Land Dynamics in Rural Cambodia from Accessibility via Suitability to Social Land Concessions

Jan-Peter MUND, Germany

Key words: Land Dynamics, Land Tenure, Land Resource Assessment, Land Reform, Cambodia

SUMMARY

The paper presents the application of a land resources assessment (LRA) method for a social land concessions program to assess biophysical resources – their condition, trends and capability for use in rural Cambodia. The applied landscape-ecological method takes account of topography, climate, soils, geology, biological diversity, wildlife, forest, land use, and hydrology. Results are systematic arrangements of land into various predefined categories according to their capability for particular land uses and the adapted treatment required to sustain those uses without land degradation. LRA is required to serve the long-term needs of economic and environmental development, planning, land allocation and environmental impact assessment as well as land management and monitoring of land related to development projects.

Social concession land for suitable and sustainable agricultural purposes will be provided to landless and poor households in Cambodia according the new and law promulgated in 2001. Major constrains for an agricultural production on those kind of land are limited commercial inputs and operation of low level technology. These circumstances imply that unfavorable land or soil qualities are difficult to modify by current farming operations. Qualities to be considered for a suitability rating are e.g. soil fertility, water retention capacity, soil depth, slope and susceptibility to erosion.

The application of landscape and ecological field observations in combination with a standardized soil resource assessment method SOTER provides the technical background to establish a land resource and suitability data base of rural Cambodia. A first approximate suitability analyzes of the land or parts of it proposed as state land for social concessions in Memot district and Oddar Meanchey province is based on the exiting 1:250,000 ASU-MRC/LRIAD and additional soil and terrain data is gathered from the digital terrain model SRTM90, the hydrological network of temporary and perennial rivers as well as land use and land cover pattern derived from Landsat and Spot remote sensing data.

Land Dynamics in Rural Cambodia from Accessibility via Suitability to Social Land Concessions

Jan-Peter MUND, **Germany**

1. INTRODUCTION

1.1 Project background

Secure access to agricultural or forest land is a crucial factor for economic development and social prosperity (OTSUKA 2001). It is widely recognized that most rural Cambodians still depend on land and natural resources for their livelihoods and subsistence (World Bank 2005). Land and Forest Reforms are therefore crucial to increase agricultural production by providing titles and security of tenure to people, especially farmers over lands they are occupying with legal certificates from the early 90ies. From every farmer occupying land in the early 1980s an estimated 12% of farmers do not own any land at present (NSDP 2005). Large scale infrastructure development, agricultural economic concessions, land speculations and local as well as foreign investment is increasing fast, while Law enforcement in the sector of natural resource management still insufficient. The poorest half of all Cambodian households hold only 15% of the land, and as many as 20% are totally landless. “Possession rights are expensive because of rent leveraging by the many officials involved in surveying and certifying land for titling and provides only limited security against pervasive land grabbing by the powerful.”(WILLIAMS 1999). Conflicts cover various kinds of land, in rural and even remote rural areas and are thriving like the instance of granting 100.000 – 200.000 ha to concessionaires in Preah Vihear and Koh Kong Province. Consequently, land disputes in Cambodia have received prominent coverage in the national and international press over the last years. Rough calculation gives evidence that about 4% of the Cambodian population have been or are involved in land disputes (SOK THA 2005). This means in particular that one in every twenty five households in Cambodia has been or is affected by land disputes.
In developing countries, like Cambodia, poor and rural population is often considered as one of the factors for inadequate natural resource management and degradation, far beyond exploitation of timber products, mining, and plantations (Figure 1 and Figure 2). A growing population and increasing consumption of forest resources for timber, fuel wood, and a range of non-timber forest products is placing the remaining resources under significant pressure. Demand on natural resources is growing fast as especially the rural population continues to grow rapidly in Cambodia. Traditionally, natural resources in Cambodia play a significant role in the household economy, as an additional source of food, but also as an important source for tools, and for medicine. More than ever before, forest cover is being lost permanently as it is converted to agricultural land, often in the form of large plantations with additional roads which have made forest areas in many parts of Cambodia easily accessible. This is facilitating a significant in-migration of settlers into forest areas. Many of whom subsequently seek to clear forestland and gain title to newly cleared areas (NGO-FORUM CAMBODIA 2003). Specifically, over 85% of the population live in rural areas and depend largely on these natural resources for their subsistence (WORLD BANK 2005). Regarding

