The Use of Geo-Information Tools and Products in Participatory Land Use Planning (PLUP) in Rural Cambodia

Harald Kirsch

The Kingdom of Cambodia comprises an area of 18,1035 km^2. The Population of ca. 12 million consist of 92% Khmer, 7% Vietnamese, and 1% Chinese, Thai, and other. The population density is with 66 pers. /km^2 relatively low compared to other countries in the region.

The relief is characterized by elevations ranging between 5 m asl in the plain around the Tonle Sap and 1813 m asl in the western mountain range. The mean annual precipitation amounts to 1604 mm/y with significant spatial variations between the humid costal areas and the inland plains.

Declining natural resources and land conflicts have become a major problem in Cambodia. In order to counter these negative impacts on the livelihood of the rural population and the assets of the whole country, the application of new tools focusing on integrated long-lasting development is absolutely necessary.

A Definition of PLUP

Participatory land-use planning (PLUP) is a modern tool for sustainable man-

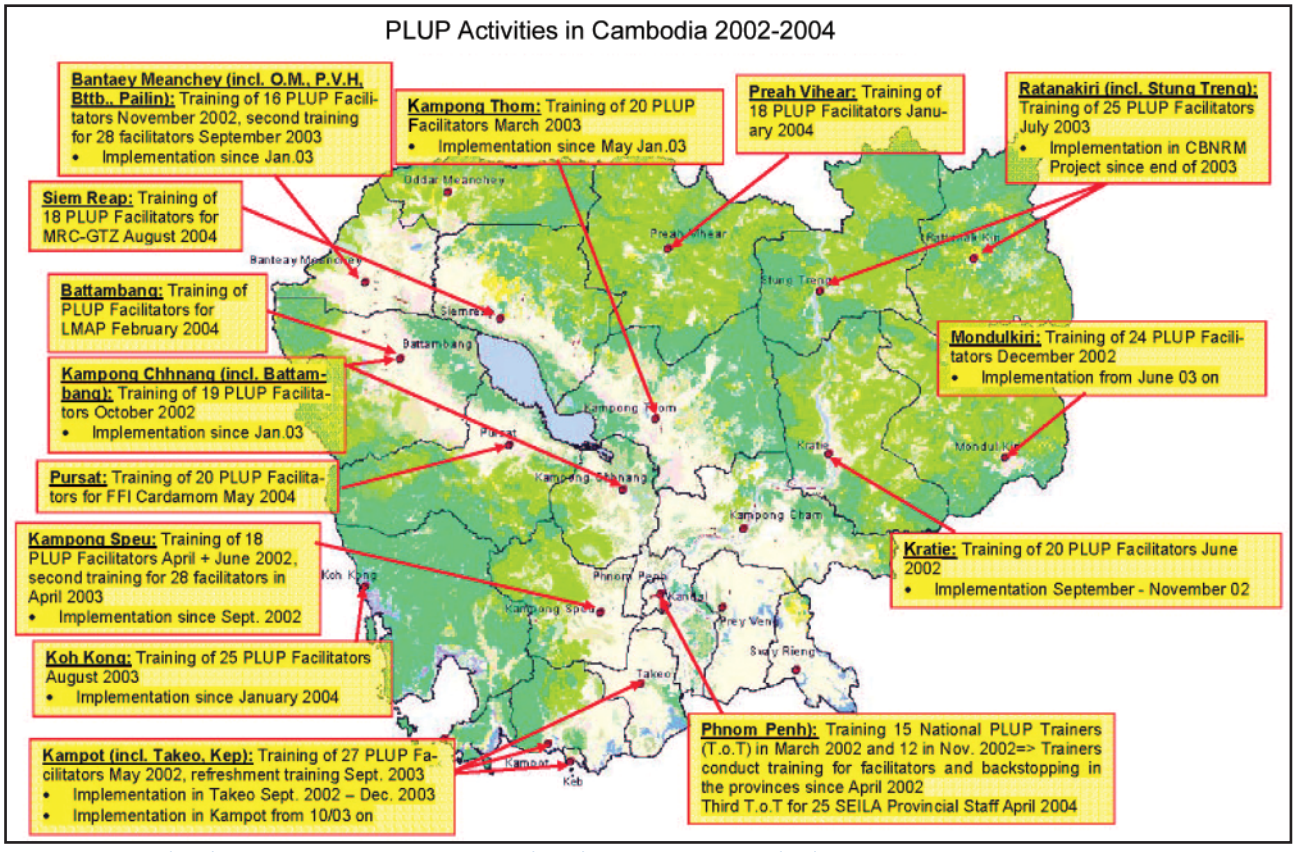

Fig. 1: Geographical overview on PLUP trainings and implementation in Cambodia

Credit: Harald Kirsch 2004

Photo 1: Drafting of a village base map in Mondulkiri

agement of natural resources in rural areas. PLUP focuses on the capacities and needs of local land users and covers the allocation, use, and protection of all resources like forests, agricultural land, and water areas. It has to be recognized that socioeconomic as well as biophysical interactions are taking place between forests, agricultural land, and water areas. A dialogue between all parties involved is seen as a precondition to reach sustainable forms of land use (Min et al. 2003).

PLUP is a bottom-up planning process - starting from the village level - in which all villagers and other stakeholders jointly plan the use, the protection and the allocation of all land and water areas within village boundaries. This process is assisted and moderated by neutral facilitators. Their task is mainly to support the planning process and to coordinate between the villagers and the authorities on communal, district and provincial level in various fields like mapping and area demarcation, drafting and approval of regulations, and the application of GIS.

