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## CONFERENCE ABSTRACTS

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### International Workshop on Dynamics of Land-Use/Land-Cover Change in the Hindu Kush-Himalaya

Kathmandu, Nepal April 20-25, 1997

#### Creating Sustainable Hydrological Regimes in the Mountainous Watersheds of Nepal

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The watersheds, especially of the Hindu-Kush Himalayan region, are complexes of various processes such as climate, geological texture and structure, land use planning, vegetation, cropping patterns, anthropogenic or natural landscape formations and existing therein infrastructures. Likewise, the inhabitants such as people, livestock and wildlife are also the important elements that exert considerable pressure on watersheds and eventually on the flow and sediment regimes of rivers. Therefore, creating sustainable hydrological regimes means understanding the linkages and inter-relations among different factors prevailing in the watersheds, and restructuring or strengthening them as the elements of any ecosystem.

This paper attempts to interrelate land-use/land cover, and, eventually, the flow and sediment processes, to the existing socio-economic and development activities and institutional arrangements prevailing in any particular watersheds. The author, therefore, intends to analyze this issue from the view-point of: "Management is the key to the Sustainability of Mountainous Watersheds." The paper presents an overview of geophysiographic, geological, climatological and pedological conditions of Nepal. It also looks at evolution of forest cover, food balance, energy balance, water balance, watershed management and land use planning.

The case studies reveal that soil fertility in the mountain watersheds is being deteriorated and, hence, cultivation of marginal lands has become a compulsion for local people to secure livelihoods. Consequently, all anthropogenic activities are further threatening to cause excessive land erosion, land slide and even mass wasting processes in fragile mountain watersheds. These issues cannot be bypassed while dealing with sustainable land-use/land cover.

The micro level natural resources management by the empowered local beneficiaries of the micro watersheds (the most sustainable planning unit) may serve as the key remedy to release anthropogenic pressure on mountain environment. This refers to optimization of constraints and opportunities present in the mountain watersheds through detailed land use planning, cropping patterns, appropriate biodiversity, cash generating occupations and local institutional people-centered arrangements. Only the well managed watersheds can reduce erosion and control sediment load in the rivers downstream.

#### Understanding the Dynamics of Watershed and Irrigation Resources

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The collaborative study between the Irrigation Management Systems Study Group (IMSSG) at the agricultural institute, Rampur, Chitwan, Nepal and the Workshop in Political Theory and Policy Analysis (WPTPA) at Indiana University, Bloomington, U.S.A. utilizes GIS technology to develop ties between

watershed and community-managed irrigation systems (CMIS) in east Chitwan valley of Nepal. While the sustenance of these CMISs depends heavily on recharging capacity of the watershed and on the ability of local institutions to resource management, the study conceptualizes the watershed to be the basic framework for spatial analysis. The IMSSG and WPTPA have analyzed landuse change via integration of data from various sources as aerial photo, topo maps, landuse maps, resource inventory and PRA ground truthing at watershed level (meso-scale) and mapped individual CMISs using GPS (micro-scale). The use of GIS Overlay revealed a multi-directional landuse change for a period between 1978-1992 in the Kair watershed. Although a significant forest area appeared degraded, the GIS analysis, on the contrary, also refuted the widely held notion of unidirectional forest depletion as there were some patches of forest regrowth.

The project, in the past three years, has put a tremendous effort to develop GIS and GPS skills in order to capture spatial elements and dynamic processes at both a micro and meso scale. Using GPS technology, more than 45 CMISs have been georeferenced and represented by point feature in GIS database. In our continued work, identification and linking of key spatial data and institutional attributes to these point features will allow us to perform spatial statistics at macro-scale which in turn will be verified by meso or micro scale ground truthing. We hypothesize that each irrigation system in the downstream responds uniquely to any change in the watershed characteristics in the upstream. To unfold these unknowns, we are now positioned to characterize a number of watersheds in the study area and ferret out the processes of how the irrigation system(s) make changes and adjustments as a result of dynamism in the watersheds. The concept of scaling up and down appear to be a matter of growing concern to better explain potentials and constraints faced by these resources that occur over all spatial scales in nature.

#### **Forest Resource Management in the Middle Mountains of Nepal a case Study of Jhiku Khola Watershed**

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This paper aims to analyse the change in forest cover and its management practices in the middle mountains of Nepal. Jhiku Khola watershed located between 27 35' to 27 41' North latitude and 85 32' to 85 41' East longitude covering an area of 140.47 Sq. km was selected for the study. The elevation of the study area ranges from 620 to 2100 meters. Overlays of land use maps of 1978/79 and 1994 were done by using PC ARC/INFO GIS software in order to identify the areas of forest cover change and to quantify the rate of change

in forest cover within Jhiku Khola watershed. Household sample survey was carried out in order to know the causes of forest cover change. Besides, group discussions were organised in order to describe the problems and prospects of community forest management activities in the area. Recently introduced community forest management practices has helped to increase the forest land from 34.55 sq. km in 1978/79 to 39.71 sq. km in 1994. Large areas of shrubland and grassland have been afforested. This type of community forestry program was introduced in this area by Nepal/Australian Forestry Project which has contributed significantly in organising Forest User Groups and plantation and management of natural forest. The Talukdari and the Kipat system were the dominant management system in this area in the past but community forest management practices is now common.

#### **Development of a Global Data Plan for LUCC Research**

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As LUCC research efforts have begun and are becoming a reality, there raises the preliminary need of defining the basic data that are required for understanding the land transformation processes. So, strategies to achieve, improve, or create these datasets must be designed right now, even though it is assumed the first issue is to match the LUCC research requirements with real possibilities in the light of existing initiatives and frameworks.

Ad hoc information for monitoring and modeling LUCC processes and trends, combining socio-economic and biophysical data, has not been well developed until now, however some current initiatives can be considered specifically suitable. The requirements for any dataset capable of being used in LUCC science activities are mainly derived from the need for quantifying the studied processes. In this sense, only geographically explicit and geometrically corrected data (both social and ecological) will permit to formalize the research results. Datasets should be usually able to be integrated in a GIS.

#### **Developing a LUCC global data plan**

Much of the ongoing initiatives on data for LUCC research cannot be easily incorporated to the scientific work because their use demands additional non-negligible efforts. Most of them should be integrated in the sense of finding conceptual and geographical links with the specific data requirements of LUCC studies. Therefore, it is becoming necessary to set up a framework which improves this situation promoting communication between data users and data producers, both from biophysical and social related data fields.

Thus, this is planned to bring them together in a common objective of defining an efficient data plan.

The general objectives of this plan are: i) to harmonize the international efforts on data systems, ii) to determine the priorities of the needed datasets, iii) to develop procedures for establishing links between existing data systems and specific LUC requirements and, iv) to provide the basis knowledge for promoting operational data systems for monitoring and modeling.

To accomplish these objectives, in collaboration with IGBP-DIS, workshops and complementary activities are proposed aimed at: i) data requirements, ii) the establishment of methodologies and procedures of data gathering and compilation according to the research requirements and priorities, iii) the identification of organizational and monitoring system needs, and iv) the setting up of the implementation strategy to develop data systems for continuous monitoring and modeling.

### **Tracking and Early Stages of Deforestation: A Spatial Analysis of Forest Distribution and Land-Use Patterns in Arunachal Pradesh, India**

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Regional changes in land-cover and land-use patterns can have profound global consequences which include altered patterns of climate, agricultural and economic productivity, and distribution of diversity. Arunachal Pradesh, located in north-eastern India, is a biodiversity rich region. However, very little information exists on the extent and distribution of the state's biodiversity. Arunachal Pradesh is a remote state and has, until recently, been relatively undisturbed by anthropogenic factors. Accelerated developmental activity in recent years has put considerable pressure on forest resources. In this study, we examine the patterns of forest distribution and land-use in the state and their relationship with variables such as elevation and distance from roads, rivers, and population centers. We use a spatially explicit model to examine the drivers of land-cover and land-use change in the state. We compare the results with those obtained from a long-term study of land-cover and land-use change in another biodiversity hotspot, the Western Ghats of South India. In contrast to Arunachal Pradesh, the Western Ghats region has been subject to high levels of human impact for hundreds of years. The importance of various drivers of land-cover and land-use change is different in the two regions. The question we ask is what can we learn about the early and secondary stages of deforestation and land-use change from these two areas and how can we integrate studies in mountain regions conducted at regional levels into a global scale?

