

# LAND USE AND POPULATION DYNAMICS IN A MOUNTAIN WATERSHED: A STUDY OF SALAKHU WATERSHED, NUWAKOT, NEPAL

Sanam Kumar Aksha<sup>1</sup>, Yashoda Rijal<sup>2</sup> and Chudamani Joshi<sup>1</sup>

<sup>1</sup> College of Applied Sciences, Tribhuvan University <sup>2</sup> Tri-Chandra Multiple College, Tribhuvan University

## Background

Satellite remote sensing has brought great opportunities in the measurement of worldwide land-cover change with regular improvements in the scale, frequency and range of variables that can be monitored. Remotely sensed land use land cover information integrated with those of socioeconomic data could provide a good reference for planning future forest management projects. The detailed analysis undertaken here aims to provide a basis for the future management of mountain forest and similar areas elsewhere in Nepal.

## Objective

The main objective of this study is to assess and analyse the spatial and temporal land-use changes of the Salakhu Khola watershed of Nuwakot district between 1989 and 2006, and assess relation of population dynamics on the land use land cover change of the study area.

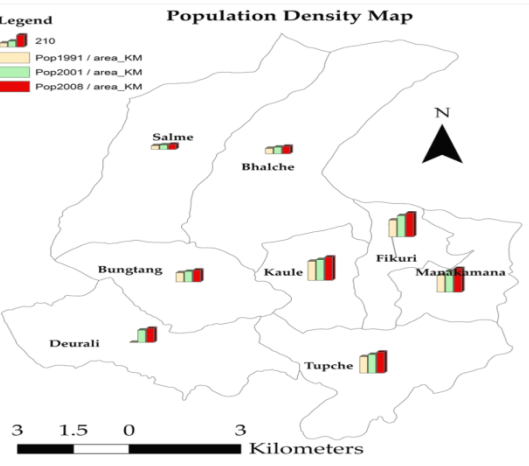
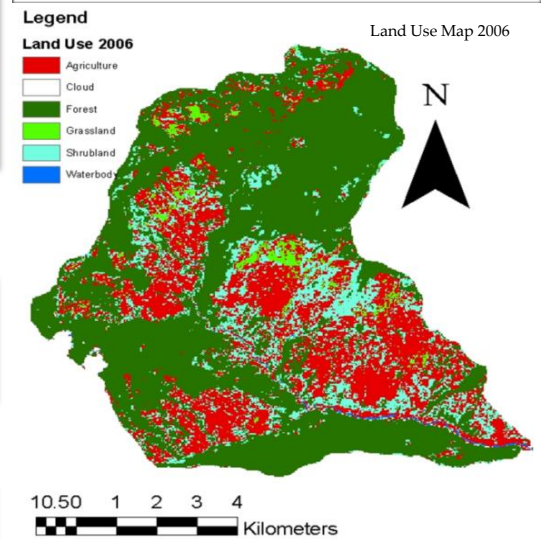
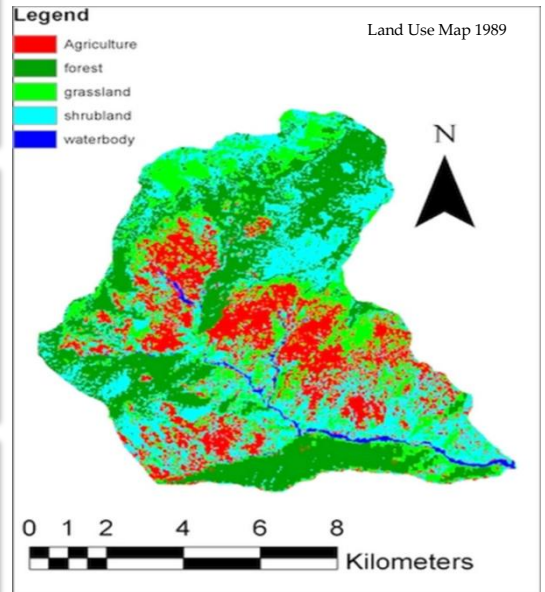
The Specific objectives are to

- Quantify land use land cover change in Salakhu Khola watershed using GIS/RS.
- To compare patterns of land cover changes in the study area during the period between 1989 and 2006.
- To assess population dynamics and its link with land use change.

## Methodology

- Area of 99.46 Sq. Km; 27°58'30" to 28°05'00" N and 85°03'38" to 85°11'11" E
- Landsat Satellite Images were collected
  - Landsat Thematic Mapper (TM) satellite image dated 1989/10/31 and
  - Landsat Enhanced Thematic mapper (ETM+) satellite image dated 2006/10/30
- Supervised Classification – Maximum Likelihood Classification
- Trainings samples for ETM+ image were generated from field study on early February 2009 where as for TM image digital land use map was used.
- Land Cover Classification
  - 5 Classes: Forest, Grassland, Shrubland, Agriculture/Other and Water body
- Rate of Forest Cover Change
  - Rate of Change (%) =  $[(a2/a1)^{(1/n)} - 1] \times 100$
- Population was collected from Central Bureau of Statistics, Government of Nepal

## Results



## Land Use Change between 1989 and 2006

Land Use Class	1989	2006	Change
Forest	31.64%	61.46%	+ 29.82%
Shrubland	24.8%	13.18%	- 11.62%
Grassland	20.36%	2.02%	- 18.34%
Agriculture	21.6%	23.07%	+ 1.47 %

**Accuracy of Image Classification**  
 1989 – 89.25%  
 2006 – 90.65%

## Conclusion

- There is substantial increase in forest cover within watershed area over the last 20 year at the rate of 3.6%.
- The rate of the population growth for the watershed during study period is 1.85% .
- Most of the forest area found achieved mostly in expense from shrubland and grassland.
- The positive changes in forest cover provides some evidences of ecological sustainability of the resource, although the reversal of the decreasing trend in shrubland has raised some questions regarding the possible continuation of observed trends in future.
- Results lead to suggest that population growth continues to be an important factor impacting environmental change, despite the importance of the intervening factors presented in the research.
- Population growth is positively correlated with land development across all spatial and temporal scales. This suggests that population growth should continue to be considered as an important underlying driver of environmental change and of LUCC.

## References

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