

Human and ecosystems interaction and its ecological impacts in Mountains: Lesson from scenario development in Himalayas of India

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The Himalayas in India is one of the biodiversity hotspots of the world. Therefore, there are many nature protection areas (NPA) such as National Park/Biosphere Reserves etc. have been established to support ecosystem conservation alongside development of local economy and people. Currently NPA occupying about 10% landscape in the mountains of the Indian Himalaya. Present study is aim to understand how human behavior is changing under shifting political, socio-economic and environmental conditions and to determine that consequently how the landscape have been changing in the region. Understanding the impact of human activity on natural resources is of critical importance in developing the way for effective management strategies. Empirical studies undertaken based on the identified indicators to study whole scenario development. Following the empirical studies the remote sensing data/ imagery were used to study the landscape development in multi-temporal dimensions.

Agriculture is main land use activity and strongly linked to the forests and provides sustainability to local people living there. For the future sustainability it is important to understand the driving forces and their role in landscape change trend of the Himalayan region. We understand the facts that besides human activities and decision there are several other factors responsible for the observed landscape change trends and changing scenario. Local perceptions on these issues were varied. A theoretical agent model was developed using the existing data sets to evaluate and predict the outcome of scenario development in Himalayan Mountains. Theoretical agent model developed here draw attention on agent/farmer behaviour and land resource use for his livelihood in temporal dimension. The current study would be helpful to intend the new approaches for the development of the methodological and theoretical aspects to study the complex human ecosystem interactions in Himalayan Mountains for the sustainable landscape development.

Keywords: Human and Ecosystem, Interaction, Natural Resources, Remote Sensing, Landscape, Sustainable Development, Himalayas

Methods and approaches used for the study

The work done for last several years in the Himalayan region of India facilitates the start of work in this direction, and thus the work-plan for the data analysis was developed. In order to evaluate sustainable resource management and economic development, a novel theoretical agent model was designed based on the complex interaction between human and ecosystems. In rural ecosystem study it is impossible to measure every variable of the system. Therefore, we have

identified the indicators for the study. Following the empirical study we used satellite data as historical record pertaining to land use was difficult to obtain for last 3-4 decades.

Relevance of our paper for the conference

As mentioned with background and purpose of the conference that it **“seeks to explore the causes and consequences of current land use trends and dynamics related to society, economy and environment”**. In this endeavor we have done our study in Indian Himalayan Mountains and identified the driving forces for landscape change in fragile Himalayan Environment and causes and consequences of the overall scenario development with emphasis on human and ecosystem interaction in the region. All the sectors such as agriculture, animal husbandry, medicinal and aromatic plants cultivation, natural resources utilization pattern and interaction of forests and domestic sector within the rural ecosystems were studied in detail and evaluated in economic and ecological currencies. Therefore, we have an impression that our work relates to the conference.