### **Historical and Contemporary Landscape Change in the Sagarmatha National Park, Khumbu, Nepal**

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The objective of the study was to assess historical and contemporary landscape change processes (vegetation, cultural, geomorphic) within the Sagarmatha National Park, Khumba, Nepal. Historical perspectives were provided by the author's 1984 assessment of soil profiles, pollen analysis of stratified soil samples, and the identification and <sup>14</sup>C dating of charcoal samples found at various soil depths. Contemporary methods included the 1984 and 1995 replication of Swiss cartographer Erwin Schneider's 1955-62 photogrammetrical landscape panoramas of the Everest region from 26 photopoints between Lukla (2,743 m) and the upper Imja Khola valley (5,500 m+). Insights regarding contemporary forest and shrub/grassland change were further supplemented by ground truth verification, sampling plots, participatory interviews, and detailed literature reviews.

Results of the palaeoecological analysis suggest that present day south-facing shrub/grassland formations are relatively recent, having abruptly replaced the fir/birch/alder forest formations which preceded them some 400-800 years ago. Pollen analysis and buried podzols suggest that the climate has become considerably cooler and drier during this same period. The presence of cereal grains and charcoal fragments throughout the soil profiles analyzed nevertheless suggest that humans and their cattle may have been frequenting and modifying the Khumbu landscapes for several thousands of years prior to the arrival of the Sherpa people, presumably some 400 years ago. Results of the contemporary analysis suggest that, since the 1950s, (1) forest cover has not been depleted to the extent previously assumed, (2) forest cover in fact appears to be increasing within the park, (3) little geomorphic change as reportedly related to overgrazing can be discerned, (4) dramatic infrastructure growth has occurred in villages located along major trekking routes, and (5) approximately 60 percent of the alpine juniper cover in the vicinity of Dingboche has been lost since 1962.

Collectively, these results contain the potential for providing insights of use to the scientific and management communities regarding (a) historic and contemporary landscape change processes, (b) human vs. natural impacts and trends, and (c) future management options. Repeat photography showed particular promise as a reliable and cost-effective monitoring and evaluation tool for project managers, field practitioners, and local communities. The techniques and methods of developed during the Khumbu work are now scheduled for further testing and replication within the Andes (Huascarán and Huayhuash

Cordilleras, Peru) and the Nepal Himalaya (Langtang National Park).

**Changes in Nepal's Midhills: A Case Study of the Kulekhani Watershed Area**

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The Kulekhani watershed area (27° 35' - 27° 45' north and 85° - 85° 15' east) (area: 125 km<sup>2</sup>, elevation: 1500 - 2621m, population: 28,485) in the north eastern section of Makawanpur District is critical to the Kathmandu Valley as a source of hydropower (60 MW). Coupled with high population density (217 persons/km<sup>2</sup>) and 87% of the economically active population engaged in agricultural activities, changes in landuse pattern are drastic and ongoing with landslides as common. The present analysis of landuse pattern of the year 1958, 1978 and 1992 in 5 broad categories; cultivated land, forest land, grazing land, shrub/bush land and waterbodies suggests that landuse change is closely related with deforestation as agriculture land has increased (71%) and forest has decreased (24%).

Although, concentrations of the landslides were observed primarily in the forest and cultivated areas with high precipitation and steep slopes (>30°), five susceptible zones of landslide hazard in the Kulekhani watershed were identified: 1) stable (38.29 km<sup>2</sup>), 2) moderately stable (42.46 km<sup>2</sup>), 3) moderately unstable (30.15 km<sup>2</sup>), 4) unstable (11.86 km<sup>2</sup>) and 5) highly unstable (1.07 km<sup>2</sup>) where both large and small landslides occurred. This may contribute more to sedimentation in the Kulekhani Reservoir where there is an imbalance of water as 92.5% volume of the water above the dead level (1476m) is used before monsoon.

**A Hierarchical Approach to Linking Land Use Dynamics and Remotely Sensed Land-Cover Data in the Middle Mountains of Nepal**

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Local case studies of land-use change in the Hindu Kush-Himalaya identify a myriad of local-, landscape- and regionally scaled drivers that influence the options available to, and decisions of, land managers. Often, this complexity has been cited as an obstacle to the 'scaling up' of predictive models to regional or global scales. At the same time, comparative local case studies have yielded useful insights into global processes (see references in Turner et al. 1995, IGBP Report #25).

We have developed a prototype framework for analyzing multi-scale driving forces in land use/land cover change in the Hindu Kush-Himalaya (Table 1). This framework is a non-exhaustive prototype that we have developed to guide the integration of our analyses of spatial patterning in remotely sensed images with other sources of information (e.g., field observations of agricultural practices, household interviews, policy analyses, retrospective studies). Our goal is to derive a multi-scaled explanation of land-use dynamics for a range of sites and situations in the Middle Hills of Nepal. We present an example of implementing this framework using empirical data on land cover, as determined by Landsat Thematic Mapper false color composites, to infer the dominant scale(s) of factors governing land use in small agricultural communities:

Scale	Proximate causes	Biophysical drivers	Social/human drivers
<b>Region</b>	subsistence agriculture; limited set of commodities; weak integration with global markets; large investment by NGOs	mountainous terrain and monsoonal climate: spatial heterogeneity due to topography; seasonal climatic variation due to timing and intensity of monsoon	marginal linkages between institutions and support systems; government policies; property regimes; isolation; marginality
<b>Landscape, village watershed</b>	proximity to highways; trekking routes; development projects; irrigation; erosion	topographically controlled biophysical constraints on agriculture	trade infrastructure; community organization; development work
<b>Local, household</b>	degree of agricultural intensification (varies by socioeconomic status and caste)	mini-greenhouses alter microclimate allowing extended growing season and alternative (cash) crops	attitudes and values with respect to trade; access to capital; access to technology (e.g., mini-greenhouses)

## **Do Land-Use Changes in the Himalayas Affect Hydrological Processes in the Lowlands of the Ganges and the Brahmaputra?**

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Today it is still generally assumed that deforestation in the Himalayas is responsible for the apparent increase of floods in Bangladesh. The chain of mechanisms seems to be very clear: population growth in the mountains; increasing demand for fuelwood, fodder and timber; uncontrolled and increasing forest removal in more and more marginal areas; intensified erosion and higher peak flows in the rivers; severe flooding in the densely populated and cultivated plains of the Ganges and Brahmaputra. There is no doubt that the Himalaya and its forelands have undergone a most dynamic change in land use in recent decades due to the rapid increase of population. But are the processes really as simple as that? Initiated by Prof. B. Messerli (Bern) and Prof. J.D. Ives (Boulder) in 1979 the Department of Geography of the University of Berne joined this discussion with the aim of promoting a more serious scientific analysis with regard to these crucial problems. The overall concern of this research has always been the ecological interaction between the Himalayan highlands and the adjacent lowlands of the Ganges and the Brahmaputra, including the impact of human activities on the environment. In the most recent study entitled with, "Floods in Bangladesh: a highland-lowland interaction?" it could be documented that floods in Bangladesh are a normal process of the highland-lowland interactive system, independent of human activities in the upper catchment. Neither the frequency nor the dimension of flooding has increased over the last 120 years. Precipitation and runoff in the Himalayas do not seem to be important causes for the floods in Bangladesh. This in turn indicates that forest removal or other land-use changes will not have any significant impact on the flooding conditions in Bangladesh. This is different if small watersheds within the Himalayas are considered: on this scale the effects of human interventions can be directly documented, e.g. in higher discharge peaks or higher sediment load within the respective watersheds.