Following a first trainig of trainers (T.o.T.) in PLUP in March 2002, fifteen trainings for PLUP facilitators have been conducted in 13 provinces of Cambodia between April 2002 and September 2004. To increase the number of trainers, two subsequent T.o.T. courses have been conducted in November 2002 and April 2004. The National Cambodian PLUP Trainer Team is multidisciplinary, its members are associated with different NGOs and International Organisations (e.g. WWF, Oxfam, GTZ-MRC, Concern) and mainly national government institutions like Forestry Administration, Dept. of Land Management, Ministry of Environment, Dept. of Fisheries, etc.). The facilitators are supposed to work as district or provincial teams of 3-5 persons and are affiliated with NGOs and International Organisations and related projects, and provincial and district government departments / offices (e.g. Forestry, Fisheries, Environment, Agriculture, Land Management, Rural Development, Water Resources).

Credit: Harald Kirsch 2004

Photo 2: Presentation to the community

The Concept of PLUP

The comprehensive approach of PLUP is based on these concepts:

- Identify land-use options acceptable to all stakeholders.
- Strengthen their capacity to manage resources in sustainable ways.
- Create a framework that is socially acceptable, environmentally sound, politically desired, and economically viable.
- Overcome "sector-thinking" attitudes of government departments and offices.
- Build up or use existing communal and village structures and committees as a frame for participatory processes.
- All activities are carried out according to Cambodian laws and regulations

Nine steps for the implementation

The implementation of PLUP in villages and communes takes place in 9 steps (Rock 2001). The time frame from step 1 to step 8 should be 4 - 6 months in the ideal case of a commune consisting of 6 -7 villages. The working load for facilitators is about 10 days per month.

Step 0: Getting Started (Preparations). Every PLUP project starts with the selection and training of PLUP facilitation teams. The training course consists of 14 modules and additional field practice; normally 3 - 4 trainers conduct a course for 18 - 25 facilitators in a period of 2 weeks. Then follows the selection of the initial working area, the assessment of existing data and information as well as the purchase of required materials and equipment.

