

GIS for Participatory Land Use Planning in the Mekong Delta, Vietnam

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Abstract

A participatory land use planning approach (PLUP) was carried out in two villages of the Mekong Delta coastal area. The PLUP was done twice (2002 and 2003). A geographic information system (GIS) was used for analyzing the land use change, the realization of the farmers' preference, the preference change and the preference conflicts between groups of aquaculture and agriculture farmers. Results show that land use in the study area is very dynamic, farmers are flexible and there are difference in preference of the agriculture farmers and the aquaculture farmers due to differences in biophysical and economic considerations. The study results not only valuable information about farmers' perspective on land use to researchers and local planners, but also experience in applying PLUP in the Mekong Delta.

Keywords: participation, land use planning, GIS

Introduction

The land use of the coastal region in the Mekong Delta is diverse, quickly shifting and strongly contrasting (van Mensvoort and Tri, 2002). The contrast is not only in terms of resources use, e.g. shrimp, mangrove forest or salt which demand brackish water as against rice or vegetable which require fresh water, but also in term of social economic sustainability and profitability. Shrimp cultivation, for instance, brings a very high income compared to rice but it is not a very stable production system because of risks such as shrimp diseases, water pollution, seed quality, weather.

Land use planning aims to encourage and assist land users in selecting options that increase their productivity, are sustainable and meet the needs of society (FAO, 1993). However, the two most crucial constraints to effective land use planning are conflicts on land use objectives between different stakeholders/interest groups (de Haan and van Ittersum, 1999; Hoanh and Roetter, 1998) and uncertainty about future land use objectives, land resources and exploitation technologies (Hoanh and Roetter, 1998).

Participatory land use planning (PLUP) has gained increasing recognition as an important tool for reaching sustainable resource management by local communities. Several organizations have been involved in defining the methodological framework for PLUP (Amler et al., 1999; Fagerstrom et al., 2003; Oltheten, 1999; Sawathvong,

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2003). FAO (1991) experience has shown that through participatory programs and activities it is possible to mobilize local knowledge and resources for self-reliant development and, in the process, reduce the cost to governments of providing development assistance. People's participation is also recognized as an essential element in strategies for sustainable agriculture, since the rural environment can only be protected with the active collaboration of the local population.

The goal of this study is to apply and evaluate a PLUP approach in the Mekong Delta in a systematic way.

The study was carried out in 20 hamlets belonging to two villages south of National Road 1A: Vinh My A and Vinh Thinh. They encompass an area of approximately 9,800 ha. The main soil related problems encountered are acidity and salinity. The main water related problems to agriculture are salinity, poor drainage and lack of fresh water. The fresh water supply of the study area completely depends on rainwater and deep groundwater. The other main problem is the erratic rainfall distribution, and surface water pollution (van Mensvoort and Tri, 2002).

Methodology

In the PLUP approach, a participatory rural appraisal (PRA) was used. The PRA had been modified based on the PRA toolbox designed by Ticheler et al. (2000) and experiences from an earlier PRA study in the same area by Feitsma et al. (2002), who was faced with difficulties regarding communication problems, lack of secondary data, large and scattered hamlets, limited time, etc.

In the PLUP approach, groups of key informants (i.e. experienced and old farmers) were formed in each hamlet, with about 10 farmers per group. The PLUP was repeated two times, in 2002 and 2003. In the 2002 PLUP, agriculture and aquaculture farmers participated together in one group. However, in order to have better understanding of the different perspectives of agriculture and aquaculture farmers, in 2003, agriculture and aquaculture farmers worked separately. In each group, farmers participated in: (1) reviewing the hamlet's land use history; (2) describing the hamlet's land condition and production; (3) explaining the reasons of land use change; (4) defining the socio-economic factors that affect to their decision; (5) drawing of a sketch map showing the land use and land constraints of the hamlet (called resource map); and (6) proposing the preferred future land use.

To facilitate the discussion, in each group two researchers were involved. The first one initiating the debate by hint questions, he/she also helps the villagers on drawing the resource sketch map, graphs or tables. The second person is responsible for taking notes. The time need for completing PLUP of a hamlet was one day. Transect walks were also conducted for verifying the accuracy of the farmers' resource map. During the transect walks, farmers were also interviewed in order to have more detailed information on the land and also the land use types practiced.

GIS have been used for combining maps of hamlets and for analyzing the land use change, realization of preference, preference change and preference conflict. The analysis flowchart is presented in Fig. 1.