If all these findings are accepted, then the habit of blaming mountain inhabitants for the flood catastrophes far downstream must be abandoned. However, this does not relieve the mountain people of their responsibility to use their natural resources in a sustainable manner in order to maintain the ecological balance in their respective environment.

### **A Comparative Land Use Study in Two Middle Hills Districts of Nepal**

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### *Nepal Australia Community Forestry Project*

Between 1993 and 1996, the Nepal Australia Community Forestry Project carried out four comparative land use studies in Sindhu Palchok and Kabhre Palanchok Districts of Nepal. These were to evaluate the impacts of Australian development assistance over a continuous 19 year period fostering the participation of local communities in forest management. The four studies assessed land use changes between 1978 and 1992 covering 30,147 ha of the lower elevation land, ranging from around 600m in the valley bottoms to generally not more than 2500m on the higher ridges, corresponding to the area of permanent settlement; and 34,050 ha of the upper slopes at elevations between 2000 and 4000m where settlement is temporary and generally in the summer months.

The four studies sampled more than 10 percent of the land area of the 2 Districts totaling some half million hectares, using two sets of aerial photographs taken in 1978 and 1992. A form of Rapid Rural Appraisal of land use changes was made based on interpretation of the photographs and from ground truthing of the results of this interpretation, and from information obtained from local villagers.

Community forestry activities within certain sample areas at the lower altitudes are having a beneficial effect on the balance of land use as part of a broader process of agrarian change. Shrublands and grasslands are being converted to more productive categories of forest land reflecting the care of local communities in managing and conserving their own forest resources. The same cannot be said for the upper slope areas, where there is evidence that the forest cover is being denuded rapidly and that the shrubland and grassland areas are increasing at the expense of forest cover. The next stage could well be the conversion of grassland and shrubland to wasteland unless many current land use practices are abandoned or modified. This must involve both local inhabitants who live close to the forests, and those land users from lower elevations who harvest products from the upper slope forests during the summer months.

The use of land for agricultural purposes appears to have been stable since 1978, but more probably reveals some level of withdrawal from the less productive agricultural land, the bari lands, and a corresponding increase in better bari lands and irrigated khet lands. This withdrawal appears to be more pronounced at the higher elevations. Recent evidence suggests that the reliance on subsistence farming is reducing as opportunities increase for off-farm income, but whether this has allowed population pressure on land resources to be contained, is debatable. While it appears that community forestry has abated the pressure on the lower altitudes of Sindhu Palchok and Kabhre Palanchok, this is not the case at higher altitudes. It is apparent that sustained population pressures combined with a lack of

coherent and coordinated land management policies and practices have resulted in a rapid decline of forest resources on the upper slopes, and a loss of catchment stability.

### **Land Cover Changes in Bangladesh**

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Bangladesh stands on the Bay of Bengal. It is almost a flat country except some hilly area at the South-eastern part of the country. It is about 8.0m high in average from the mean sea level. It is one of the most densely populated countries in the world with 120.0 million people in 144.0 Sq. km area. The main land use categories are the agriculture, forestry, homestead and water bodies. Due to population pressure and land use conflicts the land use and land cover of the country are changing rapidly. This paper briefly describes the changes of forest covers, agricultural lands and large standing water bodies. It also describes the dynamics of mangroves in the coastal region of Bangladesh.

### **Landscape Change Based on Repeat Photography of Northwestern Yunnan and Its Relevance to the Himalaya Hindu-Kush Region**

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The long-term sojourn of Joseph F. Rock (1923 - 1949) in northwestern Yunnan, China, and particularly his assemblage of several thousand large format ground photographs of high quality, provides a barely exploited archive for systematic study of land-use and land-cover change over almost 80 years. A small selection of Rock's photographs were replicated in 1985 and again in 1995, using both black and white and color film. The motivation for this, part of a much larger study, stemmed from the early and controversial challenge to the "theory of Himalayan environmental degradation", itself based upon several years of team fieldwork in Nepal.

As in Nepal, land-use and land-cover change in northwestern Yunnan is driven by a complex of natural, political and economic factors. The evolution of Chinese politics and economics from 1975 to present is presented in the context of effects on forest use and conversion. The earlier assumptions, as in the case of the Nepal Himalaya, that drastic detrimental change was leading to mountain and downstream environmental disaster, is contested. It is concluded that generalization over large areas is often counter-productive, that attraction to simple explanations risks causing

confusion, and that adoption of a one-way negative trend paradigm is untenable.

Using photographic examples from the 1920's-1930's, 1985, and 1995, the complexity of land-use and land-cover change will be presented. In 1985 many areas had a more mature forest cover than a half-century earlier, whilst some sites had been heavily damaged. Re-photography in 1995 of some of these 1985 damaged sites demonstrates remarkable recovery in the short period of ten years.

In conclusion, two recommendations are made in an attempt to encourage more effective future research: (1) there should be systematic archiving of ground photographs throughout the Himalaya - Hindu-Kush region, coupled with an active program of replication; and (2) the study of time series of ground photographs should be integrated with evaluation of satellite imagery and computerized mapping. Village level interviews will invariably assist in obtaining a realistic explanation of detected changes. Both recommendations call for an institutional base: the most logical being ICIMOD.

### **Forest Land Cover Inventories in Nepal**

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The forest land cover change is one of the important information in assessing the regional and global climatic changes. The forest land cover inventories of Nepal was carried out for the first time by the Forest Resources Survey office during the sixties. The inventory was based on aerial photographs and field sample plots. The information was updated by the Land Resource Mapping Project based on interpretation of aerial photographs taken during the year 1978-79.

The Forest Survey Division of the Forest Research and Survey Centre with technical assistance and funding from the Finnish International Development Agency has produced the report of the forest resources and deforestation of the Terai belt (which includes plains, hills and conservation area) from the year 1978-79 to 1990-91.

The study area comprises twenty administrative districts and covers 3.4 million hectare of geographical area of the country. The forest cover was found to be 1.4 million hectare or 41% of the study area, out of which only 546,000 hectare of forest area falls on the plains (potential production forest). The rate of deforestation in the plains has been found to be 1.3% per year.

The statistical method applied was stratified random sampling. The data was a combination of digital satellite images and field sample plot measurements. Field sample plots were located on the imagery with additional help of aerial photographs and were then used

of sediment load in the river course. The sediment load has been found to be the key factor of major changes in river course such as of the Kosi. With the population growth at a rate over 2 percent per annum after 1950, the energy requirement increased in proportion. It has resulted nearly 2% change of forest cover per year between 1960-80. Demand of fuel wood fodder, food and fiber along with population rise has set the vicious circle in action which resulted further loss of soil and also productivity. In recent years it is observed that natural hazards have increased in frequency as well as in space along with large number of loss of human being and property annually. Most common natural hazards are GLOF, cloud-burst, landslide, soil erosion, flood and earthquake. Landslide and soil erosion has been found to negate total development effort in infrastructures such as road, bridge, dam, canal, powerhouse etc. With the result people and country are becoming more poorer than before. To break the chain of the vicious circle of poverty deforestation (wood, fuel wood, fodder, food and fiber) and climate change Nepal has to increase her agricultural productivity by increasing investment in irrigation, fertilizer better seed and technique. To restore the watershed condition in its original state the afforestation and civil and bio-engineering works have to be carried out in degraded areas.

