Local knowledge and husbandry *integration for uplands reclamation* in Vietnam and Laos

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Population pressure coupled with economic development leads to overuse and loss of fertility of upland slopes in Asia. This deterioration is exacerbated by the increase in cattle (Vietnam) and goat (Laos) husbandry. The collaborative approach to fostering crop-livestock integration through the development of innovative agricultural alternatives based on local farmers' knowledge and better fertilizer management has resulted in widespread adoption of technologies, significant increases in income, and rapid local dissemination of information.

The uplands of Southeast Asia are under great environmental pressure caused by converging natural and socioeconomic factors: population has grown rapidly since the 1960s; upland areas are encroached upon and cultivated; fallow times are decreasing; soil erosion is accelerating; soil fertility is declining due to agricultural practices unsuited to steep slopes. In this difficult ecological context, farmers have responded by spontaneously developing livestock smallholdings (cattle and pigs in Vietnam, goats in Laos) in response to the changing economic market.

Farmers' innovations, *local knowledge and the* spread of a sustainable agro-pastoral system

The DURAS project **"Local knowledge and technical innovation for income improvement and soil fertility management by husbandry integration in upland farming systems in Vietnam and Laos"** sought to:

- identify spontaneous innovative practices in use in local communities that are useful in the management of uplands natural resources;
- define locally appropriate production systems that can provide a livelihood, have a positive environmental impact and are both socially acceptable and environmentally sustainable;
- promote the adoption of these new agricultural practices by creating a viable relationship between producers, local policymakers, extension workers and researchers.

The project was able to identify farmers' innovations and has complemented farming knowledge with field trials as well as scientific and technical training. It fostered the establishment of a profitable agro-pastoral system based on optimized fallowing, multi-year fodder production, including the rotation and association of food crops. This is expected to benefit all uplands inhabitants, especially the most disadvantaged.

Farmers, extension agents *and researchers working* together

Two municipalities served as pilot sites: Tien Xuan in Vietnam and Ban Lak Sip in Laos. Inside and outside these communities, there was active cooperation by farmers and their families, farm advisors and scientists during the project's diagnosis and implementation phases (experimental plots, demonstration sites, workshops…).

The project favoured a participatory approach throughout the process where every decision made was made in close consultation with all stakeholders. The cooperation by all three groups of development actors was the main key to the project's success.

This is important to highlight since the pilot villages were designated project participants. Local people's level of involvement was also a strong indicator of popular interest: 100% of the farmers from the pilot villages attended the meetings and training offered. Not only were the courses

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▲ *Soil sampling for chemical analysis and soil fertility diagnostic in Northern Vietnam .*

organized and scheduled at their request, the subjects taught were chosen by themselves.

In addition, there were communal fields where producers could carry out their field experiments with the advice of extension officers and researchers; any proposal was accepted. Such was the genesis of the solution of growing oats in the lowland paddy fields—a good idea that was quickly adopted by everyone.

The exchange of local and scientific knowledge helped to develop a personalized diagnosis and a schedule for each site. Farmers' involvement at this stage of the project helped them clearly understand the framework of their cooperation and their responsibilities in the implementation of *in-situ* tests and demonstrations. The positive results of these tests significantly advanced local buy-in to the project and helped promote it outside the town and district.

Active collaboration, local *training and dissemination* of practical information

Numerous field visits, plus around 20 workshops and farmer field schools, enabled new technologies to be adapted to farmers' demands and expectations and rounded out the researchers' scientific knowledge. In addition to increasing farmers' incomes, this cooperation, based on mutual exchange, strengthened their capacity for land management, integrated livestock management and pest control. In Vietnam, in addition to instruction on growing temperate forage crops in the plains during winter and tropical forage crops on slopes to rehabilitate and protect the soil, training was also given, at farmers' request, on fertilization techniques and protection of rice crops (in the plains) and cassava (on the slopes). In all, 350 people in the pilot sites were trained, while another three communes later spontaneously joined the project.

In addition, technical advice was given in a widely distributed plain-language report. A first "technology package" on soil conservation, forage crops and nutrient management in food crops was distributed.

In the second year of the project, some 1,500 booklets on soil erosion monitoring, forage crops and nutrient management were distributed. In the final stage of the project, a brochure and a video showing its practical achievements were published, together with other projects in Vietnam and scientific knowledge gained from outside institutions.

