



## Mega-Project 6

# Knowledge Management and Dissemination for Sustainable Development in Dry Areas

### Introduction

ICARDA established a Knowledge Management and Dissemination (KMD) Mega-Project in 2005, in response to concerns about the cost-effectiveness and impact of public investment in pro-poor research. The Mega-Project's primary task is to integrate ICARDA's work on knowledge management and dissemination into its overall research and capacity building agenda. KMD aims to enhance equitable learning, sharing, and access to knowledge in order to contribute to ICARDA's goals of food security, poverty reduction, and the preservation of natural resources.

Specifically, the KMD looks for ways to convert research outputs into national, regional or international public goods (IPGs), that can be scaled up and widely applied to benefit the rural poor. But it is much more than simply an aid to technology

transfer. KMD seeks to develop a new paradigm to guide scientists as they benefit from – and build on – local knowledge, to generate demand-driven, feasible, pro-poor knowledge. Thus, KMD is designed as a practical approach that aims to capitalize and add value to ICARDA's past work, and maximize benefits from its future research. Activities include development of TIPOs (Technological, Institutional and Policy Options), individually and in "packages", and provision of training in various disciplines.

The KMD also includes the Seed Unit, which is mandated to assist national programs maintain genetic purity of important varieties, produce high-quality source seed for multiplication programs, provide training, technical backstopping, and promote an informal seed sector, such as community-based seed production, for the benefit of farmers.

### Knowledge documentation: the Matrouh Resource Management Project, Egypt

The Matrouh Resource Management Project (MRMP) aims to help control natural resource degradation and alleviate poverty in Egypt's Northwest Coast region. Co-financed by the World Bank, the government of Egypt, and project beneficiaries from 1994 to 2002, the project continues its activities with support from the government of Egypt. Activities include natural resource management (NRM); adaptive research for improvement of crops, rangeland and livestock; and extension, training and social development.

The 20,000 km<sup>2</sup> target area is a semi-desert environment and home to over 20,000 families, mostly *Bedouin*. Agriculture is the main source of livelihood for 80%

of project beneficiaries; but only 7% of the total area is cultivated because natural resources are scarce. Rainfall is low and erratic – a mere 145 mm per year on the coast, rapidly declining towards the inland. Crop productivity and diversity are very low, rangeland is degraded. Barley, the principal crop, is integrated with livestock production. Good soils are allocated to figs, olives, mint, and melons. Infrastructure and public services are lacking, economic opportunities are scarce, and the population in this area is among the poorest in the country.

#### Approaches

The project approaches included decentralized management, community participation, and part-



A Matrouh project staff member and a farmer monitor the survival and growth of fodder shrubs.

nerships between scientists from different disciplines and research and extension staff from multiple institutions. The project area was divided into five sub-regions, and the beneficiaries grouped into 38 Local Communities (LC).

Community action plans were developed for each community. Each LC elected two committees – one for men, one for women – to facilitate development and implementation of the action plans.

The project produced outputs in five broad areas: new scientific methods/processes/pathways, improved technology for NRM and agricultural production, training and skill development, knowledge dissemination methods, and services and supplies. The impacts were substantial:

- Institutions and communities gained valuable experience in participatory approaches.
- The *Bedouin* community enhanced their knowledge and skills for sustainable NRM and yield improvement.
- Water supply for domestic and agricultural use was doubled
- Over 8 million fodder shrubs were planted, improving fodder production on about 10,000 hectares of rangelands and 2000 hectares of barley area.
- Adoption of TIPOs increased crop yields by about 60%, and reduced the use of expensive feed concentrates.
- Some 58% of beneficiaries increased their income by 25% or more.
- 5000 illiterate girls and women were educated, and 3100 benefited from training.
- 2500 women established small income-generating projects contributing to better nutrition and higher income for the family.
- Communities replaced fuel wood with gas ovens, built latrines, and used manual water pumps.

#### Analyzing knowledge pathways

The KMD analysis breaks up the project results into various com-

ponents. What best bet practices were identified? What innovations were developed? What TIPOs were identified, and how were individual TIPOs combined into packages for farmers? How were the packages disseminated?

