, research and extension, whether from public or private suppliers; and



- provide education and continuous training and mutual learning opportunities for educators, researchers, extensionists and farmers alike, allowing them to work together effectively.

Within such an AKIS/RD, the *public sector*; the *private commercial sector* and *civil society* would each participate meaningfully in decisions about the design, implementation, funding and evaluation of education, research and extension programmes. Farmers, in particular, would be empowered to occupy a prominent and influential position within the system.

## ... STRATEGIC EMPHASIS ...

SUCCESSFUL PURSUIT OF THE VISION REQUIRES STRATEGIC EMPHASIS ON:

- making the whole AKIS/RD financially, socially and technically more sustainable;
- improving the relevance as well as the effectiveness of the processes of knowledge and technology generation, sharing and uptake;
- making AKIS/RD more demand-driven through empowerment of farmers, particularly those who are marginalized and disadvantaged, so that they might participate more meaningfully in AKIS decisions and priority setting in order that AKIS/RD programmes would be more responsive to their needs;
- increasing the interface between and integration among the various education, research, extension and farming activities; and
- building accountability to assure that each stakeholder assumes his/her respective responsibilities, that performance failures are identified and that appropriate responses are made.

## ... AND GUIDING PRINCIPLES FOR AKIS/RD PROGRAMME DESIGN

Programmes in agricultural education, research and extension that are built on sound guiding principles will begin to achieve AKIS/RD objectives – poverty reduction, agricultural productivity gains, food security and environmental sustainability. Such programmes will display the following design characteristics:

- ***Economic efficiency.*** The benefits of AKIS/RD programmes are shown to be commensurate with costs, and programmes are tailored to a scale that is commensurate with, and justified by, expected outcomes.
- ***Careful match between comparative advantages of organizations and the functions they perform.*** The rationale for all organizations involved must be clearly stated and in accordance with the concepts in the box on pages 16 and 17. This means that the public sector’s involvement in AKIS/RD programmes is clarified and focuses on “core” public good functions.
- ***Subsidiarity.*** Operational authority and responsibilities for AKIS/RD programmes are allocated based on the principle of subsidiarity, whereby decision-making devolves to the lowest possible level of government consistent with organizational competencies and efficient use of funds. Resources, including funds, are assigned to each level based on its allocated responsibilities. This often implies the decentralization and devolution of authority and responsibility within the public sector for service delivery.
- ***Clear repartition of costs.*** The main stakeholders in AKIS/RD programmes share the burden of funding AKIS/RD activities based upon agreed criteria, including their ability to pay and their use of services. The central government assumes a share of the cost

## THE PUBLIC SECTOR ROLE IN AN AKIS/RD

### IS INFORMATION A PUBLIC OR A PRIVATE GOOD?

A challenge common to all three AKIS/RD components is to decide who should pay for what. A useful approach is to sort information according to who stands to benefit. Thus, where benefits are privately appropriable, costs can be shifted to the beneficiaries; if there are few or no gains that can be privately appropriated, public funding might be necessary. Often, however, the distinction between public and private, as two “pure” extremes, is blurred by subtle gradations in intermediate categories of goods involving elements of both.

#### *Clear distinctions in theory*

Information that is difficult to keep from freely spreading (“low excludability”) and that retains its value to individuals, no matter how many acquire it (“low subtractability”), is properly considered a public good. It should be created and made accessible to all. By contrast, information that can be limited to those who can (and often do) pay (“high excludability”) is in most cases best treated as a private good, because it loses value unless those who use it can exclude benefits to others (“high subtractability”).

#### *Grey areas in practice*

In practice, there are grey areas between these extremes. For example, techniques for natural resource management might be free to all, but rivalry for access to scarce resources diminishes the value of improved techniques (low excludability combined with high subtractability). Such information is called a “common-pool” good. Conversely, many farmers might not be able to afford commercial extension advice, even though its value is

not diminished by its broad dissemination (high excludability combined with low subtractability). This type of information is called a toll good.

