

Impact of Rural Livelihood on Land Use Land Covers in Tuichhuahen Watershed of Kolasib District, Mizoram: India

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Abstract: Land and forest are an important component of natural resources. Though humans have been modifying land resources to obtain food and other essentials for thousands of years, current rates, extents and intensities of land use land cover changes are far greater than ever in history, driving unprecedented changes in ecosystems and environmental processes at local, regional and global scales. The forest ecosystem provides watershed services and its modification results in multidimensional changes in watershed processes. Tuichhuahen watershed harbor good forest ecosystem services, but the changes in land use land cover due to anthropogenic activity disturb these services even beyond the watershed. Therefore, it is an imperative for planner, researcher and policy maker to analyse land use land cover changes at the watershed level.

Keywords: Rural Livelihood, Land Use Land Cover, Geographical Information System (GIS), Watershed, Soil Erosion

1. Introduction

The term land use land cover is a general term for the human modification of Earth's terrestrial surface. It can be broadly understand as the alteration and the manner in which human being employ the land and its resources and also implies changes in physical or natural state of the earth surface. While land cover and land use are often assumed to be identical, they are rather quite different. Land cover may be defined as the biophysical earth surface, while land use is often shaped by human, socioeconomic and political influences on the land. (Nagendra. *et al*, 2003) Though humans have been modifying land resources to obtain food and other essentials for thousands of years, current rates, extents and intensities of land use land cover changes (LULCC) are far greater than ever in history, driving unprecedented changes in ecosystems and environmental processes at local, regional and global scales.

The LULCC are mainly anthropogenic and are being increasingly recognized as critical factors influencing global environmental changes. (Helmut. *et al*, 2002, Nagendra. *et al*, 2004) The LULCC is primarily and largely confined to tropical countries (Myers, 1994). It is a complex and dynamic process which draw attention to scientific and academic community across the globe. Though, India is among the least witnessing the LULCC in tropical countries, the land and forest resources are not commensurate with its human and livestock population (Pachuau Rintluanga, 2009). However, conversion of forest to other agricultural land use, mainly shifting agriculture are common in Eastern Himalaya and the North East (Singh *et al.*, 1984, Rai *et al.*, 1994, Ramakrishna *et al.*, 1994, Schweik *et al.*, 1997, Sen *et al.*, 2002) as it continue to be the main source of livelihood for majority of the people. Therefore, it results in multi-dimensional changes in watershed services, future ecological balance and the livelihood of millions of rural community are at stake.

Tuichhuahen watershed is located in the western flank of Kolasib district in Mizoram having an extended total area of 26071 hectares. It harbor 10 census villages with a total population of 3523 and two urban centres with a population of 3981 in 2001 respectively (Appendix). The community of villages is composed of Mizo and Reang tribes with other negligible tribal community. Majority of the families directly depends on shifting agriculture and minor forest produces. The River Tuichhahen originates near Kawnpui and travels a distance of about 31.68 km. towards north and discharges its cumulative volume of 15197.1490 m³ in Barak river of Cachar district of Assam. The average annual precipitation in the watershed is about 240 cm. (mostly received during the period of SW monsoon. Highest intensity of rainfall is received during the months of May to September).

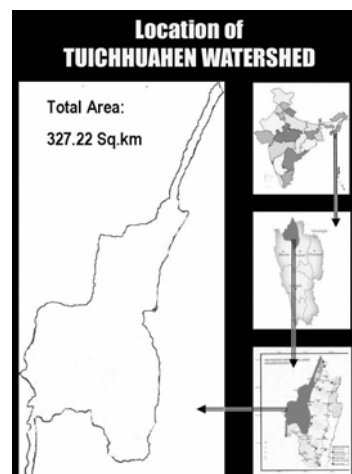


Figure 1: Map of location of the study area

The watershed like most part of the state of Mizoram is characterized by rough terrain wherein 27 per cent of the area falls in the slope group of 50% followed by 45 per cent under the slope group of 21% to 50%, 3 per cent of the area has a slope ranging between 9% to 21% and rest 25 per cent below 8% of slope i.e. almost 6518 hectares. As compared to

other watersheds as recognized by IRDAS, Hyderabad, Tuichhuahen watershed has proportionately the largest area under the slope category which may be maneuvered for different kind of land uses. However, the watershed is also exposed, due to injudicious use, to a very high degree of soil erosion and stands 3rd (third) on erosion index amongst all the watersheds of Mizoram. It, therefore, requires consideration and judicious planning on priority basis before the problem becomes insurmountable.

The soils under the watershed have developed mostly from tertiary deposits belonging to Surma group of rocks. They vary in their characteristics on account of differential elevation and slope. The watershed has a relatively good cover of evergreen and mixed forest where natural and luxuriant growth of bamboo dominates, more on the lower elevations. Bamboo, therefore, may provide, if judiciously used and transformed with labor motive instead of profit motive, a supplementary resource base for the local communities who then may refrain from misusing the forest resources due to realization of higher productivity.