*Best bet practices:* adoption of new barley varieties, tree pruning, greenhouse production methods, micro-catchment techniques.



The project encouraged *Bedouin* farmers to use supplemental irrigation to grow vegetables and high-value spices, such as mint, shown here, for improved nutrition and income.

*Innovations:* new management model and participatory community-based R&D approaches, stakeholder integration, integrated watershed management.

*TIPOs:* a wide range of TIPOs for sustainable NRM, crop-range-livestock improvement, and improvement of women's welfare were developed and disseminated.

*Dissemination methods:* a range of methods was used, depending on the target audience. Local communities received information through field days, demonstration plots, LC committees and meetings, and most important, from two institutions established by the project – the Matrouh Adaptive Research Center, and Matrouh Training Center.

Scientists and other partners also exchanged information through annual review and planning meetings, workshops, publications etc. The project has links with many other R&D projects funded by the World Bank, IDRC, IFAD and other donors – another important channel for disseminating the results to development specialists worldwide.

## Knowledge documentation: Barani Village Development Project, Pakistan

The Barani Village Development Project (BVDP) aims to reduce poverty in a poor dryland area in Pakistan by improving productivity and conserving natural resources. It is co-financed by IFAD, the government of Pakistan, and project beneficiaries. The first phase (1999-2004) was extended to 2006 on a no-cost basis. ICARDA was responsible for the applied research component in association with six local/national research institutes. Activities covered four broad areas: water and land use management; integrated crop/rangeland/livestock systems; training, capacity building and institutional strengthening; and research management.

The project area consists of six *tehsils* (administrative units) in the *barani* (rainfed) areas of Punjab province, with a total population of 21 million, of whom 83% are classified as rural. Agriculture, their main source of livelihood, is

a risky occupation. Rainfall is low and erratic; it declines from 800 mm in the northern parts (with good ground and surface water) to 450 mm in the southern parts, where water resources are limited – and saline. Yields are generally low, with frequent crop failure. Rangelands are often degraded.

There are two cropping seasons, *Rabi* (spring) and *Kharif* (autumn). The major crops are wheat, maize/sorghum, millet, mustard, groundnut, pulses and oilseed crops. Livestock are also important. Most households are poor. The farms are usually too small to provide fully for the family's basic needs – one-third of household income typically comes from off-farm sources.

### Approaches and impacts

The project area was divided into three agro-ecological regions: high, medium and low rainfall. An integrated research site with a multi-disciplinary, multi-institutional

team was established in each zone. A community-based participatory approach was used.

Project outputs targeted different user groups – farm communities, national research and extension agencies, the scientific community, and development agencies. Correspondingly, the outputs covered various aspects: new methods, processes, techniques or pathways; technologies for soil and water management and conservation, improved varieties or parent material, improved production practices, livestock and rangeland development, human resource development, knowledge dissemination methods, and services.

The impacts include:

- Research institutions, NGOs, and farming communities gained experience in multi-institutional collaboration and participatory approaches to R&D.
- The concept of integrated research sites has been established as a tool for community-based R&D, and is being extended to other areas (Balochistan).
- Mechanisms and an enabling environment have been developed for up-scaling technologies validated by the project.
- Water supply and management have improved, soil erosion controlled.
- Crop and livestock productivity have increased substantially, but adoption and impact has not yet been analyzed.
- Micro-enterprises have been initiated for producing urea-molasses feed blocks and quality seed.
- Together, these results have formed the basis of an overall effort to improve livelihoods.



Most of the population in the Barani project area depends on agriculture as the main source of livelihood.

### Analyzing knowledge pathways

The KMD analysis in Pakistan looked at various project components and related outputs.

- *Best bet practices*: integrating research and development at project sites, cost-effective water outlets and control structures, new crop and animal germplasm, use of feed blocks and urea-molasses to supplement feeds of small ruminants.
- *Innovations*: community participation and stakeholder integration process, cost-effective water outlets and erosion structures.
- *TIPO packages*: a wide range of individual TIPOs was developed for improved but sustain-

able management of crops, livestock, range and other natural resources. Some technologies were combined into packages suited to *barani* areas.