the countrywide low population density of 74 inhabitants per km² and a high rate of population growth, access to land in the over populated lowlands has already fallen short in the mid nineties. Regional population density is on a high-level only in the Mekong plains and Tonle Sap Lake regions with 256 people/km² while some coastal regions and highlands occupying around 38% of the total area are still sparsely populated with less than 11 % of the total population or around 21 people/km² (NIS 2005), but still large area of these arable lands are infested by dangerous land mines planted, and unexploded ordnance (UXO) dropped, during past conflicts.

Figure 1: Slash and burn cultivation for upland agriculture

Figure 2: Migrating farmers in the rural upland

An key challenge for Cambodia are natural resource management regulations as well as secure access to land for all, especially pro poor access to land and a land market development based on a transparent land valuation system. Additional efforts to be made are the Forestry Reform to assure, manage and maintain the existing forests and other natural resources with a continuation in reforestation, besides suspending issue of any concessions and keeping a strict watch over existing concessionaires. The challenge is to spell out a clear strategy to address management of concessions, community forests, and protected areas in a sustainable manner based on a sustainable natural resource management policy, a secure and enforced protected area system and a sound, transparent land management system which will provide social land concessions, especially to poor and landless households (Figure 3).
A social land concession (SLC) is a legal mechanism established under the Cambodian Land Law of 2001 which aims to legalize the transfer of state private land to individuals or community groups for social purposes, in particular for residential and agricultural land. Therefore, SLC procedures require a land suitability analysis for agricultural services and resource needs. Social concession land for sustainable agricultural purposes will be provided to landless and poor households starting in the beginning of 2007. Major constraints for agricultural production by poor farmers are limited commercial inputs and a low level of technology. Under these circumstances current farming operations face difficulties on unfavorable land or soil qualities that are difficult to modify. Qualities to be considered for a suitability rating are e.g. soil fertility, water retention capacity, soil depth, slope and susceptibility to erosion. Land resource assessment combines several different approaches of

land classification like measurements of suitability, capability, agro-ecological zoning (AEZ), land cover classifications, land utilization types (LUT) and land use potential (BELL, R. ET AL 2006) into a homogeneous appraisal or evaluation methodology. It is based on interdisciplinary assessments of the bio-physical conditions soil, water, vegetation, fauna and recent land cover and land use type.