#### **The IGBP Terrestrial Transects: A Framework for Interdisciplinary Global Change Research**

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The IGBP Terrestrial Transects are an initiative of the global change research community that provides a useful framework for undertaking interdisciplinary work at a regional and sub-regional level. In most cases, the transects consist of a series of research sites and sample plots organized along an underlying gradient of a global change driver such as temperature or moisture. Such transects exist in three major regions of the world: high latitudes (tundra - boreal forest biome); mid latitudes (temperate forest - grasslands); and the semi-arid tropics (savannas). In the humid tropics, the main global change driver is not biospherical but rather directly anthropogenic - land-use/cover change. Thus, a series of regional studies in the humid tropics, based on land-use change as the global change driver, have been initiated by the global change research community. These studies can also contribute to the international set of transects, as their research can be organized and analyzed in terms of "conceptual gradients" of land-use intensity. So far three such regional studies are developing the humid or dry tropical forest regions: (i) the LBA (Large-scale Biosphere-Atmosphere Experiment in Amazonia) (beginning implementation); (ii) the Miombo Network of southern and central Africa (advanced planning); and (iii) the Integrated Southeast

Asian Global Change Study (planning). The proposed Hindu Kush-Himalaya study would be an excellent addition to the three existing or planned land-use change oriented transects. The transect approach offers some significant advantages by providing a platform on which to base regional global change studies. The transects (i) facilitate interdisciplinary research by using shared sites and a common overall framework; (ii) promote the integration and synthesis of individual contributing projects; (iii) provide a means to focus global change research on regional needs and interests; (iv) enhance the value of basic global change research for management applications.

#### **Dynamics of Land Use and Land Cover Change in Pondicherry Region, India: Geographic Information Systems Approach**

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Land cover change is driven by a multitude of processes. Natural processes, such as vegetation dynamics, involve alterations in cover due to natural changes in climate and soils. However, change of land cover driven by anthropogenic forces are currently the most important and most rapid of all changes (Turner et al. 1990). In the past, major land-cover conversions have occurred as a consequence of deforestation to convert land for crop and livestock production, conversion of land for habitation, infrastructure and industry, and conversion of land for mineral extraction (Turner et al. 1994). The human-induced conversions of land cover, particularly during the last two centuries, have resulted in a net release of CO<sub>2</sub> to the atmosphere, changes in the characteristics of land surfaces (e.g. albedo and roughness), and decreased biodiversity. More subtle processes, termed land-cover modifications, affect the character of land cover without changing its overall classification (Turner et al. 1994). For instance, land-cover degradation through erosion, overgrazing, desertification, salinization and acidification, is currently considered a major environmental problem. Although the effects of land-cover modifications may be small at local levels, their aggregate impact may be considerable. This research has the objective of analyzing the spatial characteristics, temporal dynamics, and environmental consequences of land-use and land-cover changes that have occurred in Pondicherry region over the period 1980 to 1995 as a result of a range of socio-economic and bio-physical driving forces, and the significant implications for current and future land-use and land-cover change. An attempt to integrate human and biogeophysical driving forces for projecting changes in land cover through geographic information systems modeling which is the backbone of this research. The model includes a rule-based land-cover change module that is driven by the change in population size, income growth, and also governmental intervention policies on



land use. An extensive use of PC-ARC/INFO GIS software (3-4.2b version), along with PC-Freehand cartographic software is the landmark of the research work.

### **LUCC and "Socializing the Pixel"**

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The IGBP-IHDP core project LUCC (Land-Use/Cover Change) establishes a broad research agenda aimed at improving understanding of land-use/cover change dynamics regionally and globally through an integration of natural, human, and remote sensing sciences. LUCC does not fund individual research projects under its auspices. Rather, it networks the community of researchers, brings them together for "synthesis" activities, and assists them in qualifying for various research funds designated for global change research. One set of critical LUCC activities are referred to as "socializing the pixel." The full set of activities are detailed in the first LUCC Newsletter which can be obtained from the LUCC International Project Office (IPO) at the Institut Cartografic de Catalunya (Barcelona — email: [lucc@icc.es](mailto:lucc@icc.es) or website: <http://www.icc.es/lucc>). Here I focus on two sets of activities: empirical and behavioral and structural modeling approaches to understanding the regional dynamics of land-use/cover change. Empirical models seek to understand these dynamics as observed through satellite imagery, adding a spatial expression that cannot easily be obtained by other means. Given sufficient temporal resolution, the imagery itself can be used to create transition probabilities of land cover. This approach, however, suffers from problems of stationarity: changes in and shocks to the system that change the dynamics and, hence, transitions probabilities. In this case, socialization of the pixel involves the modification of the probabilities by inserting land-use and social characteristics into the pixels. Behavioral and structural models, in contrast, tend not to be spatially explicit, but capture much of the complexity that can account for the stationarity problems noted. The issue here are two: accounting for shocks to systems modeled and linking the models outcomes to the pixel. Eventually, the two approaches merge, offering the potential to address land-use/cover change from both in an integrated way. Key issues involve the identification of the interchange points between the modeling approaches (where does either cease to be robust) and the regional variation in different kinds of land-use/cover change (e.g., deforestation, intensification of cultivation, expansion of pasture).

### **Land Use and Land Cover in Pakistan and Changes in the Hindu-Kush Himalayas Region**

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Pakistan's geographical area is around 79.6 million hectares (mha), out of which about 23 mha are cultivated. About 75% of the cultivated area is under irrigation in the Indus basin and rest depends on rainfall or runoff for meeting evapotranspiration requirement. Over 3.0 mha are under natural forests and around 8.5 mha are productive rangelands. There are 13.0 mha classified as culturable waste primarily due to limitations of water. The major part of Balochistan, Sulaiman ranges of the Punjab and NWFP, Wet Mountains, and Dry Mountains of the Northern Areas constitute the HKH region. In the HKH region, free grazing, loss of rainwater through surface runoff and increased demand for fuelwood are the major causes of degradation of the surface cover. However, due to the arid environment and continued degradation in the mountainous regions, the land resources are now in a state where major rehabilitation is required through improved management of existing water resources for domestic, stockwater and irrigation needs. The HKH Region now represents the most fragile and brittle environments where poorest-of-the-poor live. The women in these areas are actively engaged in collection of fuelwood and water for domestic use. The productivity of the natural forests is declining and now hardly 40% of the existing forest area is characterized as productive forests. The net primary productivity of the rangelands is also declining rapidly due to increased population of animals and certain rangelands are now not productive at all. The mountain water resources are being tapped to an extent that groundwater levels are declining by 2-3 meters per year in valley irrigated horticulture. The sustainability of changes in the existing land use from range-livestock system to irrigated horticulture requires efficient management of irrigation water and conservation of rainfall/runoff for sustainable groundwater recharge. There is almost 100% increase in irrigated horticulture area in the Balochistan province during the last 20 years (1975-95).

### **Landscape Ecology of the Makalu-Barun National Park, Nepal: Establishing Baseline Data for Land-Use and Cover-Change Analysis**

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Highly complex mountainous landscapes in the Himalaya are characterized by spatial, biological and

cultural diversity. Lack of accurate or timely data is a major constraint for managers, policy makers, and researchers in rugged or remote mountainous regions. Establishing baseline data for land use and cover change (LUCC) analysis, as well as for Geographic Information Systems (GIS) modeling capability, is essential to identification and understanding of change processes. Change detection and modeling of these processes within a GIS environment based upon satellite remote sensing may be a cost-effective strategy in remote mountainous terrain. Due to the complex physiography of mountainous landscapes, accurate terrain modeling is an essential prerequisite to a wide variety of landscape level analyses, e.g. extent and distribution of terrain and landscape features, watershed and stream networks, and vegetation, land use, and habitat types. The use of satellite remote sensing data for LUCC analysis in steep and highly heterogeneous terrain is evaluated in a case study of the Makalu-Barun National Park and Conservation Area (MBNPCA) of eastern Nepal. The MBNPCA encompasses more than 8000 meters of vertical relief within 2300 sq. km. of protected area, with bio-climatic zones ranging from tropical to alpine. Although a great diversity of vegetation types are found within the area, including significant stands of various closed canopy late-successional forest types, substantial pressures on the natural resources of the area are evident. Agricultural practices of the 32,000 inhabitants of the area, primarily subsistence agriculturists, range from terraced hill farming to swidden practices and high altitude trans-humance pastoralism. Although tourist visitation to the Park is currently relatively low, substantial increases in tourism are expected as access and infrastructure improve. As part of an overall methodology for establishing baseline datasets for terrain and landscape analysis, a set of precision georectified and orthorectified digital base maps have been produced of the study area from satellite imagery. The maps are intended to facilitate and georeference both further research and classification of the satellite imagery. An overview of the larger research project includes: Extensive field survey and ground truthing conducted from 1991 to 1995. Forest and vegetation communities were sampled and observations were georeferenced using Global Positioning System (GPS) receivers. Multivariate statistical analysis identified significant relationships between community composition, distribution, and several site and topographic characteristics, including disturbance levels. A precision georectified DEM extracted from stereoscopic SPOT imagery is compared with a DEM generated from digitized 1:250k contour vectors. Both Landsat TM and SPOT imagery were orthorectified and precision georectified using a corrected DEM. The higher spectral resolution Landsat TM data were merged with higher spatial resolution SPOT data to produce both a digital and hard copy satellite photomap. This base map is useful both in the field, and as a visual aid for image classification. Vegetation and land use types will be delineated from the satellite imagery based upon

