

# Sharing a Canadian Approach to Addressing Land Degradation in China

Brant Kirychuk

Agriculture and Agri-food Canada-PFRA, Regina  
(Formerly Manager, Sustainable Agriculture Development Project, Beijing, China)

The majority of agricultural land in China is degraded due to a long history of intensive cropping. The implementation of practices to reduce erosion, increase organic matter, and improve the efficiency and productivity of cropping systems are very important to the long term sustainability of agriculture in China. The land degradation is causing many additional issues including: siltation, nutrient and pesticide movement into waterways; dust storms which impact comfort, health, and move pollutants to other areas in China and internationally; reduced output from agricultural land; and increased costs as farmers are putting in high levels of inputs to maintain productivity. A concerted effort to share information on the implementation of practices to reverse this trend is essential. There are successful models for implementing new technologies that have been used in other parts of the world that China could benefit from. The adoption of direct seeding in Canada is an excellent example.

## **The Challenge**

Agriculture in China is very complex, as there is a long history with many cultural influences. There are a number of challenges associated with implementing change on the agricultural landscape.

*Information not getting to farmers:* There is a very large extension system in China at national, provincial, county and even village levels. Estimates suggest that there may be as many as 1 million government employees whom at least a portion of their role is to conduct agriculture extension. That said the extension system, other than a few exceptions in some counties, is non-functional. The largest challenge is there are approximately 700 million rural residents, with a proportion living in remote areas. Further the local extension stations that would deal directly with farmers are woefully under-funded, with no money to conduct extension activities, and in many instances staff not even receiving a full salary. It is common that extension agents do not received any training in adult education or extension methodology. Further there is a distinct distrust of the extension system by farmers. Part of this may be driven by the fact that often these extension stations sell farm inputs, or provide services for fee, such as livestock inoculation, to provide some income. This would be an apparent conflict of interest.

*Variable landscapes and climate:* China is a very large country with a diversity of agriculture systems, climates, and geology. Climate varies from high moisture, tropical, three crop agriculture, to arid steppe short season agriculture. All variation of lands are cultivated in China, from flat open plains and plateaus, to significant slopes, including those that are terraced to make them farmable and allow containment of moisture. The agriculture systems for the most part are labor intensive, with a large amount of tillage.

In some cropping/livestock areas there are challenges with maintaining organic matter and soil cover as the aftermath is used for livestock feed. In moist areas dominated by cropping the opposite often happens with excess aftermath, and burning of residue being common place.

*Small individual farm and field size:* Farms and individual fields are extremely small in size. It is quite common for farms to be fractions of a hectare. Thus the resources available for modernizing agriculture or using advanced direct seeding and harvesting equipment are limited, except where farmers work as a group. Further, equipment sized for these small plots is limited, and lack of roads to many small plots makes equipment access to the fields an issue. The availability of farm labor has been quite variable. For the last decade or more there has been a migration off the farm to work at factories in urban areas. This resulted in less labor available on the farm and women playing a larger role in agriculture. The migration to urban areas resulted in some informal amalgamation of land as neighbors made rental, or land usage agreements, and ended up with larger tracts of land. This trend resulted in increased interest in and use of mechanization, as well as the development of farm associations for equipment sharing and purchase of inputs. At the extreme there was some land that was abandoned and not cropped due to a lack of labor in the area. More recently, with the down turn in manufacturing in China many people are returning to the farms, thus there is more labor available, and likely adjustments to farming approach and land use.

*Level of education in rural communities:* The level of education in rural areas is lower than urban areas with many of those on the farm having only completed some level of middle school. This makes the development of training programs and publications a challenge, so that they are of value to a wide audience with varying education and cultural backgrounds.

### **The Direction in China**

There is political support at the highest levels to both increase rural incomes and improve the health of the environment and sustainability of agriculture. In the Party General Secretary Hu Jintao's address to the China Peoples Congress in October 2007 there were 4 separate references related to improving the agriculture environment and function of agriculture extension to the benefit of farmers. In 2008 there was further emphasis on disparity of wealth between urban and rural areas with the aim of significantly increasing rural wealth.

The policy emphasis has resulted in increased funding flowing into agricultural programming. There are a number of programs which aim to support development of sustainable agriculture systems. The one most relevant to conservation agriculture is funding to set up demonstration areas for direct seeding and conservation agriculture systems. The purpose of the demonstration sites are to allow local farmers to see and experience the new technology, as well as use them for training purposes.

Research on conservation agriculture equipment and systems is quite wide spread. There is very good institutional knowledge and understanding of conservation agriculture.

While there is a significant amount of research being conducted, the variety of landscapes and crops has created challenges in developing systems applicable to all the various situations. There is a formal equipment testing and certification system that all equipment has to go through to be proven out as well. While there is good knowledge at the universities and various government research institutions there is a serious gap in getting this information to farmers. This is a key priority to be addressed in a revamped extension system.

There is a real demand for any relevant training event, field day or publication. The experience from the China-Canada Sustainable Agriculture Development Project (SADP) was that if good quality, unbiased training or publications were available, there was an overwhelming demand for these products. There is a thirst for good quality information in the farming community, thus a willing audience.

