

RURBIFARM - Sustainable farming at the rural-urban interface
An integrated knowledge-based approach for nutrient and water recycling in small-scale farming systems in peri-urban areas of China and Vietnam

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<http://www.mv.slu.se/Vv/rurbifarm/Rurbifarmmain.html>

Communication

The main focus has been on small-scale vegetable production systems, and includes studies and modelling of biophysical flows as well as farmers and consumers' knowledge and perceptions of vegetable quality related to health issues, irrigation water quality, use of different types and rates of fertilisers (including chemical fertilisers and biosolids) and pesticides. The research started with a stakeholder analysis followed by documenting local knowledge of principal stakeholder groups using knowledge based systems methods. Depending on research site, the main issue is either the impact of environmental pollution on the sustainability of the agricultural production (including product quality) or the potential impact of the sometimes very intensive cropping systems, with heavy use of fertilisers and pesticides, on the external environment, mainly surface waters and groundwater, as well as on crop quality. At this stage of the project, diverse stakeholder interactions have been initiated at several of our study sites and decision support tools are being developed.

The Vietnam Environment and Sustainable Development Institute (VESDI) have been arranging local stakeholder meetings at village level involving farmers and local authorities and collaboration with the National Institute for Soils and Fertilizer (NISF) in Vietnam and the Swedish University of Agricultural Sciences (SLU). The village is located down-stream of Hanoi City and untreated wastewater is used as the only source of irrigation water being an important nutrient source but with potential hazards. The main purpose so far has been to give feed-back to the local people on a questionnaire survey, related to characterisation of farming systems and the importance of vegetable production for local livelihoods, and to present the results from studies of biophysical flows of nutrients and heavy metals in the water vegetable farming systems, including pathways and characteristics of urban wastewater. During this year stakeholder workshops are planned with different actors who are responsible for, or impacted by, wastewater management, first at different decision levels such as village, district and city and after that round table discussions will be facilitated between stakeholders at different levels. Bayesian models of farmer decision making about a) the use of contaminated irrigation water for water vegetables at a site downstream of Hanoi and b) on use of urea as a fertiliser for mustard at a site upstream of Hanoi have been constructed by NISF in collaboration with the University of Wales, Bangor (UWB) based upon interviews with farmers. These models provide new insight into the problems of water management at contrasting sites and help to identify where effective interventions can be made.

In Thailand, Chiang Mai University (Multiple Cropping Centre), have put the main emphasis on the pesticide issue, and the development of pesticide free management practices including more diversified cropping systems and strong interactions with the local markets. They have been facilitating the interactive learning process at two levels including production as well as market arrangements ('learning by doing' and 'earning while learning'); (1) at farm/village level where the farmer field school concept (FFS) has been used, and (2) consumer-producer interactions where market strategies and meeting points (such as regular markets) have become eye-openers for both consumers and farmers/producers. In Vietnam (Hanoi), NISF are planning to use a similar concept with farmer field schools and market arrangements for 'safe vegetables' including good agricultural practices related to use of fertilisers (including solid wastes and wastewater) and pesticides.

In China, analysis of communication pathways revealed restricted flow of extension information about irrigation water management to migrant vegetable farmers in Wuxi, who are not fully recognised in the peri-urban locations where they farm. Several key problems associated with water were revealed in Nanjing and Wuxi through stakeholder analysis and survey of practice and pollutant levels in water, soil and vegetables. These included high levels of N and P in surface water and higher than recommended levels of Cd and Pb in vegetables. Specifications for three decision support tools have been drawn up to facilitate dialogue amongst stakeholders. These are as follows.