spectral characteristics and ancillary data, and utilizing topographic normalization techniques to compensate for high relief and topographic shadows. Results allow GIS modeling capability for LUCC and wildlife habitat analysis. By georeferencing these efforts to regional databases such as the ICIMOD's Nepal 1:250k GIS Database, results can be integrated into larger regional or global change models.

### **Historical and Contemporary Patterns of Land-Use/Land Cover Change in the Himalaya: Regional Characteristics and Local Processes**

Zurick, David

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This presentation examines the regional processes of environmental change in the Himalayan mountains located between the bends of the Indus and Brahmaputra rivers. The study includes the analysis of archival land inventory and national census data on population, forest cover, and land use change over the past century collected for 120 mountain districts in Pakistan, India, Nepal, and Bhutan. This comprehensive regional analysis was supplemented by intensive field study at seven sites in the Kulu and Sutlej Valleys (Himachal Pradesh), the Alaknanda Valley (Uttarakhand), the Annapurna Nature Preserve and the Middle Mountains Region (Nepal), the Richu Khola Watershed (southern Sikkim), and the Tongsa and Mongar Valleys (central Bhutan). The field sites were selected to assess the role of both natural processes and development activities such as roads, new agricultural projects, tourism, and rapid population growth in the region's land-use/land cover change. The study results presented here will focus on macro-level regional trends in land cover change linked to demographic and socio-economic factors. A series of choropleth maps based upon a comprehensive geographic data base and drawn using Atlas-GIS show regional changes among study factors during the historical (1890-1950) and contemporary (1950-1990) periods. The objective of the cartographic analysis is to describe the internal diversity of the Himalaya setting and to understand how the patterns of land-use/land cover change uncover a great deal of regional variability. Such variability discounts a highly generalized model of environmental change across the entire Himalayan mountains. The study shows the environmental consequences of specific local processes tied to subsistence resources, market economies, infrastructure developments, and government policies. In examining the regional diversity of land-use/land cover change across the Himalaya and in devising alternative mountain regions based upon historical nature-society change, the paper contributes new ways to think about Himalayan regions. Conventional divisions of the mountains according to geocological perspectives are critiqued in light of the political ecological factors. While the former may serve well to

explain the spatial distribution of naturally-occurring habitats, they are less successful in explaining the geography of contemporary human-environment relations. The latter are preeminent in producing the recognizable patterns of land-use/land cover change. The use of archival data, national censuses and land cover inventories to develop the macro spatial analysis is also critiqued in the presentation. For example, serious gaps exist in the historical database which preclude some types of regional analyses. In other cases, the accuracy of national inventories may be questioned.

Nonetheless, the study predicts that for comparative purposes, to determine broadscale historical and spatial trends, the archival database provides a very useful measure of environmental conditions. The explication of the natural and social processes that contribute to those trends, however, relies on understanding the local dynamics of change. The wide variance of local processes across the region introduces the problematique of a macro-theoretical explanation of environmental change.

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**26th Annual Conference on South Asia**  
**Center for South Asia University of Wisconsin-Madison**  
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**Consolidating Authority:  
Bureaucratization of Local Resource  
Management Institutions in Kangra,  
Himachal Pradesh**

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The imprint of the modern, bureaucratic nation state is visible in the structure of committees organized by farmers in Kangra, Himachal Pradesh to facilitate the management of the gravity flow irrigation systems (khuls) of the region. The bureaucratic organization of these kuhl committees, as well as their formal rules of operation, reflect the imperatives of conforming to an organizational mold recognized and legitimized by the civil administrative authorities with whom farmers must interact to petition for monetary grants for kuhl repair and maintenance. However, the diverse functions for kuhl committees belie their organizational uniformity and instead reflect to social relations which undergird them. Furthermore, the skills and knowledge necessary for successfully negotiating government grants differ significantly from those required for effective water diversion, conveyance, measurement and distribution. While the kuhl's watermaster (kholi) is adept within the latter realm, others, generally local elites, possess the requisite skills for action in the former realm and hence usually occupy the elected positions within the kuhl committee. The increased interaction with the postcolonial bureaucratic state has resulted in shifts of authority away from the generally mid-caste water specialists to more formally educated local elites.

**Seeing the Unseen: The Kathmandu  
Valley as Cakrasamvara Mandala**

Dina Bangdel  
*The Ohio State University*

Among the meditation cycles of the Heruka class Tantras, the Cakrasamvara Mandala figures prominently

in the technical practices of Tantric Buddhism, and especially in the Newar Buddhist traditions of Nepal. Housed in the secret agam shrines of many Buddhist bahas in the Kathmandu Valley, Cakrasamvara is one of the most important esoteric deities of Newar Buddhism, whose worship and meditation are not open to the everyone, but only accessible to the select few who have undergone ritual training and initiation. Confined to these secret practices, Cakrasamvara mandala meditation is rarely seen by the general Buddhist community.

Textual references state that the Kathmandu Valley is conceptually understood to be in the form of the Cakrasamvara Mandala. To demonstrate the defining of the valley as this sacred diagram, the paper will explore the articulation of the mandala through the self-arisen sacred places within the Valley, specifically the pithas of the Eight Mother Goddesses. Furthermore, based on original translations of a Newar manuscript depicting the 64 forms of Cakrasamvara, the paper will also not only discuss the ontological source of the Cakrasamvara cycle in Newar Buddhism, but will also re-evaluate the role of the Astamatrikas in the context of Tantric Buddhist methodologies of Nepal.

**Indian Responses to Himalayan  
Ethnography: Center vs. Periphery**

Gerald D. Berreman  
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Field research in the Garhwal Himalayas and Dehra Dun spanning 40 years, supplemented by continuing professional contacts with north Indian universities and the Anthropological Survey of India, have led me to pursue a long-term interest in professional, political and popular responses in India to ethnographic accounts -- mine and others' -- of Himalayan peoples and cultures.

A six month Fulbright in Kathmandu's Tribhuvan University in 1994, and follow-up visits each of the last

two years, provided an opportunity to conduct similar inquiries in Nepal. I report here a distinct and relatively consistent contrast between responses in the two nations among anthropologists, sociologists and other academics, administrators, politicians, newsmen, book sellers and a broader public.

The contrast is: in India, widespread embarrassment, skepticism, denial, rejection, even hostility, combined with a certain lurid fascination; in Nepal, curiosity, interest, acceptance, even enthusiasm and pride. Specific responses and events which led to and exemplify this contrast are presented, together with an analysis of its apparent sources.

The analysis hinges upon questions of contrasting familiarity with, and views of, the Himalayas as sacred geography, as contested socio-cultural ethnography, as political arena, and ultimately as center or periphery; as "us" or "them."