Results and discussion

Land use change 2002-2003

The land use in the study area is very dynamic and there is a strong trend towards aquaculture or to a mixture of agriculture-aquaculture. In only one year, 58% of the land use changed. Major changes are from mixed agriculture-aquaculture to aquaculture only (13.7% of the area); from agriculture to mixed agriculture-aquaculture (11.9%); from mixed salt-aquaculture and mixed forest-aquaculture to aquaculture only (8%), and from agriculture to aquaculture (7.8%). The locations where the changes took place are presented in Fig. 2. It should be noted that of the unchanged areas, more than 64% was used for aquaculture and more than 20% was mixture of aquaculture with something else. This means that aquaculture has become the dominant land use in the study area.

Realization of preferences

Farmers' preferences were realized in about 52% of the study areas (Fig. 3). Of these plans more than 88% was aquaculture. In the areas where plans were not realized, aquaculture or mixed agriculture-aquaculture was practiced instead of the preferred agriculture (about 40%). Moreover, mono aquaculture was also practiced instead of the preferred mixture of agriculture- aquaculture (about 35%). The main reasons were that aquaculture brings a very high profit compared to rice (Be et al., 2003), and that salinity intrusion due to the expansion of aquaculture makes other (fresh water) agriculture practices impossible (Kempen, 2004). Moreover, since late 2002, in the adjustment plan for the coastal areas of Bac Lieu, the government plans to invest more in dredging of the existing canals and excavation of new canals, giving priority to further development of aquaculture (PCBL, 2001).

Change in preference

Figure 4 presents the changes in farmers' preferences over one year (2002, 2003). The preference for aquaculture was quite consistent, about 50% of the total area has that same preference in both years. The major change was the reduced preference for agriculture and the increased preference for aquaculture or mixture with aquaculture. Where in 2002 the farmers' preference for agriculture was 27% of the area, in 2003 this preference went down to only 4%. The preference change from agriculture to aquaculture or to mixed agriculture-aquaculture was about 23.6% of the area. The other preference change was from mixed agriculture-aquaculture to mono aquaculture, in 17.6% of the area. The main reason for this preference change were the same as for the realization of preferences: high benefits from aquaculture, the inevitable salt water intrusion and the government policy giving priority to aquaculture development.

Preference conflicts

The preference conflict analysis was carried out in 7 hamlets where both agriculture and aquaculture groups could be established. The preference maps of the agriculture groups and aquaculture groups in 2003 have been overlaid in order to delineate the possible areas of preference conflict. The difference in preferences was classified

into five levels (Fig. 5): (1) same land use preference; (2) partly different preference based on consideration of natural conditions; (3) partly different preference based on economic considerations; (4) completely different preference based on consideration of natural conditions; and (5) completely different preference based on economic considerations. In most of the cases, the aquaculture groups wanted to change part of the agriculture land to shrimp land while the agriculture groups wanted to keep cultivating their existing crops. The agriculture groups either lack capital and knowledge on aquaculture or believe that rice and vegetable are less risky and still profitable.

Evaluation of PLUP

In the PLUP, farmers got involved with enthusiasm, but this attitude often receded if the discussion is too long (Fagerstrom et al., 2003; van Mensvoort and Tri, 2002). In our experience, the discussion should not be longer than 3 hours.

Separating the aquaculture and agriculture villagers into focus groups makes the discussion more specific. Moreover, this can reduce boredom among participants and superficial discussions (Moris and Copestake, 1993; van Mensvoort and Tri, 2002). From the land use preference proposed by different villagers groups, the potential land use conflict can be derived.

The presence of the commune leader during the discussion and during farmer interviews makes villagers hesitant to tell ideas that differ from the government target (van Mensvoort and Tri, 2002). The solution for this difficulty is inviting the commune leader to lead the transect walk during the villagers discussion.

Farmers describe land unit based on soil, water and terrain condition of the land. However, the questions were drawn up from outside (appraising group) who might refer to issues important to the researcher but not to the farmers. This may result in loss of issues important to the farmers. Thus the role of the discussion leader is very important.

The results are qualitative with a low spatial accuracy because land units boundaries were drawn by farmers. However, the results can be improved by transect walks and individual interviews. Cadastral maps can also help to increase the spatial accuracy.

Conclusions

Land use in the study area is very dynamic. Within one year more than half of the study area has changed, agriculture was mostly replaced by aquaculture. Land use changed even more than the farmers' preference. Half of the farmers' preferences were realized, mostly in aquaculture. The farmers' preference changed largely from agriculture to a mixture of agriculture and aquaculture, or to aquaculture alone. There was a difference in preference of the agriculture farmers and the aquaculture farmers, due to differences in biophysical and economic considerations. GIS is a very useful tool to support the data analysis and results presentation.

The PLUP approach is a good tool to get the farmers, the most disadvantage stakeholder, involve into the land use planning approach. Farmers have opportunity

to present their knowledge on the land, what they need and express their opinions on how to use the land.

