



COMMONWEALTH of LEARNING



Using Information and Communications Technology for Agricultural Extension



KNOWLEDGE SERIES

knowledge series

The success of ICT applications depends upon the appropriateness of the learning they provide

INTRODUCTION

Agriculture is the mainstay of many low-income or developing nations' economies and exports, and provides for the livelihoods of billions of smallholders. These smallholder farmers face low or reducing crop yields and incomes due to land degradation from over-farming, mono-cropping and a reduction in the labour force from the HIV/AIDS pandemic. Women smallholders today play an increasing role in agricultural production but often lack the capital, labour, time and educational levels of their male counterparts, resulting in decreased production, less nutritious crops and community pauperisation. Agricultural extension programmes can provide much-needed help in the form of practical field-advice, innovations from scientists and practitioners, and sound commodity-marketing principles.

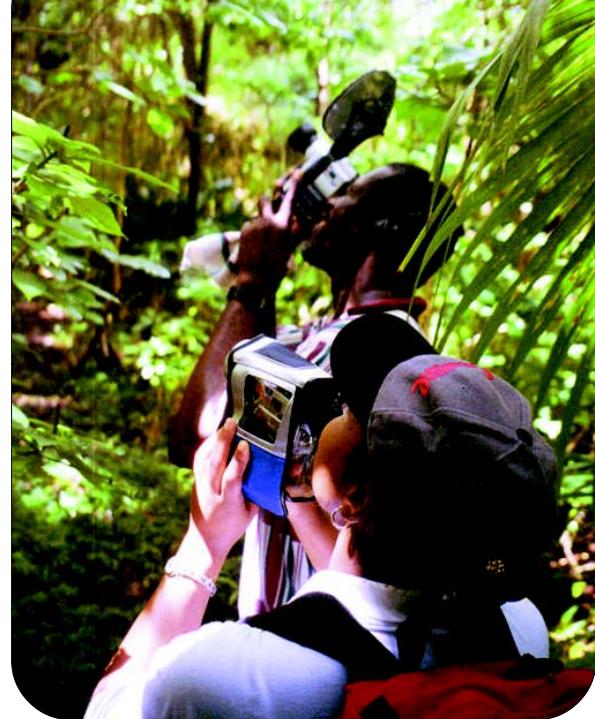
Yet the enormous demand for smallholder training can never be met through conventional extension methods. Traditionally, extension transfers knowledge from researchers or external experts to farmers through training, demonstration plots and field visits. These programmes rely on face-to-face teaching and learning, tend to be propagated slowly, are small in scale and limited in coverage. Smallholder extension programmes have always been a low priority; nowadays, the increasing privatisation and commercialisation of extension programmes places them even further out of the reach of communities most in need.

NEWER EXTENSION

In researching his book, *The Japan We Never Knew*, environmentalist David Suzuki interviewed a Japanese farmer who was promoting radically different farming methods in his community. The farmer's family and neighbours made the excuse, "We are shy to try something different." But the farmer observed, "We only need about three out of ten people to overcome this inertia. After that, when five out of ten are doing it, the rest will be shy about being left out."

The newer approaches to extension such as Farmers First, Farm Field Schools and Farmer Participatory Research mobilise communities from within, avoiding a top-down approach to effecting change and directing their efforts towards:

- *Creating smallholder community networks*: Sharing information, experiences and ideas, and passing these on to other farming groups. Identifying and training local facilitators within communities to achieve a "multiplier effect."
- *Collaborating with smallholders in researching needs*: Helping smallholders see the relevance and benefits of new or different ways of doing things, and adopting, modifying or discarding these new ways according to local circumstances.
- *Addressing smallholder-identified needs*: Providing practical learning that follows the natural cycle of seasons and farming procedures, and that considers the "why" as well as the "how."



- *Facilitating two-way information flow*: Enabling smallholders to draw upon national or even global sources, and equally importantly, contribute ideas from their own local knowledge systems.
- *Using ICT*: Increasing access to, enriching and diversifying communications and learning by employing tools such as radio, television, video and audio recordings, computers, digital cameras and the Internet.