### **Filial Prestige: Notes on the Mnga'-bdag Lineage of Lamas in Upper Nubri, Nepal**

Geoff H. Childs  
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Nubri, an ethnically Tibetan enclave in north-central Nepal, is home to a lineage (*rgyud-pa*) of married tantric practitioners (*sngags-pa*) who claim descent from the 8th century Tibetan emperor Khri-srong Lde-btsan. This paper will review the written and oral sources relating to the history of the Nubri branch of the royal family, and address the question of why they settled on the southern slope of the Himalaya during the 17th century. In addition, the paper will discuss the lamas' social standing in the village where they reside, and their social status in the broader Tibetan world.

### **The "Asokan" Stupas of Patan: An Exploration of Their Sacred Meaning**

Cathleen A. Cummings  
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Patan is a prominent Buddhist center in Nepal and is traditionally one of the oldest cities in the Kathmandu Valley. This paper will examine its four stupas, the so-called "Asokan" stupas at the four intermediary quadrants on the outer edges of the old city. The primary focus of this discussion will be the antiquity of the four stupas, the whereabouts of the elusive "fifth" stupa at the center of Patan and the possibility that these five stupas signify a mandala-like device protecting and containing Patan's sacred geography. By tracing the chronological development of the form of the stupa the paper will argue that the Patan stupas date to the early history of Buddhism in Nepal. The specific location of each stupa in relation to its immediate environment will also be discussed in order to confirm the early dating of each site as well as to demonstrate the greater function and meaning of each stupa within

the context of Newar Buddhism. As part of this discussion the location and signification of the fifth stupa at the center of Patan will be treated. Finally, this paper will look at the relationship between the four outer stupas to each other and to the fifth stupa in an attempt to show how they may reveal a mandalic-like pattern defining Buddhism in Patan.

### **(Mis) Adventures in Paradise: Tourism Discourse in Himachal Pradesh**

Rose M. DeNeve  
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Himachal Pradesh has been tagged for increased tourism development by both state and central governments. However, due to its unique geographical features, tribal populations, and underdeveloped tourism policy, Himachal also faces serious challenges in growing its tourism industry.

While much of the tourism literature promoting travel to India represents that country as a land of exoticism and mystery, Himachal Pradesh does not offer tourists the sort of stereotypical sights/sites found in Indian tourism's Golden Triangle (Delhi-Agra-Jaipur). Instead, tourism promotions produced for Himachal by both Government of India and the state tourism departments hope to appeal to a different kind of tourist—one less interested in collecting exotic destinations than in taking a holiday or having an adventure. Relatively few of Himachal's tourists are the big-spending foreigners found in the Golden Triangle: In 1994, only 51,100 foreigners visited Himachal, as compared with 1.8 million domestic tourists, many of them summer visitors escaping the heat of the Indian plains.

Promotions aimed at these tourists generally tout Himachal's mountainous landscape, natural resources, simple lifestyles, and the restorative powers these are presumed to hold. For the more intrepid, the promotions also offer a number of adventure activities, including trekking, river rafting, and hang gliding. Finally, they hold out the lure of experiencing unspoiled, "primitive" cultures quite unlike those of the tourists, who are assumed to be urban, affluent, and Western or Westernized.

But if a visit to Himachal is, as one brochure claims, an "ascent through paradise," tourism discourse in Himachal often shows little concern for the indigenous peoples along the way. Whether expressed as a marketing strategy or as destination development, it can create unrealistic expectations upon the part of both tourists and the hill peoples they come in contact with. Finally, tourists and tourism development can interrupt the organic growth of local economies, tax local resources, and catalyze undesirable social change.

The highly touristic area around Dharmshala offers a case in point. The village of Naddi, which lies in full view of the snow mountains about 1000 meters above

Dharmshala town, has seen in recent years a tidal wave of unregulated tourism development. The village's inhabitants, who are Gaddi tribespeople, have found their narrow road clogged, their fields trampled, and their water supply threatened because of this onslaught. But more disturbing for some are the changes in cultural values that have been precipitated by the lure of tourism, which some local people see as both amodernizing force and an easy road to affluence.

### **Himalayan Goddesses: The *Deuki* System in Far Western Nepal and Its Impact on High Caste Hindu Women**

Indrani de Silva  
*Smith College*

My research centered on the *deuki*, a class of high caste Hindu women living in remote provinces of Nepal whose significant role in the spiritual life of Hindu society once gave them special standing. The study observes their forced transition to prostitution and struggle for acceptance and survival in contemporary society.

The *deuki* system was outlawed in Nepal in 1950, but still flourishes today in the most remote regions of far western Nepal. *Deuki* in Sanskrit means "handmaiden to the Gods." It entails the dedication of young virgin girls to the temples of eight Hindu goddesses. Here they were required to perform rituals and maintain the cleanliness of the temple. The *deuki* are not permitted to marry. This prohibition effectively prevented the *deuki* from acquiring economic support through a husband. Many resorted to prostitution as a means of supporting themselves.

The stigma of prostitution has left an indelible mark on the *deuki* and has largely contributed to their demise. Efforts by the Nepali government and international organizations has been only marginally successful because of the failure to address deep cultural roots of the problem.

### **The Difference *Saayaa* Makes: How People in the Nepalese City of Bhaktapur Use the Cow Festival to Produce, Circulate and Utilize Sanctity**

Gregory Price Grieve  
*University of Chicago*

Secular scripture tells us that we are creators of the world, *Homo Faber*. While our other scriptures tell us that we are actors in a drama of divine creation and redemption, *Homo Religiosus*. This dichotomy obscures what actually occurs in such festivals as Bhaktapur's Gai Jaatra (Cow Festival). In this paper, I maintain that the sacred is both real and made by people. And, in fact, that reality's very human constructedness is what guarantees the experience of

sanctity. To demonstrate my point, I concentrate on the difference a fake (*nakkaali*) goat sacrifice made for the residents of the Bhaktapur Neighborhood of Suryavinyak. In order to articulate how the people of Bhaktapur generate and manipulate sanctity I employ three methodological tools: hallowed fields, religious technologies and sacred strategies. Hallowed fields are ritualistic social arenas defined by the experience of a difference which is perceived as extra-ordinary. Religious technologies create these fields; they are those tangible practices, buildings, and discourses which agents use to generate experiences which are different than the quotidian. And sacred strategies are the ways people use this difference in order to, in Pierre Bourdieu's words, "impose the definition of the social world most in conformity with their interests."

### **Regimes on Control, Strategies of Use: Foresters and Forest Users in Uttarakhand Himalayas, India**

Shubhra Gururani  
*York University*

The everyday practices of forest use, control, and access in Uttarakhand Himalayas present a complex picture of the interaction between the local users and the local level state officials. Despite the strict classification of forests since 1878 into different categories of use, access, and management in India, the local foresters - the forest guard and forest department officials - play a central role in controlling access to resources and carefully mediate the complex state-society relationship. The forest guards are invariably formally educated, upper-caste men and use their caste status and their positions within the state bureaucracy to intervene strategically between the forest users and state rules and regulations. They selectively determine the extent of use for different forest users, the level of fines for violation of forest department rules and regulations, and the punishment for offenders. The decisions to control and manage forest resources are based on their caste and class allegiances and are legitimated by their status as state employees. The forest users are fully cognizant of various alliances and exploit the ambiguities embedded in the state apparatus and strategically continue to use and access the state owned reserved forests.

### **"This Kind of 'Love' I Don't Like Too Much": Women, Pornography, and Consumer Sexuality in Kathmandu**

Mark Liechty  
*University of California-Santa Barbara*

Hard-core screen pornography has been available in Kathmandu for decades, but with increasing buying

power among middle class families and the arrival of VCR technology, viewing video pornography (local, Indian, Western, and East Asian) is becoming a more and more common experience for men and women, young and old. This paper examines three Kathmandu middle class married women's experiences and reactions as consumers of commercial pornography.