### *Examples relevant to AKIS/RDs*

- Essentially public goods: weather forecasts; basic information on soils, plant nutrition and general market prices; food safety.
- Essentially private goods: hybrid seeds; cultivation equipment and services.
- Largely common-pool goods: open and self-pollinating crop varieties; integrated pest management; common natural resource management (such as of a forest).
- Largely toll goods: farmer participation in residential courses; adaptive pesticide research; farm-planning advice; specialized market analysis.

### *So, should the public sector fund an AKIS/RD?*

Yes, except when the goods produced are essentially private in nature. For many toll and common-pool goods and for all purely public goods, public funding is justifiable: without it, there will be systematic under-investment and therefore shortages of these goods.

## **BUT DOES THE PUBLIC SECTOR HAVE WIDER RESPONSIBILITIES THAN FUNDING?**

With its intrinsic responsibilities for articulating desirable policy options, the public-sector role extends beyond providing appropriate AKIS/RD funding. To address such public concerns as empowering the population in general, alleviating rural poverty, safeguarding natural resources and ensuring urban food security, the public sector must take the lead in defining opportunities and needs for the effective, well-designed AKIS/RDs promoted by this document. This does not imply, however, that public institutions need necessarily be the sole suppliers of publicly funded services.

burden, covering the cost of public goods (see box) and avoiding investment in private goods. Local governments, the private commercial sector and client farmers themselves also shoulder part of the financial burden.

- ***Careful assessment and optimal mixing of funding and delivery mechanisms.*** Funders do not necessarily have to be implementers. Even though central and local governments help fund AKIS/RD programmes, they do not necessarily directly deliver programme services. Some AKIS/RD services and products are contracted to outside sources such as private firms and NGOs which may broaden the range of service providers, raise the operational efficiency of AKIS/RD programmes and make AKIS/RD workers more accountable for their performance and results. Similarly, private funds from the commercial sector and civil society may be used to support public sector delivery.
- ***Pluralistic and participatory approaches.*** Various approaches to service delivery attuned to local conditions are used that lead to the empowerment of local communities and other AKIS/RD stakeholders releasing their initiative and problem-solving ability and mobilizing their resources. A range of stakeholders and organizations with different strengths are promoted to increase mutual learning, self-correction and the robustness of AKIS/RD.
- ***Effective linkages among farmers, educators, researchers, extensionists and other AKIS/RD stakeholders.*** AKIS/RD programmes and institutions are explicitly designed to create synergies and collaboration among stakeholders in all three AKIS/RD domains. Farmers and their partners in each AKIS/RD programme area are provided with resources and/or the authority to purchase and/or influence the services provided in each of the other domains.
- ***Building human and social resources.*** AKIS/RD programmes incorporate resources and incentives for educating a new generation

of staff capable of empowering their rural clients to exploit fully the latest relevant advances in agricultural technology, in rearranged public/private responsibilities, in new information and communication technologies, and in concepts for participatory learning and problem solving.

- ***Sound monitoring and evaluation.*** AKIS/RD programmes would be results-oriented with rigorous systems for monitoring progress towards achieving goals and for evaluating outcomes. Monitoring and evaluation are based not only on economic criteria for calculating cost-effectiveness, but also on human-resource, institutional, and environmental criteria to ensure comprehensive impact accounting.

## APPLYING THESE PRINCIPLES

Operational guidelines, inspired by this shared vision and consistent with the principles outlined here, are under preparation by the World Bank and FAO.

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## LEARNING WITH FARMERS

Development programmes can only realize their full potential if knowledge and technology are shared effectively, and if populations are motivated and committed to achieve success.

*Jacques Diouf, Director-General, FAO, 1994*

To succeed with the mandate of promoting agricultural and food production and fighting hunger, there is a need to learn from and involve farmers, agriculturists, scientists and decision-makers everywhere.....

*Jacques Diouf, Director-General, FAO, 1999*

## KNOWLEDGE DRIVES DEVELOPMENT

We used to think of capital as the scarce factor in production and of the transfer of capital as the key instrument of growth. Knowledge is now as, if not more, important a factor in development, and this trend is set to intensify. In the next century, knowledge accumulation and application will drive development processes and will create unprecedented opportunities for growth and poverty reduction. But there are significant risks of increasing inequality between and within nations.

*James Wolfensohn, President, World Bank, 1997*