Analysis	Tool
Socio-economic aspects	Village data collection, wealth ranking, social map
Institutional aspects	Interviews, Venn diagram
Past and present use of land and natural resources	Sketch maps of present and past land use, trend analysis, list of tree, fish and wildlife species now and in the past
Land use conflicts	Mobility map (activities of villagers outside the village boundary and of outsiders within the village boundary)
Boundaries (administrative and land use)	GPS, boundary demarcation, transect walks and mapping

Credit: Harald Kirsch 2004

Types of analysis and corresponding tools

Step 1: Preparation of Field Work. Before starting PLUP implementations it is necessary to inform the local authorities. Then an introductory meeting in the selected village is conducted. Furthermore it is crucial to contact all groups of people potentially involved: Villagers and local interest groups, local authorities (village, commune and district representatives and committees), representatives of neighboring villages, private businessmen and investors having land concessions or interests in the village area, military authorities (in case of villages boundaries overlapping or bordering with military areas), local police, and local and international projects and NGOs working in the area.

Step 2: Situation Analysis in the Community. The situation analysis provides basic data for future planning activities. Several PRA (Participatory Rural Appraisal) tools are use to collect the needed data. The facilitators have the role of moderators and provide technical support.
Since PRA is normally conducted with several small groups of villagers, the results of the situation analysis have to be presented to the community for feedback and final approval.

Step 3: Identification and Screening of Options for Land Use Changes. This process is done by villagers and facilitated by provincial or district PLUP teams to identify areas requiring land use changes. A "Dream Map" (future land use sketch map) is drafted and all options are evaluated (Ranking).

Step 4: Creation of a Village Natural Resources Management (NRM) Committee. It should function as a sub-committee to the Village Development Committee and the members have to be elected.

Step 5: Preparation of Future Land Use Plan, Village Regulations and detailed Management Plans.
The NRM committee is elaborating the official future land use map (official map), village regulations, and the Community Forest or Community Fishery Management Plans together with the villagers.

Step 6: Submission of the Land Use Plans, the Regulations and the Management Plans for official endorsement and approval. This includes typing of regulations, preparations for signatures, signing by village, commune, district and provincial authorities. In this step the support of the PLUP facilitation team can be crucial, especially on technical issues like processing of sketch maps into official scale maps.

Step 7: Links to Extension Services and Land Registration by Provincial Department of Land Management, Urban Planning and Cadastre. Institutions providing e.g. agricultural and forestry extension to support the implementation of NRM activities in the village have to get involved. Land registration, land allocation, and land conflict resolution need to be done by land management officials.

Step 8: Monitoring and Evaluation. In PLUP M&E compares the present situation with the situation before the implementation of certain activities, plans, regulations, and processes. M&E helps to decide whether activities, plans, enforcement of regulations, and processes should continue in the future or need to be changed. The PLUP team and the implementing institutions facilitate the process, all decisions have to be made in a participatory way.

Geo-information tools & techniques

The following Geo-information products, tools and techniques are used:

- Forest / Land Cover Map (based on LandSat TM)
- Aerial Photographs / Orthophotos / Spot Pan
- Topographical Maps 1:50,000, 1:100,000
- Geological Maps
- Community Forestry Database (Forestry Administration)
- Agro-Ecosystems Analysis (Cambodian Australian Agriculture Extension Project)
- Results of PRA
- GPS
- Level One Survey (Landmine Areas)

All these information normally come from different sources or institutions. But since October 2003 GTZ-LMAP (Land Management and Administration Project) at the Department of Land Management provides the following updated products: LandSat images, SPOT images, aerial photos, soil and land use maps, thematic maps (villages, roads, rivers, etc.).
Data are handled mainly with ArcView, MapSource, MS Excel, and MS Access. All planning-relevant spatial land use information have to be processed with a GIS and then transferred onto the Topographical Map 1:50,000 as a base map in order to be officially recognized by government institutions. Due to lack of qualified manpower and equipment in most provincial government offices these tasks can only be carried out with the support of NGOs or international donor-funded projects, or have to be transferred to the national level.