While most men have a nonchalant attitude toward pornography, women are both more guarded and more critical. But even though women are more likely to critique the misogyny of most commercial pornography, they often take a relativistic stance that assumes the sexual activities depicted are natural and suitable for foreigners, if not for Nepalis. Pornographic sexuality becomes another dimension of an experience of modernity-as-foreign commodity that Nepali women must struggle to reconcile with their efforts to build modern Nepali lives.

The paper concludes with a discussion of the parallel rise of restaurants, lodges, pornography, and prostitution in Kathmandu. I suggest that these are interdependent forms of public consumption all related to the development of a larger middle-class consumer culture in the city.

#### **Mandalas, Monuments, and Manuscripts: The Four Yoginis of the Nepal Valley**

Natalie R. Marsh  
*The Ohio State University*

Sakti worship has been an underlying religious basis of all of South Asia, and certainly of Nepal religions, whether Hindu or Buddhist. In recorded history and the creation story of Nepal, the Svayambhu Purana, this female component is clearly important. In Buddhist practice in Nepal the caturyoginis, four dynamic female deities, have served as personifications of sakti qualities. Four sacred sites were established at Sankhu, Pharping, Guhesvari, and temples built on the sites, to honor these female deities. Furthermore, their presence relates directly to the Cakrasamvara Tantra, the primary esoteric Tantra of Newar Buddhist practice. Through iconographic, textual and inscriptional analysis of the four yogini temple sites, as well as Nepalese artists' manuscripts from the Los Angeles County Museum of Art, the importance of the yoginis can be placed within the larger mandalic construct of the Nepal Valley.

#### **Local Management of the Upper Slope Forest of Central and Western Nepal**

John Metz  
*Northern Kentucky University*

Products taken from trees on private, common property, and open access lands are essential

components of farming systems throughout Nepal. In the hills and mountains, the largest remaining forest lie between 2500 and 3700 m, because monsoon mist and clouds cover that zone and hinder agricultural production. Over 90% of the people, however, live below 2500 m and most rely on private trees and the remnant forest patches common below 2500 m for their needs. As a result the vast majority of research on the use of forests has been at these lower, largely deforested elevations. That research has described interaction between people and forests ranging from open access to access restricted to known members of a "user group, to passive restrictions on "traditional" uses of forest (no grazing, no cutting of green wood, etc.) to active management of forests for biological and production objectives (cutting multiple stems to one, thinning lopping at a specified schedule, harvesting "mature trees). Establishing the institutions to govern active management is the most difficult and most important task user groups face. Few scholars have examined the management practices of people controlling the upper slope forests, even though these are the largest areas of more or less intact forests remaining in the uplands. This paper will outline some of the research that has been done on these upper forests and suggest the future research that might increase our knowledge and help improve management.

#### **Power and Nature: Contestations Over Land Use in Nepal**

Andrea Nightingale  
*University of Minnesota*

This paper presents a theoretical argument for understanding the linkages between social and ecological systems. I begin by examining how human-environment interactions are informed by discourses of nature and social relations of power. Ecological conditions are understood to influence social power hierarchies when groups who control land use ecological conditions as a means of reinforcing social control. In addition, when ecological conditions degrade marginalized groups often bear a disproportionate share of the resulting burdens and dangers. Using discourses of nature and social power relations as a central analytical tool is one way to link social and ecological systems. The range of land management options that a person will consider is limited by their understandings of ecology and their role within nature, both components of a discourse about nature. These land management decisions in turn affect (or don't) ecological conditions which can then transform or reproduce people's understandings of nature and the institutions that govern land use and social power relations, thus perpetuating the discourse. Some preliminary ethnographic results from fieldwork done in Nepal is used to support my argument and suggest areas for further research.

### **Social Resource and Symbolic Legitimation in the Tibeto-Nepalese Carpet Industry**

Tom O'Neill  
*McMaster University*

An explosion in the export of Tibetan carpets to European markets in the last decade has attracted hundreds of new carpet entrepreneurs from Nepal's rural regions to Kathmandu's bustling peri-urban communities where these carpets are woven. In this case study, an 'economy of practices' links one small scale entrepreneur to the social capital of a village that provides much of the labor on which his enterprise depends. In this paper, I will discuss how he legitimates his new role as city-bound entrepreneur in part by displaying his wealth and power in his native village through religious patronage. Economic utility is thus obtained by ensuring a trusted pool of carpet weavers, reducing the risks that other entrepreneurs face in an uncertain labor market. A purely economic accounting of these practices, I argue, overstates the extent to which this entrepreneur recognizes the utility of his behavior, but does usefully demonstrate how social resources are often mobilized in incipient industry.

### **A More Familiar Faith: Conversion to Mormonism in India and Nepal**

Jennifer Olsen  
*University of Utah*

Mormonism is one of the fastest growing denominations of Christianity in the world. It has transcended its U.S. origins to gain converts worldwide, most notable in the developing countries of Latin America, Africa, and Asia. How has the Mormon Church achieved such phenomenal growth, especially in competition with other Christian sects? This paper attempts to answer this question by focusing on the Church's recent missionary activities in India and Nepal, where ethnographic research was conducted during 1995-96. Analysis of interviews with missionaries and recent converts suggests that Mormonism has benefited in the transnational context form a distinctive "double tension" at its heart. The first tension is between what we call a shamanic orientation and a clerical orientation (Samuel 1993). As defined here, shamanism employs altered states of consciousness to gain contact with a more fundamental form of reality than that of everyday experience. As a result, shamanic religions remain open to change through divine revelation. Clerical religions, by contrast, are scholarly, disciplined, and hierarchically organized, with a tendency toward stable orthodoxy. Mormonism combines shamanic and clerical elements by stressing the possibility of divine revelation, even among lay persons, while filtering and regulating the content of such revelation through the auspices of an elaborate clerical hierarchy. Within the south Asian context, shamanic practices are familiar to

Hindus and appear to lend Mormonism an advantage in competition with more rigidly clerical forms of Christianity. Mormonism's second tension is between patriarchal family structure and economic individualism. On the one hand, women and children are enjoined by Mormon social values to obey the head of the household, who in turn answers to God. On the other hand, Mormonism stresses individual free will and divine rewards of hard work and the striving for economic prosperity. An emphasis on patriarchal family structure is again familiar to Hindus, yet Mormonism ironically combines this structure with an economic individualism that is usually regarded as a threat to the traditional extended family of India and Nepal. Mormonism strikes a balance, then, between the traditional values of patriarchal society and a capitalist mentality already at work in the south Asian context.

### **"Children-out-of-Place": Marginality, Criminality, and Paranoia**

Lazima Onta-Bhatta  
*Cornell University*

The street children in Nepal are popularly perceived as "children-out-of-place," i.e. not in "appropriate places for childhood." This paper focuses on the street children's placelessness in Kathmandu, and discusses: i) the processes of marginalization and criminalization of the street children; ii) how these processes interrelate with the meanings of the domestic and public spaces, the normative conceptions of children, and the public anxiety over safety, wholesomeness, and nation's image; and iii) the street children's experiences of violence.

Since the placelessness of the street children is linked with their subjection to violence from the state and the society, this paper focuses on the cultural construction of placelessness and how it signifies danger and disorder to the adults. Illustrating the relationship between adults' perception of the threat from the street children and their use of violence to control and transform them, the paper illuminates how violence emanates as a mechanism of the adults to maintain their specific imaginations of identity, status, and power when they perceive disorder in the processes of social reproduction. By fleshing out how violence is rendered different meanings by the state, the society, the NGOs, and the children themselves, violence is illustrated as a decentered, contested, and intricately layered phenomenon.