Connections between traditionally and culturally embedded knowledge and technological research findings

The underlying idea behind the entire project was to start from an analysis of knowledge held by different stakeholder groups. This has been done and revealed both sophistication within the local knowledge system that is important for scientists to appreciate and gaps in local knowledge that can be addressed by research and extension. In terms of sophistication, farmers in China evaluate organic manures as much on the basis of animal

diets as the type of livestock from which they are produced, and farmers in Vietnam evaluate waste water quality using combinations of the colour and smell of water and foam that forms on it that drive irrigation decisions. Consumers in Thailand, China and Vietnam share complex schemes for judging vegetable quality based upon appearance with distrust of plants that appear too pristine. Conversely, comparative analysis of knowledge in China revealed lack of appreciation amongst farmers of differences in the mode of action of different pesticides and overapplication of Urea in response to K deficiency in plants leading to excess N contamination of surface water. Farmers, consumers and traders in all three countries were unaware of heavy metal contamination.

Decision support tools are now being developed within the RURBIFARM project, that combine local and scientific knowledge. For example, farmers evaluation of the previous crop, soil type and growth of the present crop are used together with information about soil amendments to estimate nutrient status and then suggest appropriate fertilisation strategies and predict resulting yields and nutrient losses to surface water courses. These tools have been developed with local people in terms that they understand.

Comparative analysis of knowledge of different stakeholder groups (e.g. farmers, consumers and traders) has identified important disjunctions in knowledge along water and food chains and highlighted the importance of social capital, particularly relationships of trust across these groups, for promoting more sustainable and safer farming practices and ensuring that value accrues where farmers manage their systems to produce safer vegetables with less environmental contamination.

Take up by managers, policy makers, educators

The first step has been to make the collaborators within the project familiar with the IWRM and other concepts in theory and practice, and now after three years we have reached a stage where we can start to implement these ideas in decision support tools, stakeholder workshops etc. It is too early to say if the ideas will be taken up by managers, policy makers, educators etc, but potential is evident. There will be variation between countries. It is likely to be more easily adopted in Thailand and Vietnam than in China due to differences in decision structure and in the way, and to what extent, scientists and local people interact. It is anticipated that formal decision support tools may play a particularly significant role in facilitating communication amongst stakeholder groups in China because they provide a structured basis for communication.

Contribution to capacity building legacy

Capacity building is a very important part of the project in order to introduce and tune the methodologies being used within the different work-packages. There are five study sites spread across three countries. It is a component of the project that all partners are very motivated and thus willing to allocate human and financial resources far beyond the original plans. We have been organising several training workshops; during the first year (2002-2003) in China and Vietnam, respectively, with participation from three or more partners at every session, and later on twice at Chiang Mai University in Thailand (2003, 2005) with participation from all partners. Senior scientists, younger research staff and students have participated in training workshops.

Asian and European MSc students have been linked to the project and they have produced theses within the RURBIFARM framework. Two PhD students in China have produced theses within the project - graduated at ISSAS, Nanjing, and one Vietnamese PhD student has worked on a thesis - enrolled at SLU.

Longer-term institutional cooperation

The collaboration has proven very fruitful with synergy within the research teams across the Asian and the European partners. RURBIFARM in late 2005 was in the last year of the 4-year project period. Prospects for longer-term institutional cooperation are favourable. Further funding is being sought. Many other research studies have been initiated as a result of this EU-INCO project.

Linkages amongst European partners have also been strengthened. Staff from UWB have lectured on both undergraduate and postgraduate courses within SLU and staff from SLU have visited UWB and given research seminars. Opportunities for further collaboration are in train.

Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)

It is too early to say, but the project has already led to important insights about local knowledge and highlighted important environmental issues related to the use of river water in peri-urban agriculture in some of the fastest growing urban fringes in Southeast Asia.

Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions?

We have detailed documentation of the local knowledge of a range of stakeholders and have been analysing the information comparatively.

Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)

The development of the approaches developed in this study must be backed up with accessible documentation systems. This information infrastructure would facilitate the integration of local knowledge with science. These databases are vital for effective communication about water resources and their management, for negotiating rational use of water resources and evidence based policy. [Comment by the panel: this recommendation reflects a limited understanding of the importance of understanding political contexts with respect to the feasibility of communicating and having impact.]