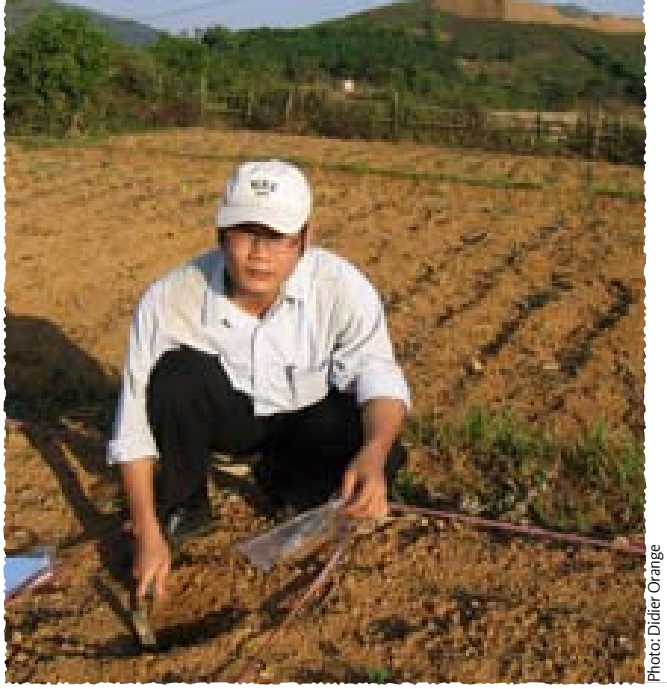
Getting farmers to adopt new technologies to address soil erosion and fertility problems is not easy. In Vietnam, a multidisciplinary research project to improve soil management in traditional mountainous agricultural farming systems managed to attract farmers' interest and stop soil erosion. This success stems from encouraging farmers, extensionists and researchers to jointly define and implement the project. Their different aims could be followed simultaneously: scientific results for researchers, better agricultural practice for extension workers, and economic success and free choice for farmers.



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Different interests, common concerns and shared benefits

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Soil erosion comes about because of both human activity, such as erosive farming practices, and biophysical factors, including intense rainfalls and sloping land. In Vietnam, the rising population level has encouraged agricultural production to shift from the rich-soil lowlands to the degradation-prone marginal uplands. In this context of severe agricultural intensification, soil erosion has become a major economic and environmental problem. It has affected the livelihoods of smallholders and has hindered the long-term development of these areas.

Many different organisations have responded to this problem by working on the development and promotion of better soil management practices, aiming at higher yields and reduction of rural poverty. Studies show that the promotion of a new practice as a major factor towards change, needs to be complemented by other factors, such as access to external markets and achieving higher incomes. In addition, policies and regulations have proved to have a further positive impact on the adoption of a given technique. This article examines a multidisciplinary research project on adoption of soil management techniques in three villages in Hoa Binh province, northern Vietnam.

Multi-institutional context

This work was part of an international research programme called MSEC (Management of Soil Erosion Consortium). Its objectives are to promote sustainable land management systems, evaluate the biophysical, environmental and socio-economic effects of soil erosion, and to generate reliable information for the improvement of local policies and regulations, in the uplands of Southeast Asia. After a four year assessment, working with around 50 small scale farmers in the commune of Tien Xuan (approximately 50 km west of the capital Hanoi), this programme found that local factors can be far more important than national policies in determining change. These results provided the basis for an integrated crop-livestock project carried out by the Vietnamese Soils and Fertilizers Research Institute (SFRI) in Vietnam and Laos, in collaboration with the National Institute of Animal Husbandry (NIAH) in Vietnam and the National Agriculture and Forestry Research Institute (NAFRI) in Laos. In addition, two international research centres were involved, IRD (French Institute of Research for Development) and CIRAD (French Agricultural Research Centre for International Development). The crop-livestock project's aim was to support farmers in their efforts to reduce poverty and enhance environmental sustainability in mountainous areas. This was to be achieved by promoting new technologies that build on existing knowledge and farming practices.

Finding the right mix of activities

The research focused on the integration of animal husbandry into the traditional agricultural farming systems in the region, which are based on cassava production and forestry in the uplands, and rice cultivation in the lowlands. A discussion process between farmers, local decision-makers and scientists helped define the activities, to ensure all their goals would be met. In Vietnam, improved management of soil fertility in rice- and cassava-based systems, and simultaneously cultivating fodder grass on steep slopes matched both the farmers' and scientists' interests. The plan was to produce sufficient animal feed during the cold winter season and the warm rainy season, while at the same time decreasing soil erosion. The project's activities, which began in 2005, included:

- testing fodder species for sloping lands on experimental plots and demonstration sites, considering temperate grasses and legumes (such as *Avena strigosa* or *Medicago sativa*) and also tropical species (*Panicum maximum*, *Brachiaria* sp., *Paspalum atratum* or *Stylosanthes* sp.). The main purpose was to secure the production of cattle feed, (especially in winter), and also to select the best species for soil conservation during the rainy season;
- setting up demonstration sites, focused on soil and nutrient management when growing cassava (on upland plots) and paddy rice (in the lowland areas). The aim was to show how well balanced fertility management can improve crop yields without increasing the use of external inputs.