The study does not result in a land use plan, but provides valuable information about the farmers' perspectives on land use to the researchers and local land use planners. And more important, this study gains considerable experiences on applying PLUP in the Mekong Delta.

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Figures

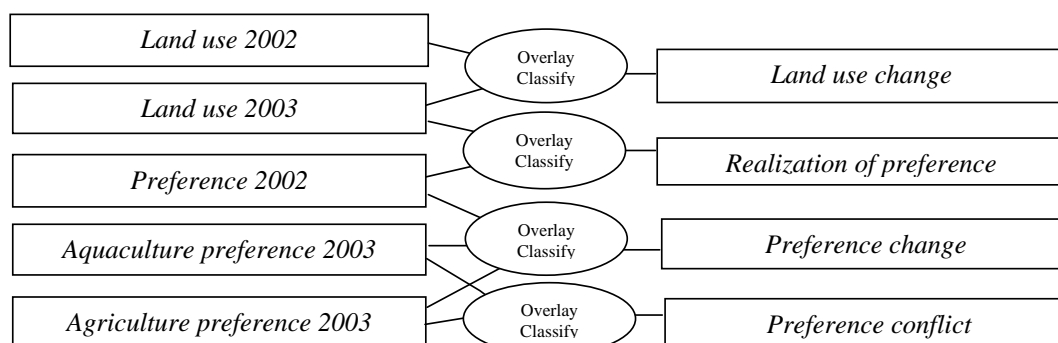