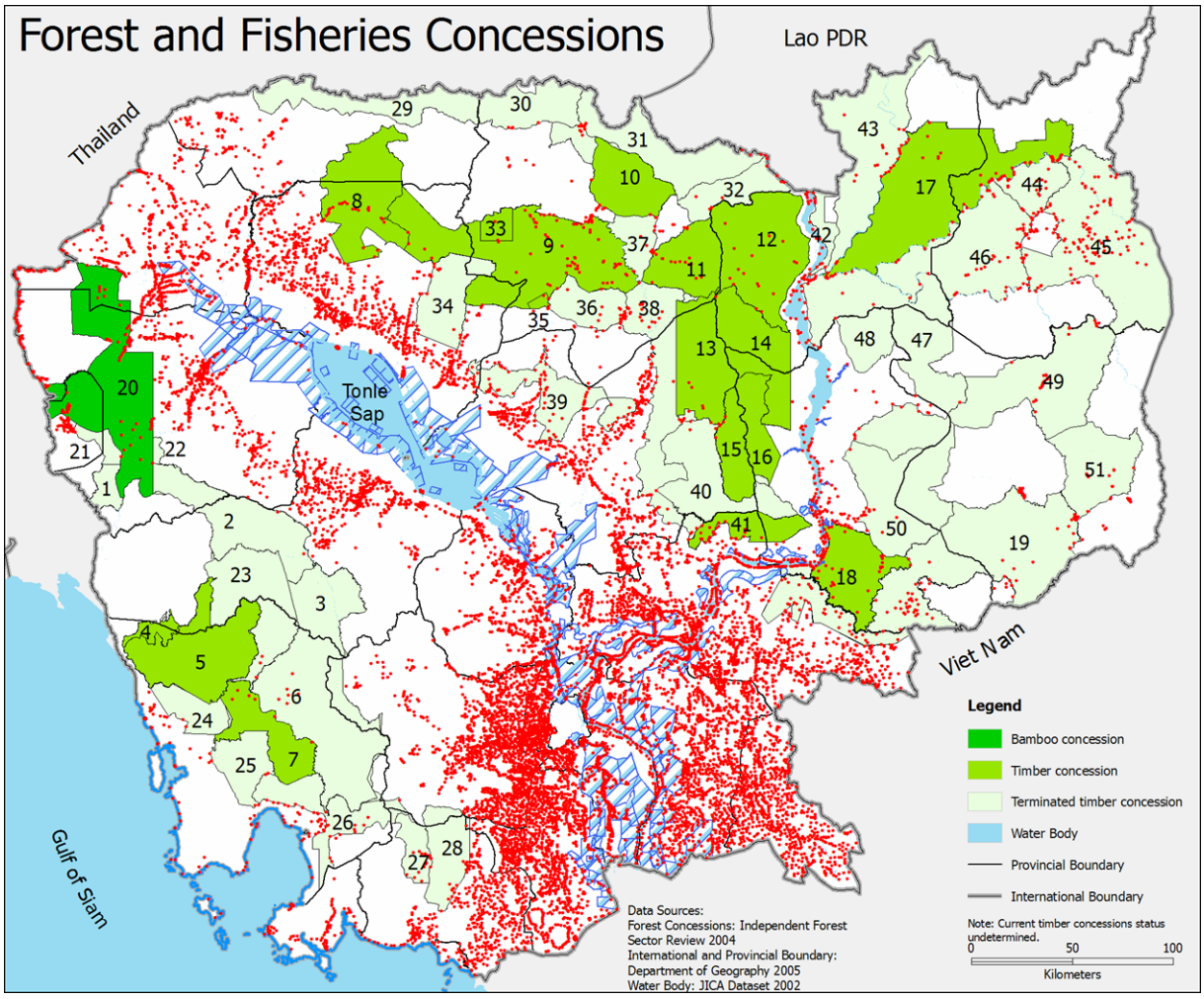

Figure 3: Different land and land use concession types in Cambodia

1.2 Existing Data and applied SOTER method

The existing environmental and soil information of Cambodia (CARBONNEL 1972) covers mostly major rice production areas in the alluvial lowlands (WHITE ET AL. 1997), while environmental conditions, especially soil data of the uplands are still very limited (CROCKER 1962). As a result land resources information in Cambodia is based on existing soil map at scale 1:1 million (IGN 1977) and MRC soil data (Agriculture Soil Unit 2002; Mekong River Commission 2002), an analysis of the SRTM90 digital terrain model (USGS 2003). The SRTM90 analysis as proposed by DOBOS ET AL. (2005) was applied using slightly different classes. It produced four layers: elevation, slope gradient, relief intensity

and potential drainage density (Figure 4). Furthermore, the hydrological network as well as land use and land cover pattern derived from Landsat and Spot remote sensing data was used. The resulting information was verified and enhanced by field observations.
Landscape and ecological field observations, assembled in a standardized soil and terrain resources database - World Soils and Terrain Digital Database – SOTER - (van Engelen and Wen, 1995), provide the basis for a suitability assessment. The database is structured as a comprehensive framework for the storage and retrieval of uniform soil and terrain data that can be used for a wide range of applications at different scales. It presents adequate data to extract information at a resolution of 1:1 million, both in the form of maps and as tables. SOTER provides standardized resource maps, interpretative maps and tabular information essential for the development, management and conservation of environmental resources, for soil mapping on reconnaissance level as well as for the development of national environmental and soil databases at scales from 1:1 million to 1:100 000.

