Using GIS tourism research in combating poverty in developing countries: the case of Phuket, Thailand

M. Landré
J. van der Sterren
Centre for Sustainable Tourism and Transport,
NHTV Breda University of Applied Sciences

1. Land use and land ownership, poverty and the importance of land policies

Appropriate land policies in developing countries can contribute positively to poverty alleviation. Especially people living in rural areas depending on natural resources and land, often have ill-defined (or non-existent) land tenure and restricted rights to resources. They often live on land that is traditionally theirs but is not recognized as such: no documents are available or registered. The absence of rights to land, resources information and institutional support particularly affects poor women.
Securing local community rights to land tenure and resources would encourage the sustainable use of resources. Unfortunately however, in many developing countries land policies and related planning decisions are not clear. Land ownership structures and cadastral registrations have hardly developed. As a consequence, transfer of land ownership or change of land use is badly documented.

Effective land policies can be used as instruments to reduce poverty and support development. They can improve the welfare of those, such as women, whose land rights have often been neglected. Secondly a transparent land market with protecting measures for those owning land facilitates economic growth. Governments have a role to play in promotion and contributing a socially desired land allocation and utilization. To accomplish such socially land allocation following means are required:

- Proper cadastral registration of land ownership structures, including recognition of historical ownership rights;
- Systems of monitoring of land transfers and sales , as well as land prices;
- Fair tax systems on transfers of land ownership, enabling governments to facilitate a well functioning land policies;

However, often these effective means for this are lacking. Geographical Information Systems are helpful instruments to enable developing countries in developing effective and relatively cheap registration and monitoring systems for land use and ownership.

2. Tourism, developing countries, poverty alleviation and land use conflicts

Many developing countries promote tourism growth strategies based on exploitation of their natural and cultural assets. In the absence of domestic capital markets investing in the exploration and exploitation of natural assets for tourism purposes, many developing countries promote Foreign Direct Investments in tourism (FDI). Investors are approached for the purchase and management of large real estate projects, the management of cultural heritage sites.

FDI is promoted in many ways such as fiscal measures like income tax or VAT exemptions, free profit repatriation facilities and easy procedures for registering businesses and purchasing real estate.

The issue of land ownership and land use is one of the first to be tackled, when considering to facilitate tourism development as a growth strategy. A proper and fair land policy framework is a necessary precondition to develop long term sustainable growth strategies. However, reality is different in developing countries: the absence of updated cadastral registers leads to multiple land claims and related conflicts, as well as obscures corrupt management of land use.
In a situation where a developing country has been successfully attracted visitors and investors, this problem becomes more urgent. The increased growth of visitor numbers leads to higher real estate prices and land speculation. This tension increases the chance of potential conflicts between private investors in tourism and local stakeholders such as individual farmers.

In many situations, local inhabitants and businesses are bound to loose this battle, being unable to put forward their claims against powerful international tourism investors (real estate agencies, hotel chains), moreover because the latter are supported through (local and national) government urging to develop tourism as a growth strategy. Large scale tourism development projects are hindered because of unclear and complicated land ownership structures. It might lead to long procedures for purchasing land and higher investment costs for the tourism project. There is a permanent tension between investors promoting large scale tourism development projects and those wanting to promote effective poverty reduction through 'fair land trade'

Land policies and developing a transparent land market are important mechanisms for guaranteeing a fair land distribution and claim resolution mechanisms. In absence of existing registers and procedures (or in situations where these registers are lost), GIS and GPS technology are relatively cheap and helpful tools to recover, develop and monitor land use databases and support the decision making process on related land policy for future development.

3. The NHTV/ITMC pilot in Phuket, Thailand

Within the framework of destination analysis, students used their obligatory field work period in Phuket, Thailand in March and April 2006 to make an inventory of land use and land ownership in three selected areas: Karon, Patong and Nai Harn. The objective of this survey was to establish changes in land-use before and after the dec. 2004 Tsunami hit these coasts. For this satellite images, GPS receivers and digital cameras were used to register activities at specific points in these areas. In this way, and with the aid of lists of survey points that link coordinates to descriptions of land uses and questionnaires to determine changes in landownership, use of buildings and reconstruction, a database of land use and land ownership change could be established (Landré, Van der Sterren & Simons 2006: 3-4).

After return to the Netherlands, a portion of the collected data was processed and used as input in a geographical information system (GIS).

As a GPS receiver determines not only the coordinates of a point but also elevation, additional information could be obtained regarding elevation differences in the areas. Transferal of the GPS data to the GIS allowed the creation of two types of map: land use maps and elevation maps (Landré, Van der Sterren & Simons 2006: 9-12).