This holistic approach:

- Accounts for the social, cultural and economic changes involved in achieving agricultural change.
- Recognises that farming practices are influenced not just by smallholders, but also by their families, fellow workers and communities.
- Seeks to empower and to educate all concerned groups, and to ensure gender and generational inclusiveness.
- Seeks to increase involvement of others in the food-to-market chain, such as suppliers, market intermediaries, local entrepreneurs and consumers, as the extension programmes grow and mature.

DEVELOPING ICT

The 2002-2003 iNARS discussion and workshop on a framework for the effective use of ICT for farmers and smallholders through National Agricultural Research and Extension Systems (NARES), organised by the International Service for National Agricultural Research (ISNAR) and the International Institute for Communication and Development (IICD), established that:

- Every community, whatever its nature, size and location, has its own knowledge base and information and communications networks.
- ICT can enhance and enlarge this "information space" and the learning within it.
- Communities need access to ICT and learning networks to receive information and training materials, articulate their needs, envision new possibilities, negotiate with partners and stakeholders, and work towards fulfilling their visions.

The latest ICT does not necessarily hold all the answers. Older technologies work best in some extension contexts. Some older media are now converging in ICT. For example, telephony, fax, audio- and videoconferencing and streaming video and audio are now available through computers and cell phones via terrestrial, satellite, cellular or wireless networks. But the inherent strengths and weaknesses of these older technologies don't change just because they've become digital.

Weigh the advantages and disadvantages of each technology against the alternatives. No single technology works best in all applications,

Combining ICT with newer extension at the centre of development

communities or contexts. It is often best to use a mix, for example, to combine print, broadcasting and/or ICT with face-to-face methods.

Consider also whether the necessary connectivity, power supply, training and ongoing technical support are available and affordable, and don't waste time and money on "enriching" materials with technological gimmicks and unessential services. Smallholders have limited time and concentration and will only use those materials and services they recognise as meeting their immediate needs. The success of ICT systems and applications depends upon the appropriateness and effectiveness of the learning and information they provide, as well as upon sound business planning to ensure long-term sustainability.

The agricultural research and development community must:

- Re-conceptualise extension, communications and capacity building to focus on smallholder communities in rural and disadvantaged regions, and use newer extension methods in conjunction with ICT to achieve these goals.
- Consider the culture and circumstances of the targeted smallholder communities and issues of connectivity and cost.
- Consider the target community's information needs and how to enlarge and enhance their existing "information space." Ensure the quality, impact and cost benefit of the programmes throughout programme development, delivery and implementation.
- Train extension providers and enablers in the new ICT-adapted forms of delivery, wherever possible through distance learning technologies and methodologies.
- Commit to long-term collaboration with, and intervention by, international, regional and national institutions.
- Establish and encourage significant public-private-community partnerships.

Extension providers, such as specialists in international, national or regional extension agencies, and extension enablers, such as workers in developmental, farmers' or broadcasting organisations, can provide the following support:

- Those close to information-providing organisations can help identify the most relevant, useful and credible information, and make this information and the information platforms more effective for sharing with smallholders.
- Those close to the farming communities, such as local community leaders, teachers and educated youths who can use ICT, can help "localise" information from the Internet and enable users to act upon it.
- Intermediaries such as public call offices or telecentre operators can work to establish or improve access and communications for user communities.

For example, to develop an extension programme providing a community with daily prices from urban markets, consider:

- What "information platforms" already exist? For example, do marketers provide information on which grade of particular commodities attracts the best prices? What form is the information in? For example, via a website, telephone call centre or community blackboard?
- Is there an organisation with the capacity to generate and process this information? For example, does or could the urban marketing board or marketers' association collect, organise and distribute the information in forms the farming community needs and can access?
- Who will "localise" this information, that is, inform the community about the opportunities and threats in marketing, and how to add value to their produce?
- By whom and by what means can this information be brought from the various information sources to the farming community? For example, will the market price be communicated by telephone, newspaper,

radio, or the Internet, or simply distributed in leaflets brought by local bus drivers operating between towns?