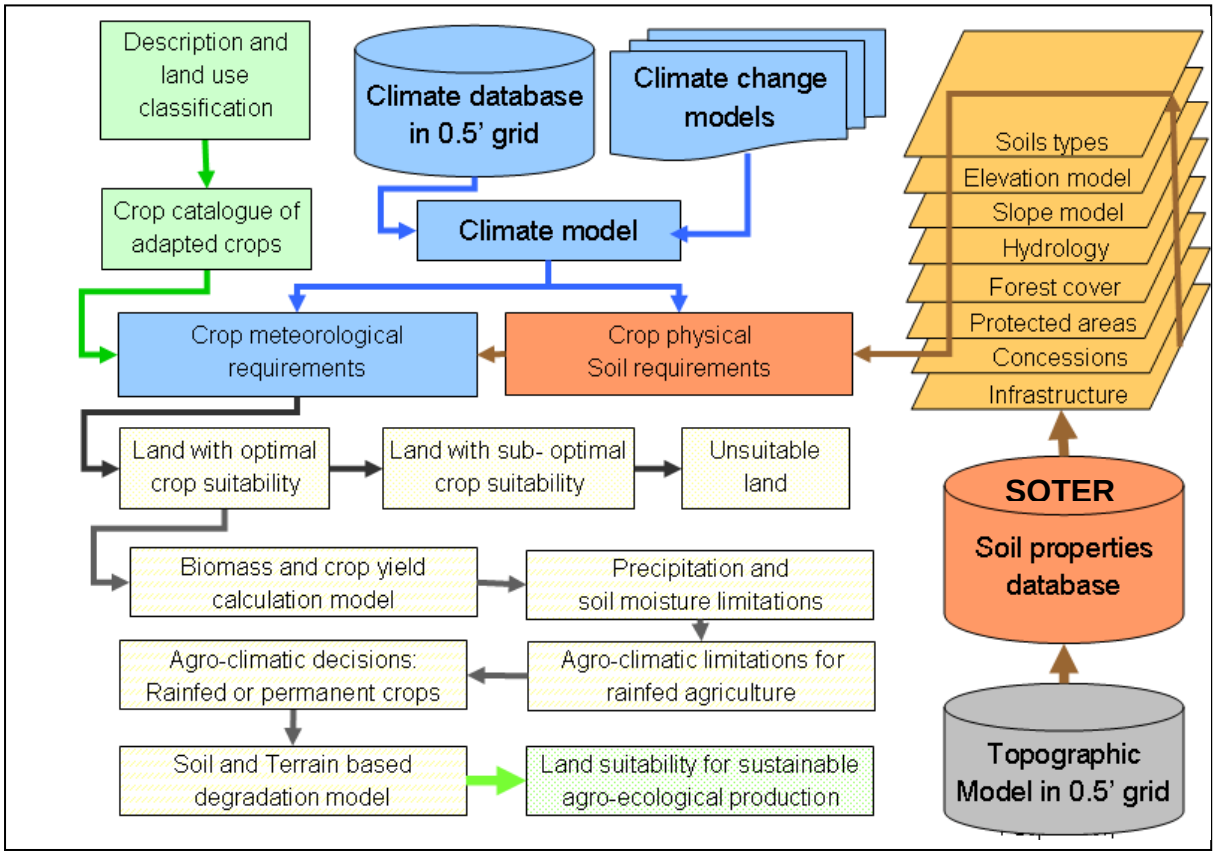

Figure 4: Land resource assessment data and analysis model

2. PRELIMNARY RESULTS

A preliminary suitability analysis in two provinces was based on the existing soil map and updated MRC soil data. Additional soil and terrain data was gathered from the digital terrain model SRTM90, the hydrological network as well as land use and land cover pattern derived from Landsat and Spot remote sensing data. Based on 41 auger samples and 10 full pit