All of this information was widely shared with local communities, district and provincial extension agencies, and NGOs. Farmers had access to a solid selection of interdisciplinary techniques, beyond the pilot sites and the experiments that were conducted. •••

Year-round forage crops *for cattle in Vietnam*

To ensure a continuous supply of cattle feed, the cultivation of various forage species, both temperate (e.g. A*vena strigosa, Medicago sativa, Avex…*) and tropical (e.g. *Bracharia, Paspalum atratum, Panicum maximum, Stylosanthes guianensis…*) were tested on slopes and bottomlands. The forage species selected *(A. strigosa, P. atratum, P. maximum)* proved well adapted to local agro-climatic conditions (protection against soil erosion, high drought resistance and tolerance of nutrient-poor soil). Cattle feed and soil fertility have improved significantly since they were planted; slope erosion, moreover, has been stopped. In Tien Xuan, the cattle herd increased over two years from 1,572 to 1,768 head, while at the same time, average erosion fell from 10-20 t/ha/yr to less than 1 t/ha/yr.

Many different products *and increased yields in Laos*

In Laos, activities focused on improving the uplands fallow cycle and on a small goat farm. The paper mulberry *(Broussonetia papyrifera)*, a versatile tree that occurs naturally in fallow fields, showed it could restore soil and combat erosion.

Activities focusing on crop rotation and intercropping in the plains, to increase yields and economic gains, showed the value of the pigeon pea *(Cajanus cajan)*. When intercropped with annual crops, it improves soil fertility.

System profitability as a *guarantee of sustainability*

Much more than the ecological dimension, there are two prerequisites for farmers to adopt new technologies: they must first meet their expectations, then have positive economic effects.

On the pilot Vietnam site, the average rice harvest increased by 10% and farm income by VND (Vietnamese dong) 2,800,000/ha per crop—a very significant increase for this poor region (average annual income in 2006 VND 15,000,000/yr, or about US$1,000). Hybrid rice varieties have a 21% higher rate of return and relative incomes rose by VND 4,800,000/ha per crop (or US$480). As a direct result, 40 households signed up to buy hybrid rice varieties.

For cassava, the techniques being tested yielded returns 28% higher than for traditional yields, increasing revenues by VND 6,400,000/ha/yr (US$590).

Dissemination and *adoption of results for* sustainable upland *agriculture*

Farmers' perceptions, as surveyed after the training, indicated that the majority favoured adoption of the proposed techniques. Post-project interviews showed that the information had been spontaneously passed on even outside the pilot sites, as farmers told others that the techniques recommended were appropriate and easy to implement.

The project demonstrated, by example, that erosion could be stopped and soil restored on slopes by means of appropriate agricultural technology that is promoted by the farming community. It is clear, however, that the economic dimension was farmers' key motivation, and the exclusive focus of the dialogue between farmers and researchers.

Though environmental protection, soil restoration and erosion control were mentioned, they were never the crux of the arguments used to persuade farmers to adopt a given technology.

The sustainability of the actions taken is difficult to assess at this point, two years into the project cycle. But there is hope, given farmers' enthusiastic participation and the immediate improvement in their living conditions. If further progress is to be made, the project will have to be carried forward through an investment in technical services by agriculture departments.

Finally, it is clear that the project's profitability is likely to spur the adoption of sustainable agriculture in the poor mountainous regions of Southeast Asia. The integration of livestock smallholdings appears to be a viable alternative in the fight against poverty, while it will also help restore soil fertility and promote local people's access to economic markets. ■