ORGANISATIONAL ISSUES

Development of effective ICT-enabled programmes is constrained by:

- Lack of government commitment and national and community policies that support the provision of telecommunications to improve the quality of life in rural and disadvantaged areas.
- Costs and lack of infrastructure, technology and technical expertise.
- Limited learning opportunities within farming communities.
- Difficulty in developing and sustaining collaborative partnerships.
- A dearth of appropriate, ICT-provided NARES programmes, materials and services in low-income countries.

The effectiveness of many existing ICT-based programmes is limited by:

- Donor-supported or pilot projects being mainly directed toward agricultural specialists or more sophisticated farming groups, rather than the smallholders most in need.
- Provider-driven programmes providing one-way information and denying opportunities for input or feedback.
- Lack of formal evaluation of programme design quality, extent of adoption, impact, outcomes, costs and cost benefits.
- Lack of funds, infrastructure and educational and technological expertise to design, deliver and evaluate long term, institutionalised, ICT-based programmes.

It's important for agricultural research and development organisations such as the Food and Agriculture Organization (FAO), the Consultative Group on International Agriculture Research (CGIAR) institutes and the Commonwealth of Learning (COL) to help develop long-term capacities, ensuring that the human, technological and other resources are sustainable and correctly deployed.

SOCIAL AND CULTURAL ISSUES

In designing extension networks, communications and learning systems, consider the ways in which particular smallholders normally acquire their values and knowledge, negotiate common understandings and reach agreement on common courses of action—for example, through word of mouth, or in response to advice and example from community elders. Extension programmes must help smallholder communities through the following stages:

- *Denial.* Smallholders tend to hold on to traditional values and practices, denying any need for change. Extension work must focus on helping them see the reasons for, and the benefits of, change.
- *Resistance.* Smallholders may try to protect themselves and their interests by opposing change. Extension programmes need to provide motivation and empowerment, as well as training.
- *Exploration.* Smallholders may be concerned if everything doesn't work out as planned. The extension system must give them practical support and reassurance, help them understand the causes of success or failure, and help them overcome the situation.
- *Commitment.* Smallholders are self-reliant in dealing with change, and are capable of envisioning and implementing further change. They can become local leaders and facilitators whenever external support is withdrawn.

ICT & AGI

Methods can place smallholders

LEARNING SYSTEMS

Extension programmes and services should:

- Allow individuals, households, farming groups and the wider community to participate throughout the learning process.
- Give smallholders a strong say in how things will change.
- Acknowledge that smallholding communities pay most attention to groups and persons whom they respect, and whom they recognise as dealing with similar conditions and problems as their community.
- Allow ideas to be negotiated and experiences to be shared between everyone involved in the agricultural development.
- Not simply deliver learning materials, but also give smallholders access to assistance and “communities of practice”—help desks, question and answer (Q&A) systems, frequently asked questions (FAQ) postings, and email and Web conferencing.
- Be simple to understand and implement, case studies-based and immediately applicable.
- Motivate and build confidence as well as competence.
- Help smallholders learn how to learn, and how to apply new learning productively and profitably.
- Be appropriate to the technology, budget and time realistically available to programme providers, enablers and users.
- Be faster, cheaper and better than any conventional alternative.
- Be constantly evaluated, to ensure that changing requirements and expectations are met.

CONTENT ISSUES

Programme content should reflect:

- Learning needs, strategies, materials and interactions that will empower, motivate, educate and skill targeted smallholders.
- The circumstances, culture, language, literacy level, educational background and learning readiness of smallholders. For example, jargon-heavy, English-only materials and communications will confuse or alienate smallholders or extension workers who normally use another language, and who may be unfamiliar with highly technical terms.
- Current, reliable and locally appropriate knowledge, information and findings.
- Adoption or adaptation of existing programmes, rather than original material. Establishing and evaluating what's already available should become easier as more providers develop databases of generic learning materials online and elsewhere.
- Soundly-based and user-focused instructional design. It is usually insufficient to simply place existing lecture notes, research findings, PowerPoint presentations or information materials online. Learning principles need to be applied.

TECHNOLOGICAL ISSUES

PRINT

Standardised, portable, compact and often the most cost-effective. Good for self-paced learning. However, it needs literacy, lacks moving images to

demonstrate processes, and can be slow and costly to customise to local communities' needs. It may also be difficult to deliver to remote areas.