analyses a soil mapping process on reconnaissance level (1:500,000) was started in Oddar Meanchey in the North of the country. Samples were analyzed for major physical and chemical soil characteristics in the Soil laboratory of the Ministry of Agriculture. The suitability assessment combines results from soil fertility, water retention capacity, soil depth, slope and susceptibility to erosion, providing five suitability classes according FAO (1974). This derived map (Figure 5) provides a quick and comprehensive overview of land resources and conditions for decision makers in the process of land allocation.

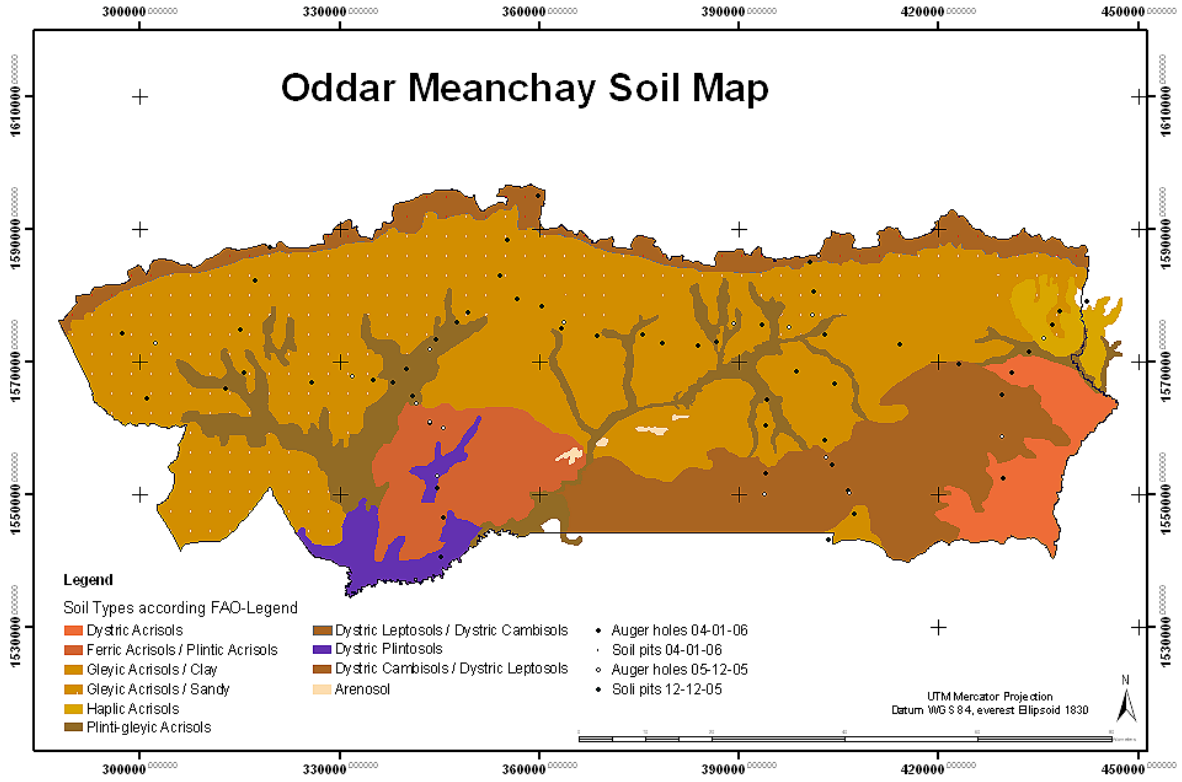

Figure 5: Soil Map of Oddar Meanchay Province, Cambodia

In the Southeast of the country an area forming the transition between quaternary basalt flows and older crystalline rocks was mapped in detail (1:50,000) using Spot images and contours derived from the DEM completed with more than 50 field observations (Figure 6). The following terrain-soil units are distinguished (Figure 7)