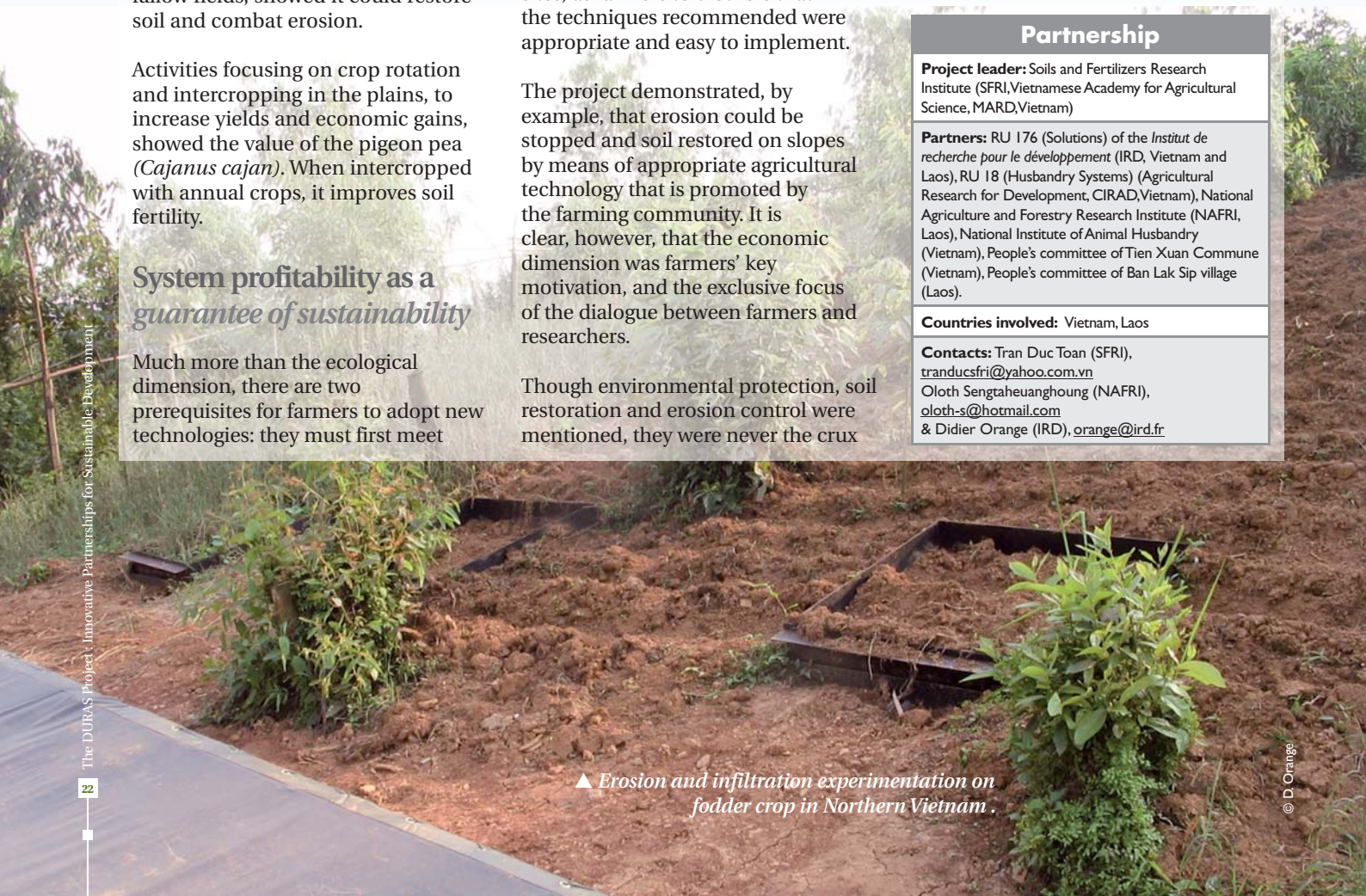
Partnership

Project leader: Soils and Fertilizers Research Institute (SFRI, Vietnamese Academy for Agricultural Science, MARD, Vietnam)

Partners: RU 176 (Solutions) of the *Institut de recherche pour le développement* (IRD, Vietnam and Laos), RU 18 (Husbandry Systems) (Agricultural Research for Development, CIRAD, Vietnam), National Agriculture and Forestry Research Institute (NAFRI, Laos), National Institute of Animal Husbandry (Vietnam), People's committee of Tien Xuan Commune (Vietnam), People's committee of Ban Lak Sip village (Laos).

Countries involved: Vietnam, Laos

Contacts: Tran Duc Toan (SFRI), tranducsfri@yahoo.com.vn
Oloth Sengtaheuanghoung (NAFRI), oloth-s@hotmail.com
& Didier Orange (IRD), orange@ird.fr



▲ *Erosion and infiltration experimentation on fodder crop in Northern Vietnam .*

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