### **Sharing Canada's Experience**

A two phase bilateral project was first established in China in 2000 with funding from the Canadian International Development Agency and counterpart funding from the Chinese government, called the China-Canada Sustainable Agriculture Development Project. This is a project aiming to provide the technical and extension basis to address the severe degradation of China's rangeland and cultivated lands. The project focused on developing capacity in the rural western regions of China with the objectives of: 1) adaptation of land resource management systems for sustainable agriculture; 2) enhanced Sustainable Agriculture Extension Systems, and; 3) improved enabling environment for sustainable land resource management. The project was conducted in the provinces of Inner Mongolia, Sichuan, Xinjiang, Gansu, Hubei and Hunan in north-west China.

The project approach was based on successful models used in Canada in regards to adoption of new agricultural practices and technology. An example often referred to in training programs, and also the model which some of the project design was based on was the spread of direct seeding technology across Canada. The use of multiple approaches, by various sectors, focussed on the farmer, towards a mutual goal of developing and implementing the new technology and improved knowledge. The most important message shared regarding the successful uptake of direct seeding is the dual benefit of environmental health and producer bottom line. The project emphasized developing or sharing these "win-win" practices.

### **The Approach**

SADP used a needs based, client focussed extension approach. The project developed programs to improve extension skills among specialists, adapted and demonstrated technologies new to north-west China, and implemented model extension programs. The project took a "full farm approach" in most programming. In regards to conservation agriculture that meant developing a program that integrated equipment, crop rotations, soil conservation, nutrient management, pest control, and economics. The project felt this was critical in China, as quite often each issue was treated separately and integrated systems were not developed or promoted.

*Farmer Focussed, Needs Based Extension:* A combination of formal needs assessment, partner knowledge of the area, and working directly with clients, was used to develop a program that was focussed on the local needs of farmers. The most successful activities implemented, directly met the needs of the farm clients being targeted and were often more popular than what project resources could accommodate. This was an approach that was quite new to extension personnel who worked in a system, where they implemented programs as they were told by their superiors, with little regard for the situation in the field.

*Training of trainers:* A primary focus of the project was developing extension skills and improving knowledge in the most recent developments in conservation agriculture technology of key partners, predominantly those that are in organizations which have the mandate to work directly with farmers. SADP conducted training both in-Canada and at national and provincial levels in China to develop a cadre of trainers who could deliver this knowledge to their staff and colleagues. Local level training was then carried out in collaboration with project specialists and as skills developed, extension events were then put on by these trained individuals on their own.

*Local extension models:* In each project province there were 1-3 counties where needs based, farmer focussed extension models were established. Each province had a Canadian Long Term Technical Advisor, who developed these programs in collaboration with local counterparts, based on the priority needs of the local farmers. This allowed local extension personnel to gain experience in delivering an extension program, and also develop a model on the ground that others could theoretically copy.

*Technology adaptation demonstrations:* Agriculture practices related to conservation agriculture are quite well developed in North America, Australia and Europe, and even at the institutional level in China. There was an opportunity to take some of these key proven techniques and adapt them to a local region through a trial and demonstration program. Some practices that were adapted included seeding equipment, manual seeding techniques, crop rotations and balanced nutrient management, and alternative pest control. Demonstrations were widely used as tools to show technologies not common to an area. This allowed farmers to gain experience with a practice they were not familiar with, by seeing it in the field, getting first hand knowledge on how it was implemented, thus seeing its applicability to the region. These demonstrations were also used as part of the local training and extension program.

*Farmer Field Schools:* Farmer Field Schools (FFS) have been very successful outputs of the project. These were generally half or one day events put on right at the village level on a very specific topic relevant to that community. These FFS were commonly delivered by people that came out of the projects "Training of Trainers" program, and would commonly deliver a series of FFS in their local community. Many FFS are now operating independently after initial training and mentoring from the project. Several sessions have been held by these experienced FFS delivery agents to train even more people to run FFS. These are a real success story as the FFS model now has a life of its own. Tens of thousands of farmers have been trained throughout China using the FFS model. Many organizations are implementing their own programs to

provide training and support for FFS and are being delivered both by local technicians and farmers who are comfortable training and are leaders in their area. The popularity and success of these initiatives were because they: were low cost to implement; met the local community's needs; were unbiased and relevant; and fit into the schedule of the farming community.

*Farmer Associations:* SADP conducted training on roles of farmer associations as tools for farmers both in collaborative business arrangements, and also as formal mediums for farmers to work with farmers. The project also collaborated on the set up of new farmer associations that would play a role in a community working together to improve both their agricultural environment and livelihood.

## **Conclusion**

China has some major challenges facing it to reduce the agricultural footprint on the landscape and make it more sustainable in the long term. There are proven agricultural techniques used in other parts of the world that have successfully improved the health of agricultural lands, and the profitability of farms. The expansion and uptake of direct seeding in Canada is an excellent, model that could be applied to China. On a small scale, SADP has demonstrated the applicability of this approach. The Chinese government has made improving the environment and rural livelihoods a priority, and they have allocated resources to these areas. Thus the technology, methods, and motivation are in place, and how well these are implemented and accepted will be the key to success.

## **References**

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