A third SLC area has been selected in Kratie province, where a detailed soil survey as well as and agro-ecosystem analysis took place in 2006. Around 70-80% of this larger SLC area of 4,500 ha is covered by different types of Acrisols according to their position along the toposequence. Different depths of subsoil development occur and were subject of a more detailed follow-up investigation. It seems that an ironstone layer underlies the poor sandy to silty Acrisols mostly on middle and lower positions along the straight to slightly convex slopes.

In a next step results of the three separate LRA-SLC projects at different scale level from

1:500,000 to 1:50,000 will provide necessary data for further land and economic suitability classifications, which will finally determine and propose the ecological most appropriate land use types for the selected SLC areas.

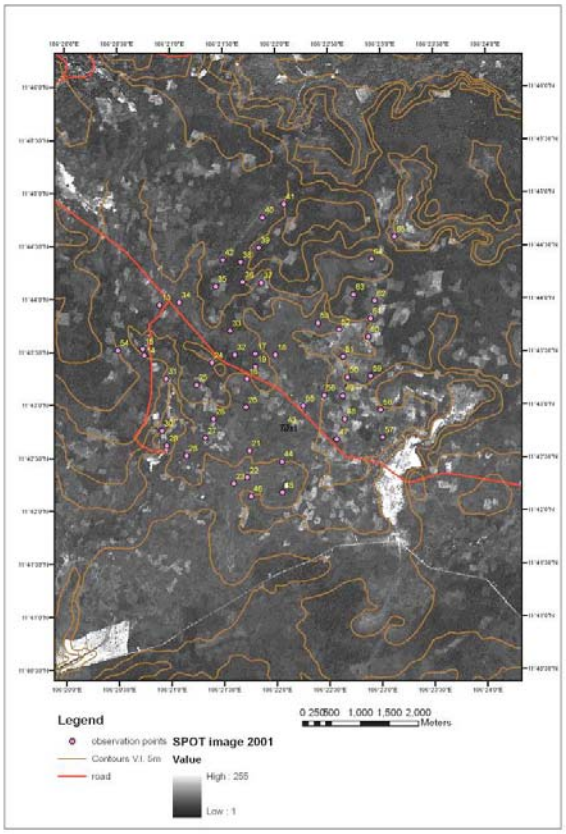

Figure 6. Contours (V.I. 5m) and soil observations points

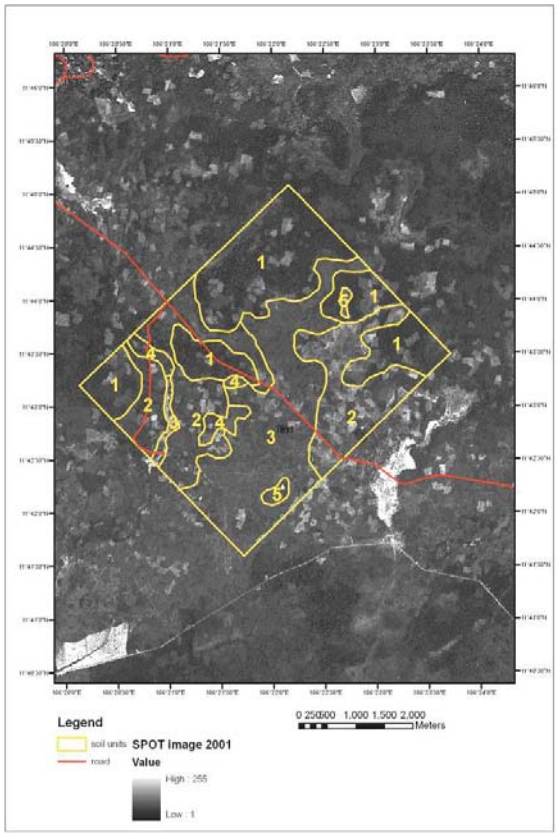

Figure 7. Terrain-soil units

Determined soil types

1. Deep, dark yellowish brown, gravelly sandy clay loam to (sandy) clay, with a loamy sand topsoil (Ferric and Plinthic Acrisols) on the higher positions in the terrain, originally covered by evergreen forest. The rather low water holding capacity might create moisture shortages at the end of the rainy season. Soil fertility is low. They are best used for tree crops (cashew) as these deep rooted plants can exploit a larger soil volume than annual crops.
2. Deep, grayish brown to light brownish gray, slightly gravelly, sandy clay loam to sandy clay with a loamy sand topsoil (Haplic Acrisols). Their soil moisture is somewhat better but fertility is still very low. They could be used for annual crops, other than rice, but require substantial inputs
3. Deep, grayish brown to very pale brown, gravelly to non gravelly, mottled sandy clay loam to (sandy) clay with a loamy sand topsoil (Gleyi-Plinthic Acrisols) in the lower positions of the landscape. They have water logging problems during the

rainy season and are therefore considered unsuitable for most crops, except rice. Fertility is a constraint.

4. Deep light gray to gray, slightly gravelly, mottled, loamy sand to sand (Gleyic Arenosols). These soils have water logging problems in the rainy season and have on top of this extremely low soil fertility. Not suitable.
