IK Notes

No. 45
June 2002

Using Indigenous Knowledge to Raise Agricultural Productivity

An Example from India

Knowledge is transferred from one generation to the next and from one country to another through trading ties and social interactions between different communities. This has given rise to a number of cross-country exchanges and knowledge sharing activities within Africa and beyond. Farmers and local healers from Mozambique have exchanged knowledge of best practices with similar communities in Uganda. A number of regional projects such as the Lake Victoria Environmental Management Project have brought together neighboring fishing communities from Kenya, Tanzania and Uganda.

These activities reinforce the universality of IK, which is embedded in the traditional practices of communities in different regions. Despite geographical differences, the ways in which communities in India for instance, make effective use of their environmental and social assets, can provide useful lessons for similar communities in Africa.

The Sodic Lands Reclamation Project in India provides a good example of how the integration of traditional knowledge into Bank-supported operations can help transform barren soils into fertile arable land. In the state of Uttar Pradesh (UP) in North India, agricultural yields declined, while the population continued to rise through the 1980s. Inappropriate irrigation practices salinated the soils, while brown plant hoppers destroyed 40–60 percent of paddy and wheat crops. Most of these lands were owned by poor farmers.

To raise agricultural productivity, government extension agencies tried to propagate the use of new farming technologies and systems. However, these practices were not implemented by local farmers, who, in any case, viewed government agents with suspicion. However, due to poor participatory methods, the technology dissemination did not reach the farmers.

In 1993, the UP Government launched a World Bank supported farmer driven Sodic Lands Reclamation

IK Notes reports periodically on Indigenous Knowledge (IK) initiatives in Sub-Saharan Africa and occasionally on such initiatives outside the Region. It is published by the Africa Region's Knowledge and Learning Center as part of an evolving IK partnership between the World Bank, communities, NGOs, development institutions and multilateral organizations. The views expressed in this article are those of the authors and should not be attributed to the World Bank Group or its partners in this initiative. A webpage on IK is available at // www.worldbank.org/afr/ik/default.htm

Project. The goal was to strengthen local institutions, empower the beneficiaries and develop a model for transferring service delivery to communities.

The first challenge was to treat the high build-up of salts in the fields. These soils contain high concentrations of exchangeable sodium in which finer soil particles are dispersed. As a result, water and air cannot penetrate, and highly alkaline conditions are created. Known as sodic soils, they are toxic to plants and adversely affect agriculture, human and plant health.

Application of traditional knowledge

Farmers created local site implementation committees and self-help groups. Applying their own knowledge and experiences, farmers reclaimed over 68,000 hectares belonging to 247,000 families. They spread gypsum, built bunds, leached the soil, started multi-cropping, green manuring and crop rotation, used compost and plowed the land. Maintaining continuous ground cover through intensive cropping protected the soils from a return of surface salts.

From the planning to implementation process, the project managers, NGOs and local farmers worked together to develop endogenous strategies. These were constantly innovated, modified, and adapted to suit local or specific conditions. For instance, certain modern practices such as the use of chemical fertilizers were found to be more harmful than good. In this context, farmers developed indigenous technologies based on traditional knowledge and practices that have proved to be cost-effective and environmentally friendly.

In some cases, farmers drew from farming practices in other states. In Maharashtra, a local farmer had developed a new technique of composting. The Nadep compost relies on a compost structure using bricks instead of a pit and was applied in over 100 villages in the project area.

The higher levels of soil nutrients found in this form of compost reduced the need for fertilizers and pesticides by a quarter, and also reduced the costs of farm inputs. Using less chemical fertilizers improved the quality, taste and weight of food grains. The flavor and color of scented grains like wheat and basmati rice were also enhanced, enabling farmers to increase prices.

Previously, farmers used various pesticides such as Melathian dust. Today, they are applying indigenous forms of pest control practices, such as the sowing of Daincha (green manure crop) in paddy field boundaries. In some villages like Jivelly, Devari and Dhanepur, farmers use neem properties to protect crops from pest attacks.

In 1997, there was a massive attack of brown plant hoppers and over 40 percent of the paddy crop was destroyed throughout Uttar Pradesh. Local farmers knew that kerosene oil keeps away snakes and can even kill some types of snakes. One of the more knowledgeable farmers in the region speculated that if kerosene oil could kill a snake, it could also kill the brown plant hopper.

To test this idea, he sprayed kerosene oil in one square meter of his field, where the attack had occurred. Within a few minutes, all the pests had been destroyed. Based on these results, kerosene was sprayed in the corners of the field and subsequently in nearby fields. Initially, 10 liters of kerosene oil were applied on 0.25 hectares. Over time, the farmer modified this technology, using five liters of kerosene oil, mixed with 25kg of paddy husk to treat 0.25 hectares of reclaimed land.

IK Notes

would be of interest to:

Name _____

Institution _____

Address _____

_____

_____

Letters, comments, and requests for publications should be addressed to:

Editor: IK Notes
Knowledge and Learning Center
Africa Region, World Bank
1818 H Street, N.W., Room J5-055
Washington, D.C. 20433
E-mail: pmohan@worldbank.org

Economic impact

These various practices were tried by 600 farmers in different districts. The result was a substantive reduction in the damage caused by brown plant hoppers from 49 percent down to 2 percent. The success story was soon being replicated, as farmers across the state began to control brown plant hopper attacks with neem extracts, rice husks and green manure. In addition, several other indigenous practices that had been used by generations of farmers were back in vogue. These included traditional animal husbandry practices to treat common diseases such as worms, foot disease and pain common to cows and buffaloes.