RADIO

Radio broadcasting equipment is standardised, cheap, powerful and portable. Can now also be Internet streamed. Suitable for self-paced learning and for conveying timely information to rural communities wherever reception is not problematic, and literacy levels are low. Radio lacks visuals and is usually used for one-way communication. However linked with telephony and the Internet, it allows smallholders to call in to live programmes and provides immediate, informative, interactive, effective and efficient “community information spaces.” Interactivity can also be achieved by exchanging recordings of programmes. Audiocassettes are cheap and easy to produce, and although cumbersome to distribute, are a cost-effective way to spread localised information in areas where illiteracy is a major issue and where communities can't access radio.

WIRELESS TELECOMMUNICATIONS AND TOOLS

May help regions with low teledensity to access multimedia content, large-volume data and global knowledge sources.

Cellular telephony: This technology is seeing a phenomenal growth in many developing countries. Short Message Service (SMS) and Wireless Application Protocol (WAP) enabled cell phones with cameras can be effective in offering “always available” extension between experts and farmers. Has great potential, especially if help desks are established within the extension system.

Audioconferencing via telephony: Can help community members at different locations build relationships and understanding. It uses standardised technology, and can be organised at fairly short notice. Now also possible via Internet-enabled computers. However, smallholders in rural communities without personal telephones must travel to call offices at set participation times, which may be inconvenient to their farming schedules.

AUDIO-VISUAL

Videoconferencing: Offers the advantages of audioconferencing, plus a visual dimension. Capital costs and connection costs can be high (but are reducing). Now also possible via Internet-enabled computers. Again, the time and place of the conferences may not suit smallholders' farming schedules.

Television, videocassette, VCD and DVD: Provide programmes with moving pictures and sound otherwise unavailable to smallholders, using standardised and readily available technologies. Television programmes can be pre-recorded or live and interactive (with smallholders calling in), although the latter may have to be asynchronous over greater distances and different time zones. Television programmes can now be Internet streamed. Videocassettes, VCDs and DVDs can be shared between individuals, families and community groups for self-paced learning. Production and material rights acquisition costs can be high and time consuming to maintain.

Video and digital video cameras: Emerging as important tools for extension. Rural smallholders can visually record and communicate problems to subject specialists. Digital photographs and video clips can be distributed and exchanged online through email or instant messaging, or by regular mail, enabling interactive and collaborative problem solving. Use of these applications should grow as costs reduce, and as digital video and operating systems become more standardised and available.

AGRICULTURE

COMPUTER AND INTERNET-BASED

Internet delivery is fast and inexpensive, given the right policies and infrastructure. Connectivity is problematic in rural and remote regions and poorer nations. However, Internet access may be enabled through community-based telecentres, Internet cafés, information kiosks, points of presence (POPs), or mobile services using ICT-equipped vehicles.

Web-based information and learning resources. Web-based "learning objects"—individual, self-contained and often customisable information or instructional packages with text, images, animations or movie clips—are rapidly growing in number and availability. They allow smallholders to pursue their own learning routes and interests, but there are issues of cost, computer literacy and Internet access. Smallholders also have to be able to plan and manage their own learning, discriminate between reliable and dubious source material, and draw their own conclusions from the available resources. Program developers must be capable of using advanced authoring tools to customise courses to individual needs, while achieving economies of scale by designing for large learning groups.

CD-ROM and DVD-ROM. Store large amounts of text, audio, graphics and video in computer-accessible learning documents. Considerably cheaper to mail than print material, but smallholders must have access to computers and printers and be able to afford the connection, printing and other costs.

Computer-mediated communication (CMC). Via the Internet, CMC is relatively easy to learn, fairly quickly initiated, suitable for fast-changing courses and topics, and asynchronous. However, smallholders must have access to Internet-capable computers and be able to afford the online costs—which increase according to the extent and frequency of Internet use.

Computer-based learning (CBL). Using CD-ROM and DVD-ROM, CBL is self-paced, interactive and provides learner feedback. Programs can be multimedia, combining text, sound, graphics and video, and can provide simulations, tests and other active learning tasks. Smallholders must be computer literate, or helped in using the technology. Computer access is an issue, but mobile computing with sturdy laptop and notebook computers is a promising solution for low-income countries.