The land use information was brought about through a combination of land uses listed in the survey, interpretation of the color images, and investigating the photographs taken on site. Eventually, ensembles of urban activities could be detected, which simplified the interpretation of activities not included in the survey. This resulted in four general land use maps, in which a distinction is made between tourism related activities, such as hotels and resorts, and commercial, industrial and residential activities.

With the elevation data contour maps could be drawn, which give an indication of the elevation differences in the areas. This information turned out to be very useful in finding locations of heavy damage caused by the tsunami, as only low lying areas were affected. Unsupervised classification of the color images (Landré, Van der Sterren & Simons 2006: 14) allowed a comparison of the situation before and after the tsunami to determine its impact on the terrain. In this way an overview could be obtained of the extent of the damage and the effect on land use patterns. This information could then be linked to data obtained from the questionnaires, extending thereby the impact analysis to socio-economic aspects.

The survey and the GIS analysis of the data obtained resulted in the development of a recipe consisting of different methods and techniques, which allow the comparison of patterns of land use and land ownership and its development over a period of years. The spatial-temporal information obtained in this way could be used to model socio-spatial change in tourist areas in developing countries. Such modeling demands a specific data input such as employment data, demographical data, and business information of tourism sector. The use of satellite data overcomes partially the lack of cadastral data in developing countries.

Estimation of the long term effects of socio-spatial change in such areas could become more cost effective and be improved by using comprehensive land use models that take account of poor conditions regarding cadastral and statistical data and survey circumstances. Results of the model could then be used to anticipate negative trends and be used in policy formulation. Therefore, a concept has been developed for a model consisting of three components: a demand model, an allocation model, and an impact model (Landré, Van der Sterren & Simons 2006: 19).

The elements of the demand model are founded on the principles of system dynamics. This allows the consideration of underlying factors that play a role in land use change and the relationships between them. The model is based on the model developed by Forrester (1969), and adapted versions by Alfeld and Graham (1976) and Onsted (2002). The idea is to adjust this model and apply its features in a development situation where tourism is a growth sector. In this situation, hotel and resort development are seen as the primary driver of tourism growth. A particular advantage of this model is that the data demands are relatively low. Fieldwork data of the type collected in the Phuket survey have to be supplemented with data on population densities and land prices.

The demand model serves primarily to obtain input for the allocation model. The latter is the CLUE-S model developed by Wageningen University (Verburg et al 2002). This

model has been especially developed for land cover research in developing countries, but its suitability in urban situations has been proven by Feng (2004).

With the impact model socio-economic and environmental impacts for the different scenarios generated by the allocation model are generated. Sustainability indicators could be used in the evaluation of the different land use scenarios (Landré, Van der Sterren & Simons 2006: 20-21).

4 Conclusions

In this paper a description was given of a first pilot project in which NHTV students have gathered GPS land use data. These were analyzed for a specific tourism destination, in this case Phuket, Thailand, before and in the aftermath of the Tsunami disaster. From a methodological perspective, the pilot has proven to be a successful: it is relatively cheap data gathering method, can be organized in a systematic way. If applied in a multi-annual setting, it enables to analyze land use changes over time in tourism areas.

The estimation of long term land *ownership* effects will depend on the availability of additional data on socio-economic changes in the same area. These most probably can only be gathered through qualitative research methods, as most developing countries lack quantitative information. For the areas under analysis, CSTT will implement some research projects, in which students, in the framework of their fourth year thesis research, will be analyzing the socio-economic changes that have occurred during the last two years. While combining on the one hand qualitative research on changes in land ownership structures with quantitative GPS/GIS data sets on land use changes, future impacts of tourism development can be better predicted and advice can be given for implementing effective public land use policies supporting tourism as a tool for economic growth and income distribution.

Alfeld, LE & Graham, *Introduction to urban dynamics*. Cambridge, Massachusetts: Wright-Allen Press

Feng, X 2004. *Modelling the spatial pattern of urban fringe: case study Hongshan, Wuhan.* Unpublished MSc thesis ITSC Enschede.

Forrester, J 1969. *Urban dynamics*. Cambridge, Massachusetts: The MIT Press

Landré, M, Van der Sterren, J & Simons, R 2006. *GPS en GIS applicaties en analyse van grondgebruik in toerismebestemmingen in de opleiding International Tourism Management and Consultancy (ITMC)*. Breda: NHTV Centre for Sustainable Tourism and Transport

Onsted, J 2002. *SCOPE: a modification and application of the Forrester model to the south coast of Santa Barbara County*. Santa Barbara, California: University of California Santa Barbara

Verburg, PH, Soepboer, W, Veldkamp, A, Limpiada, R & Espaldon, V 2002. Modeling the spatial dynamics of regional land use: the CLUE-S model. *Environmental Management*, vol 30: 391-405