Figure 1. Analyzing of results

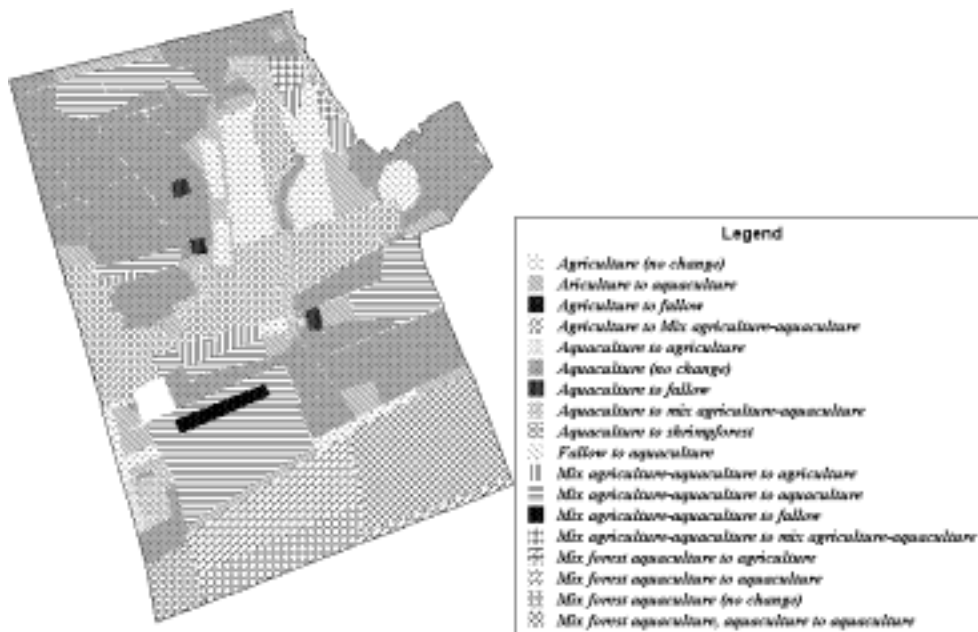


Figure 2. Land use change 2003-2003

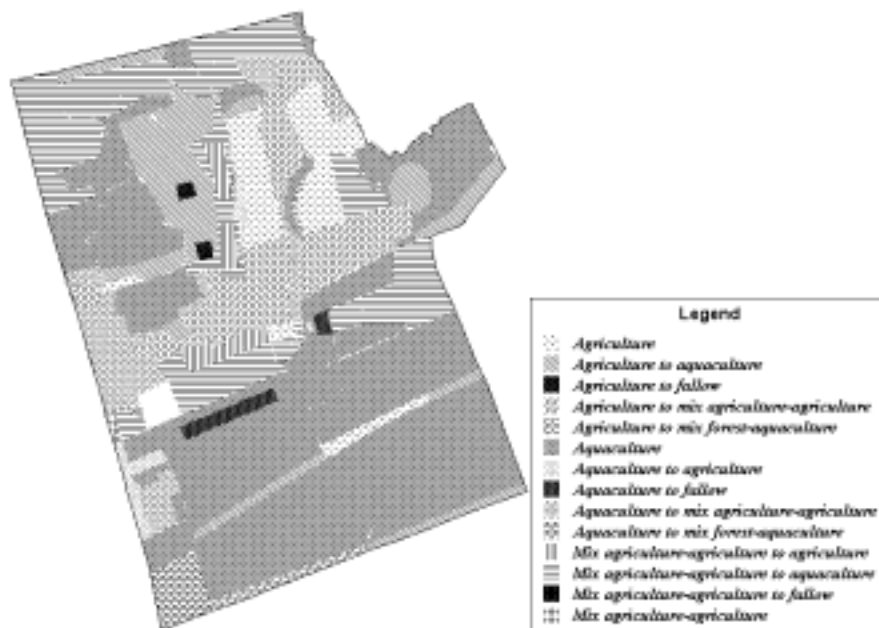


Figure 3. Realization of the farmers' preferences

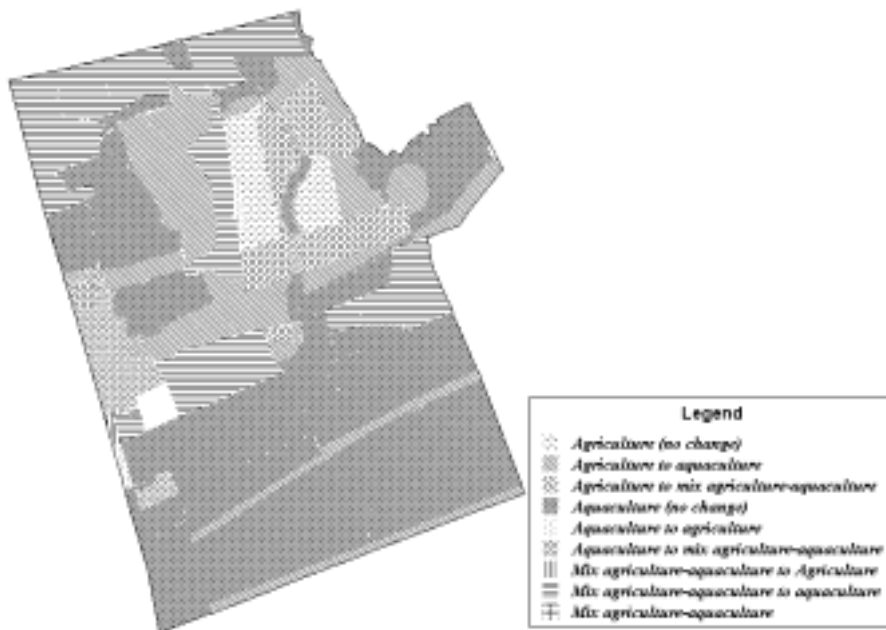


Figure 4. Preference change 2002-2003

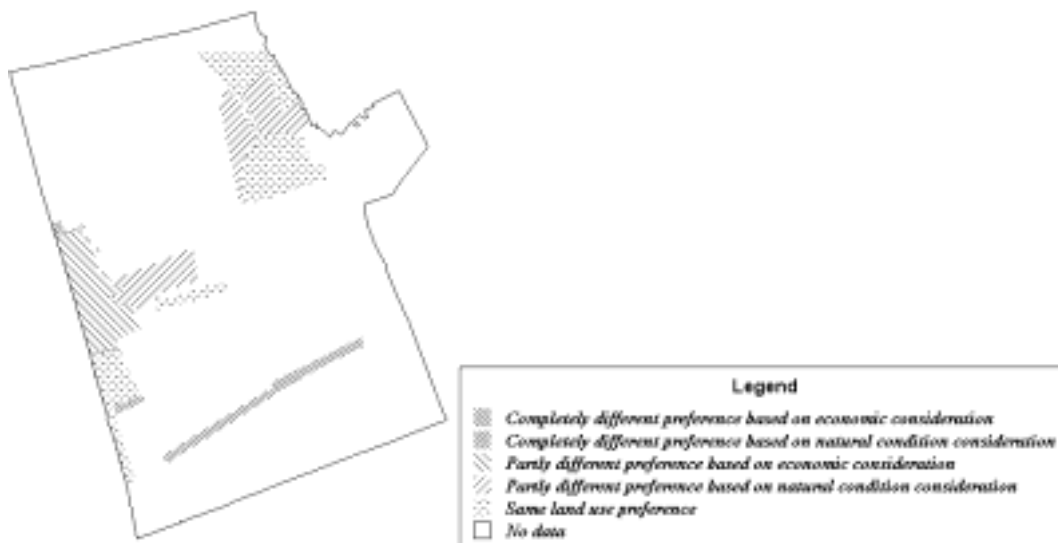


Figure 5. Preference conflict