MIXED MEDIA

Provides information, knowledge bases and interactivity between farming communities through a mix of analogue and digital media—for example, Internet access through cell phones and satellite radio, and rural and community radio and television stations linked with telephony or the Internet.

PRACTICAL EXAMPLES

RADIO

Simli (Friendship) Radio, Ghana: Assisted by Danida, this community radio station provides programmes for 8-12 year olds and adults. Agricultural programmes are prepared by community radio extension officers who visit communities to discuss problems and priorities and record discussions with local experts. They enable smallholders to hear people within their own communities discuss the issues in their local languages.



RADIO WITH THE INTERNET

Kothmale Community Radio Internet project, Sri Lanka: Provides an interface between smallholders in remote regions and the Internet. In daily programmes presenters browse the Internet live in response to listeners' requests, the information accessed is explained, and communities are enabled to develop their own websites which are then hosted on the station's server.

SATELLITE RADIO WITH THE INTERNET

Arid Lands Information Network-East Africa (ALIN-EA): Partnered with World Space Foundation, ALIN-EA uses digital satellite radio broadcasting to provide Web-based information for smallholders in Ethiopia, Kenya, Tanzania and Uganda.

TELEPHONY/CELLULAR TELEPHONY

Grameen Telecom's Village Phone (VP) Programme, Bangladesh: Not-for-profit non-governmental organisation (NGO) Grameen Bank provides no-collateral small loans to enable poor villagers, mostly women, to purchase cell phones and become village pay phone operators, thereby repaying the loans. Villagers use the phone service to access the latest business and market information, improve their rural income-generating activities and foster local micro-enterprises.

VIDEO

Commonwealth of Learning Media Empowerment (COLME), Ghana and the Caribbean: Working with in-country agencies, COLME identifies rural community needs and trains extension workers in shooting and editing videos using local content. The tapes and/or broadcasts serve large numbers of farmers, thus offsetting reducing extension services. The programme provides training in literacy for smallholders and women in Ghana, and in agribusiness and environmental sustainability in the Caribbean.

VIDEOCONFERENCING

National Institute of Agricultural Extension Management (MANAGE), India: MANAGE provides disadvantaged rural communities, participating agencies, researchers, extension managers and smallholders with facilities and funding for videoconferencing, and a network of information kiosks offering ICT access, training and information services.

WEB AND THE INTERNET

Rice Knowledge Bank: This comprehensive resource provided by the International Rice Research Institute (IRRI) links with the IRRI Rice Web, providing information on practices in the field; research findings; technology transfer methods and support skills; training materials; statistics and other data; a discussion area; and access to other agricultural sites.

MULTIPLE TECHNOLOGIES

Institut Africain pour le Développement Economique et Social-Formation (INADES-formation), West Africa: This uses print, radio, audio and local facilitators to support group and individual study in Francophone West Africa. The programmes cover self-development, group management, managing community resources, financial management and marketing. Content is adapted for different ethnic groups and is available in 50 local languages.

TELECENTRES

RUNetwork, Jamaica: This pilot project of the Caribbean Agricultural Advisory Service (CAIS) uses "Information Cafés" with Internet connection to exchange knowledge and experience between rural communities, researchers and extension services. It provides CD-ROM based information and printers, scanners, digital cameras and audio recorders for capturing, storing and distributing local information.

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- Technical Centre for Agricultural and Rural Cooperation AC-EU (CTA). www.cta.int
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- World Agricultural Information Centre (WAICENT), Food and Agriculture Organization of the United Nations (FAO). www.fao.org/waicent
- United Nations Centre for Regional Development (UNCRD). www.uncrd

OTHER USEFUL WEB SOURCES

- Acacia Initiative: International Development Research Centre (IDRC), Canada. web.idrc.ca/en/ev-5895-201-1-DO_TOPIC.html
- Agriculture Research and Extension Network (AgREN). www.odi.org.uk/agren

USING INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) FOR AGRICULTURAL EXTENSION

Written and researched by

Ajit Maru, Research Officer, International Service for National Agricultural Research (ISNAR)

Colin Latchem, Distance Education Consultant, Australia

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