Credit: Harald Kirsch 2004

Photo 3: Fishery Mobility Map of a village at the Tonle Sap

LandSat FCCs and land cover maps are used to get a general overview (small scale, 1:50,000 - 1:250,000). Especially the application of LandSat data without a proper ground control survey can be problematic (Broge et al. 2000).

For large scale (1:1000 - 1:15,000) mapping of village or commune areas the application aerial photos is more suitable (Rakariyatham & Kirsch 1995; Kirsch 1998). One possible procedure is to demarcate an area with a GPS, digitally transfer the boundary onto a rectified aerial photo; or to map an area on ortho photos and then digitize it. Land use units mapped by villagers on sketch maps can be transferred to ortho photos and then digitized. If no recent aerial photos are available, Spot Pan can be an alternative.

General Problems and Needs

Many information are available, but is it somewhat difficult for the potential user to find out who has what. Also the flow of information and communication between government institutions need to be improved. The institutions providing information services and products depend on input from various sources to update their data. Often this input is not provided.

The most crucial factor regarding the implementation of PLUP is the fact that everything depends entirely on whether a strong NGO or an International Project can take the leading role.

Detailed planning activities are often made more difficult due to the lack of accurate data in these fields:

- Climate (rainfall in mountainous areas)
- Soil
- Geology
- Commune boundaries, concession boundaries
- Type of land (state land), land ownership

Since most information products and data are only available in Phnom Penh, it is quite difficult for people in the districts and provinces to access them.

Bibliography

BROGE, N.H., ISAGER, L., UPARASIT, U., SANGAWONGSE, S. & KIRSCH, H. (2000): The use of remote sensing and anthropological tools to define multifunctional landscapes in Thailand. - In: BRANDT, J., TRESS, B. and TRESS, G. [Eds.] Multifunctional Landscapes: Interdisciplinary Approaches to Landscape Research and Management. - Conference material for the conference on "multifunctional landscapes", Center for Landscape Research, Roskilde,18-21 October 2000.

CHRIST, H. [Ed.] (1999): Participatory Land Use Planning in Cambodia. – Proceedings of the Introductory Workshop, 14 –15 September 1999, Dept. of Forestry and Wildlife; Phnom Penh.

KIRSCH, H. (1998): Untersuchungen zur jungquartären Boden- und Reliefentwicklung im Bergland Nordthailands am Beispiel des Einzugsgebiets des Nam Mae Chan in der Provinz Chiang Rai. – (Quaternary Soil and Relief Development in Northern Thailand, German with English and Thai summary) Frankfurter Geowiss. Arb., Ser. D, 23, 307 pp.; Frankfurt a.M.

MIN, B., KIRSCH, H., & DÜMMER, I. (2003): Participatory Land Use Planning in Cambodia: Concept and Experiences after the first year. - Will be published in a volume on CBNRM by WWF Cambodia in late 2004.

RAKARIYATHAM, P. & KIRSCH, H. [Ed.] (1995): Improvement of Crop Yields and Simultaneous Environmental Impact Assessment in Conjunction with Intensification and Diversification of Agroforestry on Marginal Land in Northern Thailand. - Final Report to EC; Vol. 1 [General Reports and Summaries]: 73 pp.; Vol. 2 [The Database]: 91 pp., 1 microdisk; Vol. 3 [Maps of the Chom Thong Land Reform Area]: 34 pp., 17 maps; Chiang Mai (Faculty. of Social Sciences, CMU).

ROCK, F, [Ed.] (2001): Participatory Land Use Planning PLUP in Rural Cambodia. Manual for Government Staff and Development Workers. - (English and Khmer Version) Ministry of Land Management, Urban Planning and Construction; Phnom Penh.

Dr. Harald Kirsch [HaraldCM@hotmail.com] is PLUP Adviser at the Forestry Administration Phnom Penh, c/o German Development Service (DED), P.O. Box 628, Phnom Penh, Cambodia