### **Strategic Religion: The Politics of Orthodoxy Among the Tamang of Nepal**

W. Dennis Pontius  
*University of Michigan*

Changes in the value placed on religious activities can drastically alter the social order and local level political economies. The resurgence of Tibetan

Buddhist ideology among the Tamang of Nepal has resulted in the transformation of their religious practices. This is particularly true for those living in villages who were, until recently, under the direct control of the state. In these villages other, non-Buddhist, religious forms and institutions were encouraged until quite recently. Now, central to the rise of ethnic consciousness among Tamang throughout Nepal have come demands for the return to Buddhist religious practice. In the Tamang villages of the Kathmandu valley this has led to a profound change in the religious activities of villagers. This is not only seen in the types of rituals participated in by lay people but in the make up of the religious order within these villages. In this paper I will trace the life of one man who has managed to remain a religious leader throughout this period of change.

Through an analysis of this man's life history I will show how the value placed upon various kinds of religious practice have changed over time. I will pay particular attention to how these external political considerations have influenced the religious activities of villagers and what this has meant in the lives of both villagers in general and those involved in supplying them with the rituals necessary in their lives.

#### **Using Spatial Information to Understand Forest Change and Community Dynamics: A Case from Nepal**

Charles M. Schweik  
*Indiana University*

In most settings, the forest composition we witness today is a product of temporal anthropogenic and nonanthropogenic disturbances. Any investigation dedicated to understanding human impact on forest resources therefore requires the collection of information on the condition of forests across multiple time periods. Or does it? Scholars from geography, anthropology and other disciplines have long been aware of the informing nature of spatial relationships: human actions from a previous time often leave their imprints in today's landscape. Traditional empirical studies of forest condition typically ignore this type of information and rely on aggregated forest-level indicators developed from aspatial plot-level analyses. This paper conducts a spatial analysis of one particular important forest product species using geographically referenced forest plots collected in the southern Siwalik hills of Nepal. After accounting for the natural spatial distribution of the species and physiographic influences, an unexpected geographic pattern is discovered. This pattern is best explained through an understanding of the forest governance structure and the social inequities that exist between villagers within the forest user community.

#### **Common Land and Common Tragedy: Any Common Ground?**

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*Florida A&M University*

Land is not just a feature in the grand configuration of nature; it is also a vital resource, imbued with social and cultural meanings because it is a source of social status and cultural roots. Land is what gives peasants their rootedness, what gives a peasant society like Nepal its economic character and grounding. By definition, common land can be viewed as a resource that anybody (or any class member) can claim. There are three competing forces that lay claim to this resource in the Tarai. They are: the state, the (local) dominant class, and the landless and near-landless (the dependent class). Admittedly, the division between the state and the dominant class is somewhat tricky because of the fact that the state's ruling class is generally the dominant class in society. In this sense their interests certainly overlap. Yet their diverse interests cannot be ignored. While the state as a ruling class is vested with the duty of protecting its dominant class interest, the state as a ruler composed of certain factions or individual members of the ruling class is keenly interested in preserving its own factional or individualized priorities, that is, to maintain its powerhold and hence the spoils of their power and authority almost at any cost. Such a power and class configuration and contestation over common land has historically led to common tragedies, both for poor peasants and common land resources. Yet missing from this picture is any common ground that can bind the three competing forces together for a common cause, that is, to protect the ecological sanctity of the land as well as the economic security of the poor. It is these issues that my presentation will explore.

#### **Locating the Mahasiddhas in Newar Buddhism**

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The *Mahasiddhas*, Great Accomplished Ones, from a diverse range of personages from kings to housewives who, having obtained higher realizations in their lifetimes, acquired transcendental powers over physical and mental phenomena. The tradition of great siddhas or master yogins occurs both in Buddhism and Hinduism. The great siddhas are generally believed to represent real, historical personages whose life spans coincided with the establishment of the great Buddhist learning centers during the Pala Sena Dynasties (7th to 12th centuries). In the Tibetan Vajrayana traditions, the great siddhas figure significantly as the authors and transmitters of many important texts. Although no similar teaching lineage per se occurs in Newar Buddhism, sick/has are mentioned in the Swayambhu Purana, and a sick/has are frequently represented in



Newar Buddhist art. Their importance is primarily related to Cakrasamvara, the agam deity of many Newar temples. This paper will examine what sick/has occur in Newar Buddhism and how they relate to the greater ontology of the Newar Buddhist community.

### **Government by Deity: Caste, Representations, and Agency in a Former Himalayan Hindu State**

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Caste (with a capital 'C') no longer dominates anthropological studies of India. But, despite repeated assertions that Enlightenment models and orientalist discourse have rendered caste agency invisible in western historiography, we still know little about the political life of castes (with a small 'c') in the precolonial Hindu state -- especially in the 'mid-field' of power between 'king' and 'village.' My regional fieldwork on the 'devi-devata system' (system of goddesses and gods) of eastern Himachal Pradesh fills the gap with a detailed study of a Himalayan political idiom which one of my informants felicitously calls 'government by deity.'

Ethno-historical analysis shows that the 'signifying practice' of tutelary deities and their oracles formerly articulated a territorially organized and caste-ranked system of collective representation, power, and agency in the twenty-two Hindu states of the Simla Hill States District under colonial rule.

I argue that this traditional religious system, now seen as the sign of 'under-development,' still preserves a pre-colonial form of Hindu polity frozen by 'British protection' in 1815. My paper focuses on the world-constituting representational symbolism of jati in government by deity in which different 'species' (jati) of tutelary deity 'stand for,' and 'act on behalf of' different human 'castes' (also jati) in four kinds of relationship -- 1) between local communities (in peasant society), 2) with the king (in the former Bashahr state), 3) with demons (in nature), and 4) with the great gods (in Indraloka) -- through an idiom of 'dancing' palanquins, oracular speech, processions, and assemblies.

### **Lessons from Ladakh? Local Discourses about development**

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Ladakh is often held up as a place where the ill effects of the 'development project' are clearly seen. Traditional Ladakh, in these representations, is placed either in the past, or in the villages. It is represented as an utopia of gentle Buddhists living in harmony with one another and their environment. This traditional Ladakh is then held up as a model for itself and the world.

This paper, drawing on more than a decade of research and engagement in Ladakh, critically reviews some of the dominant themes in the representation of Ladakh. Rather than engaging in a debate on authenticity, it lets Ladakhi political leaders, activists and 'the people' speak about their ideas of past, present and future of their society. These statements show that Ladakhis themselves do not recognize a glorious golden past, nor do they share a coherent critique of development, or 'Western civilization.'

Ladakhis' lived experience, in their own understanding, is not one between tradition and modernity, village and city, past and present, but an engagement with the conditions of their lives as they seek to create livelihoods. In this context, they consistently employ idioms of 'backwardness' and 'marginality,' attributing their lack of 'progress' to the machinations of unsympathetic and incompetent state governments. Their demands, quite logically, have been for more conventional development and a state of their own to manage it. Rather than engage these local conceptions, they have been dismissed and erased by counterdevelopment activists.

### **Nepalese Labor Migration to Japan: From British Army to Japanese Factory**

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According to Japanese immigration records, in 1989 during the height of Japan's rapid economic growth, 2,964 Nepalese entered Japan legally, an unprecedented number. Many of these arrivals overstayed their tourist visas to work illegally in jobs shunned by Japanese. Alarmed by the massive arrival of foreign migrant workers, the government implemented its revised immigration law in June 1990, imposing criminal penalties for employers hiring undocumented workers. In 1992 the economy entered a deep recession, leading the government to tighten immigration control even further. Nevertheless, the inflow of Nepalese workers continued. By the end of 1995 an estimated 3,000 unauthorized Nepalese--mostly men--were working in such labor-short industries as manufacturing, construction and services.

This study, based on 140 interviews and survey questionnaires collected among Nepalese workers in central Japan and returnees in Kathmandu and Pokhara, analyzes labor migration experiences of Nepalese as one of Japan's most vulnerable laborer categories. The research revealed a predominance of Tibeto-Burman speakers from Nepal's western hills, suggesting the likelihood that the well-documented antecedent "Gurkha connection" in the Asia-Pacific region has played a role in building contemporary Nepalese migration networks.