Over time, the knowledge and wisdom of local farmers began to bear fruit. Cropping intensity increased from 37 percent to 200 percent. Yields of wheat and rice on reclaimed land were double the projections. After five years, yields and incomes had risen by 60 percent. In some areas, land values have quadrupled after reclamation. Wage rates have doubled as a result of increased economic activity. Women self-help groups are generating incomes by diversifying into poultry farming and horticulture.

There has also been a substantial reduction in seasonal labor migration out of project villages. As one beneficiary in Shobapur village said, "because my *usar* (sodic) fields were barren, I used to go to Bhopal, Bombay and Calcutta looking for work. Now that they have been reclaimed, where is the time?"

Farmers' School in Pratapgarh, Uttar Pradesh

However, the sustainability of any reclamation project depends upon the effective management of these lands. Regular access to information on new agricultural practices and technologies are some of the vital ingredients needed to sustain multi-cropping systems in such areas. Keeping this in mind and the fact that Bank support would not last forever, a group of key resource persons and trained farmers came together to devise innovative new strategies, drawing upon indigenous resources and knowledge about agricultural practices.

This led to the formation of a Farmers Field School in Pratapgarh. These practices were institutionalized and widely disseminated through the school. Initially there were twelve master trainers in the school. Each one had to demonstrate in his own field how certain practices proved to be beneficial, before others began to replicate these practices. Training was conducted in the local dialects such as Avdi.

Topics covered included improved drainage networks, green manuring, composting, use of bio-fertilizers, credit management, self help groups and multi-cropping. Each of these drew on years of indigenous experiences in dealing with challenges such as the brown plant hopper attacks. Once the results showed positive gains, they were disseminated from one village to another through trainers.

The training is mostly hands-on and involves farmer-to-farmer exchanges. For instance, a group of farmers are taken to an area reclaimed earlier to see differences in soil fertility and rates of progress. Farmers from the project area have also been taken on study tours and exchange visits to other parts of the country (Haryana, Andhra Pradesh and Gujarat) to share and learn from the practices of other farmers. Such exchanges have broadened their knowledge base through exposure to different types of traditional knowledge systems. Today, Uttar Pradesh has begun to hand over training and extension services to local farmers' schools, which reach more than 7,200 farmers in 65 villages beyond the project area.

One such village is Dhanepur

In 1996, in the middle of barren lands in Narangpur, that had been reclaimed, a project worker planted a bale tree. The sodic land was ash white and completely deserted. There was no sign of any vegetation.

Slowly, the tree began to blossom and farmers from nearby villages started to cultivate the land. Soon vegetables were being grown. Small settlements began to emerge around the Saroj tree. Today, an entire village has mushroomed in the areas, known as Dhanepur.

The village has a community-owned water pump, sugar cane processor, flour grinder, paddy thresher and animal fodder processor. These are all situated near each other, to be jointly operated by electricity or a diesel engine. The machinery has been adapted to local conditions, using local innovations.

Earlier, farmers could only harvest a single crop from their fields. Today they are planting four crops, using the multi-cropping techniques taught by the school, growing pigeon pee, millets and black gram. These are sown together in the fields which are watered through drip irrigation. The result is four/five times higher yields from the same fields.

Incomes have increased by five times as a result of these higher yields. In the past, farmers managed to save $110 per year. Today their annual savings have risen to $555.

These savings have been carefully invested in housing, electricity and roads to connect the village to other areas and markets. Previously, there were poor linkages and communications.

Higher incomes have dramatically improved the quality of life in the village. Most people were illiterate. Today, there are educational programs for children.

There has been a significant change in local attitudes. Initially, the farmers were divided over the project: One group was ready to cooperate with the implementing agencies and the other comprising of larger farm-holders, opposed the project. However, when these farmers saw the lands of those who actively participated in the project turn green, while theirs remained infertile and ash-colored, they soon came around. Today, they are only too eager to participate in the second phase of the project.

Self-help groups empower women

The training provided to women by the farmers school has had a major impact at the household level, driving forward social and economic changes to improve the welfare of the entire family. Today over 175 women's' self help groups have been formed, such as the Kaveri Mahela Self-Help Group.

Formed in 1995, the Kaveri group initially comprised 15 members. Each member saved 10 cents per month, which then increased from 40 cents to 80 cents over the next six months. Today, each member saves up to $6 per month. The funds are saved in the local bank under a joint fund called the Kaveri Self Help Fund.

Having saved a fair amount, the women started an internal lending scheme within the group. They also took out individual loans worth $100-$200 from the local bank to invest in modern technologies such as a sugar cane processor.

These self help-groups have also become effective agents of social change in the countryside and have addressed several sensitive issues, such as the dowry system. Today, a large number of women in this district can read, write and comprehend complex aspects of their business transactions.

The State Minister for Agriculture visited the school and recommended that such innovative methods of self-help agricultural extension should be replicated through-out the state. The European Union is funding a reclamation project with the same design in three other districts. This will build on the primary lessons learned from the first phase of the project: building on indigenous knowledge increases sustainable agricultural production and provides a model for transferring service delivery to communities.

Community-to-community exchanges could be the conduit for transferring such knowledge across countries and continents. Given that agriculture is the dominating factor in most African economies and in India, the appropriate dissemination and use of indigenous knowledge could prove very fruitful.

This note was written by Siddhartha Prakash, based on a field visit to the farmers' school and project sites in 2001. For further information email: Sprakash@worldbank.org