- *Dissemination methods*: publications, workshops, conferences, TV and radio, demonstration plots. A large number of documents on planning, design, implementation, monitoring and evaluation of project activities are available at the Agency for Barani Area Development, and at ICARDA and partner institutes. The project also has links to many other R&D projects, facilitating global exchange of information on dryland area development.



Cost-effective, simple water-regulating structures were designed by the project and implemented by farmers, for erosion control and rainwater management.

### International seed trade conference

The WANA region imports seed of various crops worth over \$250 million. But few private seed companies are taking advantage of this huge market potential within the region and beyond. National seed industries focus on domestic markets, with little or no seed trade among countries. Moreover, trade is restricted by both tariff and non-tariff barriers – policy, regulatory, institutional, and technical constraints.

ICARDA worked with the Turkish Seed Industry Association to organize an international seed trade conference in Antalya, Turkey, to stimulate regional contacts and encourage private sector seed trade. Specifically, the conference aimed to:

- Review the potential of seed markets in the CWANA region

- Provide a forum to promote business contacts among seed companies
- Provide opportunities for stimulating regional seed trade
- Share experiences among stakeholders in the seed trade

- Explore opportunities for a regional seed trade association.

The conference attracted more than 225 participants from 45 countries, representing private firms from the CWANA region, private seed and agricultural input suppliers from Africa, Asia, Europe and USA, private seed



CWANA international seed trade conference in progress in Antalya, Turkey.

equipment manufacturers from Asia, Europe and USA; international/regional/national private sector seed trade associations from Asia and Europe; and international/regional development organizations working on seed issues (ISF, ISTA, OECD, UPOV, CIHEAM, ICARDA).

Promoting contacts and seed trade was a key element of the conference. There were 33 exhibitors: public and private seed compa-

nies, input suppliers, and manufacturers of seed equipment and agricultural machinery. A trading floor was set aside for potential customers and suppliers, and did excellent business.

The presentations and panel discussions covered a range of policy, regulatory, institutional and technical issues affecting the seed industry. Several sideline meetings were also held with public seed agencies and private firms. The

most important outcome was an agreement to establish a Regional Seed Association for Central and West Asia, and to hold an international seed trade conference every alternate year. Building on these discussions, ICARDA is now exploring options to devolve some of its seed activities to regional players, for example by transforming the WANA Seed Network into a Regional Seed Association.

## Lessons learned from seed aid interventions in Afghanistan

ICARDA is implementing an IDRC-supported project on "Strengthening seed systems for food security in Afghanistan." The project aims to provide a deeper understanding of how local seed systems in Afghanistan adapt to stress and conflict conditions; and use this understanding to identify how to strengthen seed aid interventions and farmers' crop production systems. Extensive consultations with stakeholders in 2004 and 2005 helped document institutional and social aspects of the informal seed system, issues emerging from the return of displaced populations, and the benefits of emergency seed relief.

The study suggests that almost all branches of the formal seed system are weak – research, variety maintenance, seed multiplication and dissemination, extension services. The informal system has proven resilient to conflicts and drought; but it too has a number of shortcomings: weak local institutions, over-exploitation of the same crop varieties, inadequate introduction of new genetic mate-

rials, and inequity in seed access between relatively well-off and poor farmers, and between men and women. Seed quality is generally sub-optimal because of poor production and processing technologies, and the formal system is unable to provide quality control services for locally produced or imported seeds. In all communities, well-known "nodal" farmers produce and supply seed to other farmers, on credit or for payment in cash or kind. Some farmers

have seed stocks of a large number of varieties (partly because they grow different varieties to spread risk), but lack the skills to produce quality seeds for other farmers.

One project component looked specifically at the problems of women farmers. Widows can inherit land, but it is usually rented out to other males, for cash or sharecropping. In male-headed households, women must work under male supervision, except for small vegetable plots and kitchen gardens. Because of social restrictions on the movement of



An assessment of seed aid interventions in Afghanistan.

women, it is mainly the men who have access to new agricultural technologies including seed and extension services. Clearly, it is important to make more efforts to target women. But opinions are divided as to how best this can be done; for example, whether it is practical to distribute seed directly to women.