Joint decision-making

The activities in each village and the process used for each trial and demonstration site were jointly defined by farmers, extension workers and researchers. Their involvement in the planning phase helped farmers and extensionists to clearly understand the project's framework and their responsibilities in the implementation of trials and demonstration sites. All activities were meant to promote new technologies offsetting erosion, and at the same time build local capacities. The two-

Soil sampling on a fodder field in the Que Vay village. Mr. Thiet, an agronomist working for SFRI, had the help of many interested farmers.

pronged strategy that emerged included field visits to take measurements on erosion and soil fertility, complemented by more than 20 Farmer Field School sessions, and regular meetings between extension workers and researchers.

One main interest was to consider local initiatives. As scientists, we found it necessary to complete our knowledge and understanding of the farmers' decision-making processes, as a first step to ensure their involvement. It was thus interesting to see how their participation resulted in new activities coming up. For example, the fodder crops were initially proposed to be cultivated on sloping land, resulting in animal feed in the winter (the farmers' main concern) and also in an efficient way of protecting the soil (the researchers' interest). However, as the lowlands are often left fallow during the winter, some farmers started testing temperate fodder crops like *Avena* on their paddy fields. All of them had very positive results in terms of crop yields, and it was relatively easy to feed their animals. After one year, around 80 percent of all lowland farmers were growing *Avena* and other temperate fodder crops through the winter.

When the project was initiated in 2004, the MSEC team worked on planting fodder on sloping land with only five smallholders in one village (Dong Cao). Within three months, these farmers bought cows using their own resources. The next year, the People's Committee of Tien Xuan Commune became officially involved. Most smallholders in the area also became very interested in integrating animal husbandry and reforestation activities into their farming systems. In 2006 and 2007, the production of fodder crops in this area was rapidly adopted by more than 300 farmers, from seven different villages and three communes. The impact in terms of erosion was immediate: all measurements showed that the trees and the fodder crops stopped soil losses.

Factors behind successful farmer involvement

Looking back at the project, we can see why farmers became actively involved and worked together with other stakeholders. Two major factors stand out: first, that farmer leaders (such as the People's Committee) were involved in the project from the beginning; and second, that scientists were forced to adapt their experiments to the farmers' demands. Another important aspect is the participatory approach that was followed, in which farmers, local extension workers and researchers worked together in the diagnosis of the problems, in setting up the pilot demonstration sites, and in disseminating and scaling up results. This also proved to give a valuable opportunity to scientists to conduct on-farm experiments on scientific processes such as surface runoff and the soil organic carbon cycle, leading to new insights that helped their dialogue with farmers. Evidently, a participatory approach also meant following different aims or interests simultaneously: scientific results for researchers, the appropriation of better agricultural practice for extension officers, and economic success and free choice for farmers.

Among the factors for success in this case, we can identify the following:

- facilitating local participation in the research and extension processes aimed at improving the economic efficiency of the area's farming systems;
- consulting and informing local stakeholders (farmers and village representatives) on all key steps of the experiment;
- making it possible for farmers to assess the productivity and the nutritional value of different fodder species, as well as their seed production capacity; and
- developing training workshops for the dissemination of new technologies (fodder production, husbandry integration, fertilizer management) at farm level, especially when conducted by local extension workers.

It must further be noted that a desire to reduce soil erosion was not the driving force that led to the adoption of these techniques. According to the farmers involved, what motivated them most was that their incomes were improved when adopting new forestry and fodder production practices.

Learning from this new collaborative approach

The crop-livestock project demonstrated that sustainable agricultural practices require a judicious combination of incentives and the promotion of technologies that have a significant impact on smallholder incomes and on environmental sustainability. It has also demonstrated that although farmers are concerned about the environment and resource management, this in itself may not motivate them enough to adopt sustainable land and water management practices. By increasing farmers' incomes through intensive livestock production, this project has shown that indirect methods can help control erosion.

In addition, the project effectively contributed to improving local extension approaches, as well as creating better links between researchers, extensionists and farmers. The participation of the local population ensured that local interests and local knowledge in the development of new farming techniques were met. The collaborative approach between researchers and farmers has supported spontaneous innovations within the local farming systems, resulting in a better integration of their different components.

The project's greatest limitation has been its short duration (two years). Nevertheless, it was enough time to build farmers' capacities in integrated natural resource management. This was also possible due to the co-operation of all stakeholders (including policy makers) throughout, in spite of their having different immediate interests.

This process should continue to be developed. For example, different "payment for environmental services" schemes could be considered, whereby downstream farmers agree to support upland farmers through mutual arrangements, all of them framed within an economic contract.

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