5. Ironstone outcrops ands very shallow, very gravelly sandy soils (Leptosols) without vegetation or with poor grassland vegetation are unsuitable for any agricultural activity.

3. CONCLUSION

First results of the project give significant evidence that secure access to land is biased in Cambodia, while more than 60 % of Cambodian land is still declared as state land. At the moment this state land is purely managed by single line ministries and subsequent administrative bodies and still fairly surveyed, mapped and inappropriately managed. Even now large scale land concessions are distributed in a not transparent way and 20-30% of all land concessions serve for speculative reason or for contracted farming without providing proper land titles to smallholder farmers. Even in rural areas sporadic land titling is still dominant like in urban areas with supports the postulation of land being misused for speculative measures, only.

In this particular situation of fair land management in Cambodia, the idea of social land concessions in combination with a sound and decentralized land resource assessment could serve as a first promising attempt towards a more comprehensive land reform to avoid further land disputes and increase the sustainability of future agrarian use.

REFERENCES

Agricultural Soil Unit (2002): Land Resources Inventory for Agricultural Development Project, Soil Database Component, Cambodia Part of Lower Mekong Basin, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Cambodia.

ARD 2004: An Assessment of forest conflict at the community level. USAID, Phnom Penh.

Bell, R. et al. (2006): Proceedings Land Resource Assessment Forum for Cambodia. 14-17.09.2004. CARDI, AUSAID. Phnom Penh, Cambodia.

Carbonel, J.-P, (1972): Le Quarternaire Cambodgien. Structure et Stratigraphie. ORSTOM. Paris.

Cooper, G. 2006: Draft note on legal categories of lands in Cambodia, gtz, Phnom Penh

Crocker, CH. D. (1962): Exploratory survey of the soils of Cambodia. Royal Cambodian Government Soil Commission and USAID. Phnom Penh, Cambodia.

Dobose, E, DAaroussin,J and Montanarella, L (2005): An SRTM-based procedure to delineate SOTER Terrain Units on 1:1 and 1:5 million scales. EUR 21571 EN, Institute for Environment and Sustainability, Joint Research Centre, ISPRA.