2. Materials and Methods

An Aerial photo 1987 and LISS-IV images 2007 were used for change assessment by using Geographical Information System (GIS). Primary data and other necessary information were collected by using structured questionnaire with the help of the community in respective villages. Interview was conducted representing various local body and field level Forest Department staff to know the causes and path of changes. LISS-III Remote Sensing image (2002) IRS-IC/ID (Digital) is also used to highlight trends in Land use land cover during field work. Reports on Census of India 2001 are also used for population and household data.

3. Calculation of change assessment

The analysis of two dates satellite data viz. 1987 and 2007 remarks the level and intensity of LULCC. The empirical evidences show that the changes are anthropogenic. The rate of changes within twenty years in Shifting Agriculture is from 21 to 27 per cent. Another remarkable change is the increase in Bamboo Brake from 15 to 19 per cent. However, the area of Non Forest is also doubled from 6 to 12 per cent. There is also a huge reduction of evergreen miscellaneous forest mixed with bamboo from 58 to 42 per cent. This miscellaneous evergreen mixed forest is compact and dominates the land use during the 1980's.

Table 1: Change assessment using Aerial Photo and LISS IV image

Imagery	Vegetation Types	LISS IV Imagery 2007 in km sq & (%)				
		SA	BB	MB	NF	Tot. 1987
PHOTOGRAPH 1987 in Sq. Km & %	SA	14.6	17.7	0	1.9	34.2 (21)
	BB	5.4	6.2	11.3	1.5	24.4 (15)
	MB	22.7	6.6	55.5	7.5	92.3 (58)
	NF	0	0.4	0	8.7	9.1 (6)

	Total 2007	42.7 (27)	30.9 (19)	66.8 (42)	19.6 (12)	160(100) -100
Note:						
SA = Shifting Agriculture; BB = Bamboo Brake						
MB = Misc. Forest with Bamboo; NF = Non Forest						

4. Discussion and Conclusion

The communities in Tuichhuahen watershed largely depends on land and forest resources for livelihood necessity. These occupational activities modify and change the Tuichhuahen Watershed landscape. The in-migrants of the Reang community and the policy to accommodate temporarily by the state government during the late 1980's increase the pressure on land and forest resources. This Reang community lead a nomadic life and solely bank on jhum cultivation for their livelihood. Conversion of forest land for shifting agriculture purpose and encroachment of notified reserved forest was common in Tuichhuahen Watershed. Forest with a mixture of Bamboo was the dominant land use/cover with an extensive shifting agriculture land use during the last two decades. After a decade of extensive exploitation, the land is highly degraded and the remaining forest cover is also highly fragmented. The high rate of increase in Bamboo Brake and Non-Forest seems to be the result of an excessive use of forest and leads to land degradation.

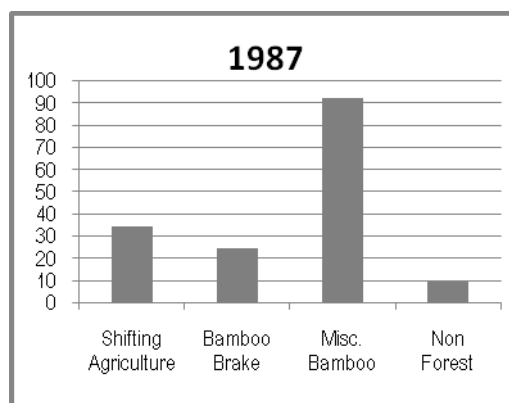


Figure 2: Comparative graph of land use land cover change in Tuichhuahen watershed – 1987.

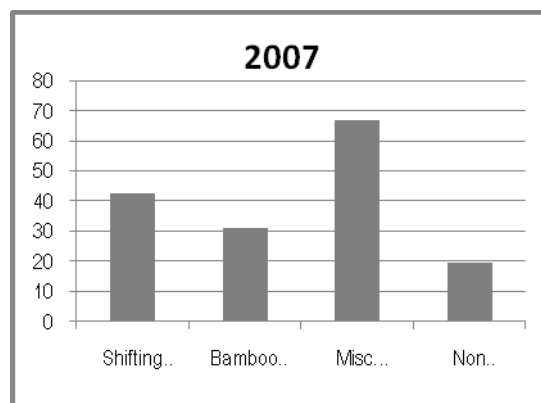


Figure 3: Comparative graph of land use land cover change in Tuichhuahen watershed – 2007.

The alteration and modification of land use/cover due to anthropogenic activity signifies a serious concern to

environment and ecological balance for the entire watershed. It also threatens the future livelihood of the communities. The intensity of forest fragmentation after twenty years also signifies a high degree of habitat loss. Moreover, it shows lack of proper planning and management of land and forest by the community and the concerned department. Which, in the long run is detrimental for balance ecosystem services and livelihood of the community in the entire watershed? The continuing increase in Bamboo Brake could lead to grass dominated land cover with soil fertility loss if the trend is not reversed. Therefore, it is important for the entire stakeholder to conserve and manage these resources on a sustainable basis in order to maintain future valuable ecosystem services of the watershed and the livelihood security of the community.

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Author Profile



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