Emergency seed interventions in 2002-03 had a generally positive impact. In the majority of communities studied, farmers reported that production had increased by up to 40% as a result of planting improved seed received from aid agencies. Most NGOs also supported these views although they did not carry out systematic impact assessments. The major concern, however, was that not all farmers received seed aid; and those who did, received only small quantities. Development programs feel concerned that these efforts do not encourage self-reliance; farmers have begun to expect continuing (and increasing) free seed distribution; and the program is discouraging private seed enterprises.

The assessment also examined the

role of social networks and institutions. It was found that the village councils (predominantly male) played a key role. The councils maintain community regulations and traditional laws, and resolve conflicts within the community. Correspondingly, they played an important role in enforcement of the "code of conduct", seed aid distribution, and inception of new projects.

Seed relief interventions, being short term, did not enhance social networks between farmers, their organizations, and seed vendors, which in many cases were non-existent. Nor did they strengthen local seed system capacity. In terms of "village politics", many communities who received seed aid stated that the authority and influence of the village council had increased as a result. But overall, the time frame was too short to expect substantive social and institutional changes.

There is still a compelling need to improve food security and livelihoods in Afghanistan. Seed as well as other interventions will be required. There seems to be only

limited justification for continuing large-scale emergency seed relief; it is more important to focus on long-term seed system development.

In view of the weakness of the formal seed system and the importance of the informal system, perhaps the solution is to strengthen local or community-level seed systems. ICARDA and FAO are taking the lead in establishing viable small-scale seed enterprises in some provinces. This emerging private sector will require support and incentives, particularly in areas of acute or chronic seed insecurity.

In the medium term, institutional and capacity building (for both formal and informal systems), implementation of recently enacted seed laws (regulatory reforms), and improving the policy environment will all be necessary. Also necessary will be research on some key areas: land tenure, labor migration, and the dynamics of household decision-making on access and use of resources as well as income generation and spending.

## Village-based seed enterprises in Afghanistan

ICARDA's Seed Unit has established 20 Village-Based Seed Enterprises (VBSEs) in Afghanistan as part of a USAID-funded program known as RAMP (Rebuilding Agricultural Market Program). The aim of the program is to improve farmers' access to quality seed of a wide range of local and improved varieties; and equally important, to ensure that VBSEs are economi-

cally viable. It is expected that at least half the 20 VBSEs will be making profits before the program ends in 2006.

The rationale is that market-oriented VBSEs will accelerate the process of farmer-to-farmer diffusion of improved varieties; improving crop productivity and farm incomes, and also maintaining agrobiodiversity.

Substantial quantities of seed have been produced and sold, to farmers and organizations involved in agricultural reconstruction. Seed production has increased four-fold compared to the 2003/04 cropping season. This year, 17 VBSEs produced 2188 tons of wheat seed, 651 tons of rice seed, 429 tons of mung bean seed, and 887 tons of potato tubers. On average, each VBSE produced over 100 tons of wheat seed - meeting the end-of-project target one year earlier.



Wheat produced by a Village-Based Seed Enterprise group of farmers in Afghanistan.

Profitability figures are equally encouraging, largely because of very high demand for seed. In the 2004/05 cropping season, field-level production costs averaged

\$129 per ton for wheat seed; estimated post-harvest processing and marketing cost was \$45 per ton. VBSE members received prices ranging from \$285 to \$420 per ton,

i.e. profits of \$111 to \$246 per ton. All VBSEs did not benefit equally from high prices; margins depended on negotiation skills, sales timing, volumes, and quality (seed processing, quality certification). The most progressive VBSEs are not only cashing in on the seed market but also diversifying into other crops. One-third of the VBSEs produced onions and tomatoes – 632 and 1438 tons, respectively. About 30% of the tomato harvest was processed to make tomato seed.

The VBSEs achieved record returns this year because of high prices for wheat seed; but not all enterprises have the financial management skills needed to ensure sustainability over time. ICARDA will continue to provide technical support in many areas: quality control, finance and business management, and marketing.