Dümmer, I. 2004: Information and Knowledge Based System for Land Suitability Analysis in Cambodia. Paper Prepared for the Land Resource Assessment Forum (14-17 Sept 2004).

Forest Resources Management (FRM), 2003: Report on Trains in Land Cover Changes Detection between 1996/97 and 2002 by Remote Sensing Analysis. Phnom Penh.
IGN (1977): Lower Mekong Basin, Pedo-geomorphological map 1:1 million. Mekong River Secretariat, Bangkok, Phnom Penh, Vientiane.
Legris, P & Blasco, F. (1972): Carte International Du Tapis Vegetal et des condition ecologiques a 1/1.000.000, Notice de la carte Cambodge. Extrait des Traveaux de la section Scientifique et Technique de l'institut Français de Pondichéry. Hors Serie No. 11 – 1972.
Mekong River Commission (2002): Soil Map of the Lower Mekong Basin. Mekong River Commission, Phnom Penh, Cambodia.
Mekong Secretariat & River Commission 1994: Cambodia Land Cover Atlas (1985/87 to 1992/1993), FAO/UNDP.
Ministry of Planning, Cambodia 1999: Cambodia Poverty Assessment, p. 22 Cambodian Red Cross; Handicap International; UNICEF; Ministry of Foreign Affairs of Finland.
Ministry of Planning, Cambodia 2005: CamInfo 2.1 Statistical database of Cambodia.
Otsuka, K. & F. Place (eds.) 2001: Land Tenure and Natural Resource Management – A comparative Study of Agrarian Communities in Asia and Africa. IFPRI.
Save Cambodia's (2006): The Atlas of Cambodia, National Poverty and Environmental Maps. Phnom Penh, Cambodia.
Tola, P. B. McKenney 2003: "Forest product trade in Cambodia: a case study in resin", Cambodia Development Review, Vol. 7, No. 2, April-June 2003
USGS (2003): Shuttle Radar Topographic Mission Digital Elevation Model (http://srtm.usgs.gov/)
Van Engelen, V.W.P. & Wen, T.T. (1995): Global and National Soils and Terrain Digital Databases (SOTER), Procedures Manual (revised edition). UNEP-ISSS-FAO-ISRIc, Wageningen, The Netherlands (http://www.isric.org/isric/webdocs/Docs/SOTER_Procedures_Manual_1995.pdf)
White, P.F.; Oberthür, T. & Domingo, L.V. (1995): Classifying Cambodian Soils from an Agronomic perspective. Cambodian IRRI-Australia Project. IRRI, Phnom Penh.
White, P.F.; Oberthür, T. & Sovuthy, P. (1997): The soils used for Rice Production in Cambodia. Cambodian IRRI-Australia Project. IRRI, Phnom Penh, Manila.
Williams. S. 1999:" Land dispute in Cambodia", National Workshop on Institutional Cooperation about Resolving Land Dispute in Cambodia, organized by Oxfam GB-ADHOC, 15-16 July 1999.
World Bank Group 2005: Cambodia – Country Assistance Strategy of the World Bank Group 2005-2008, Partners in Development Assisting Cambodia to attain its Millennium Development Goals, Phnom Penh.

BIOGRAPHICAL NOTES

Dr. **Jan-Peter Mund** is a Geographer (Dr. rer nat.) and senior lecturer from the Universities of Mainz and Bonn, Germany. Before he was an independent GIS consultant and Managing Director of GeoMedia Bonn consulting Group in Bonn, Germany

CONTACTS

Dr. Jan-Peter Mund
CIM-gtz Advisor to the Royal University of Agriculture
gtz-Office Phnom Penh, P.O. Box 81, Phnom Penh
KINGDOM OF CAMBODIA
Email: jpmun03@yahoo.com,
Website: http://www.rua.edu.kh/land_mgt.html; www.geo-media.de