

# Land cover change modeling in Kathmandu Valley, Nepal

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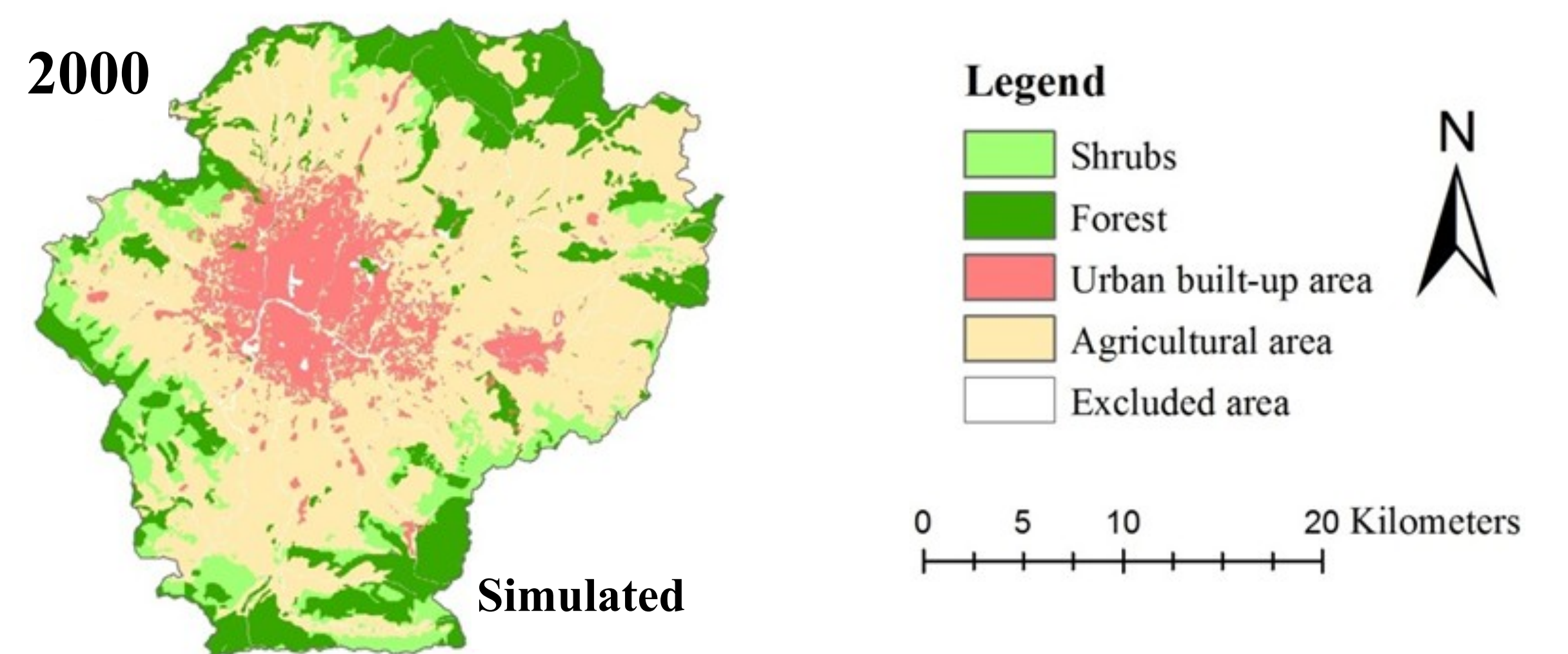
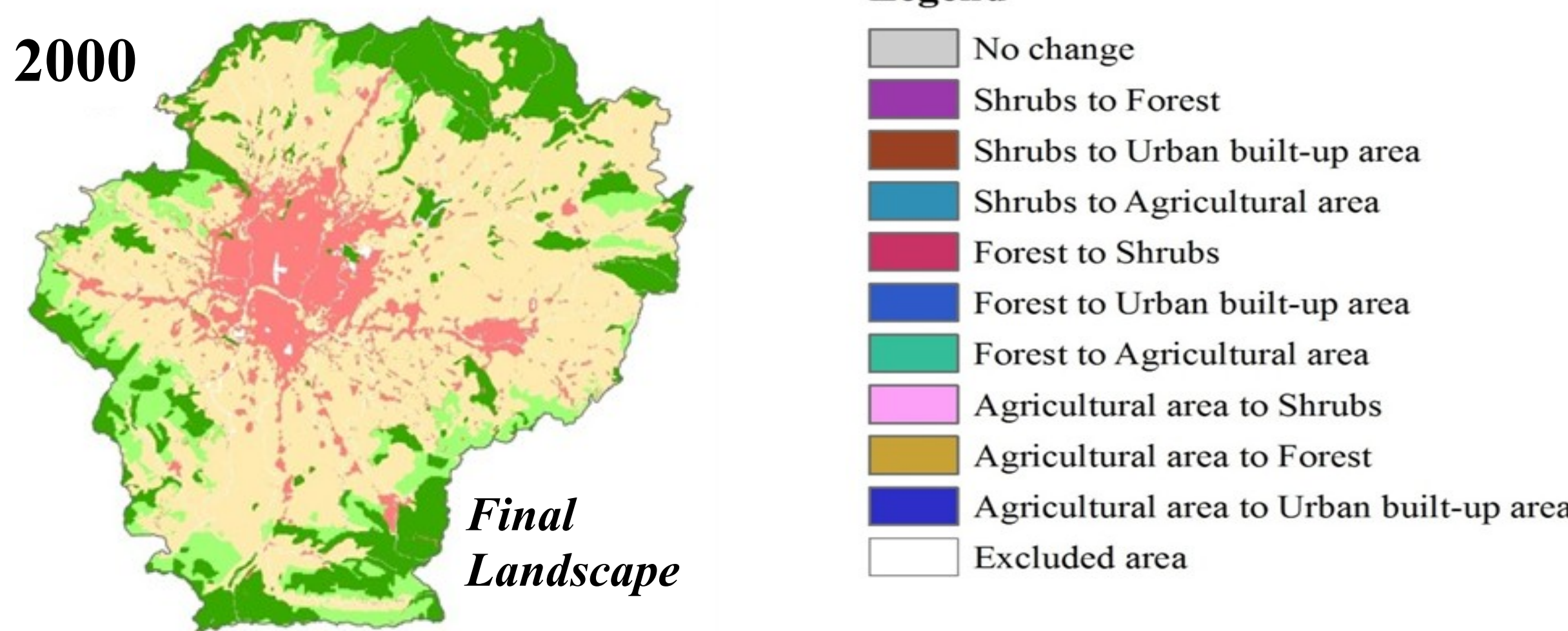
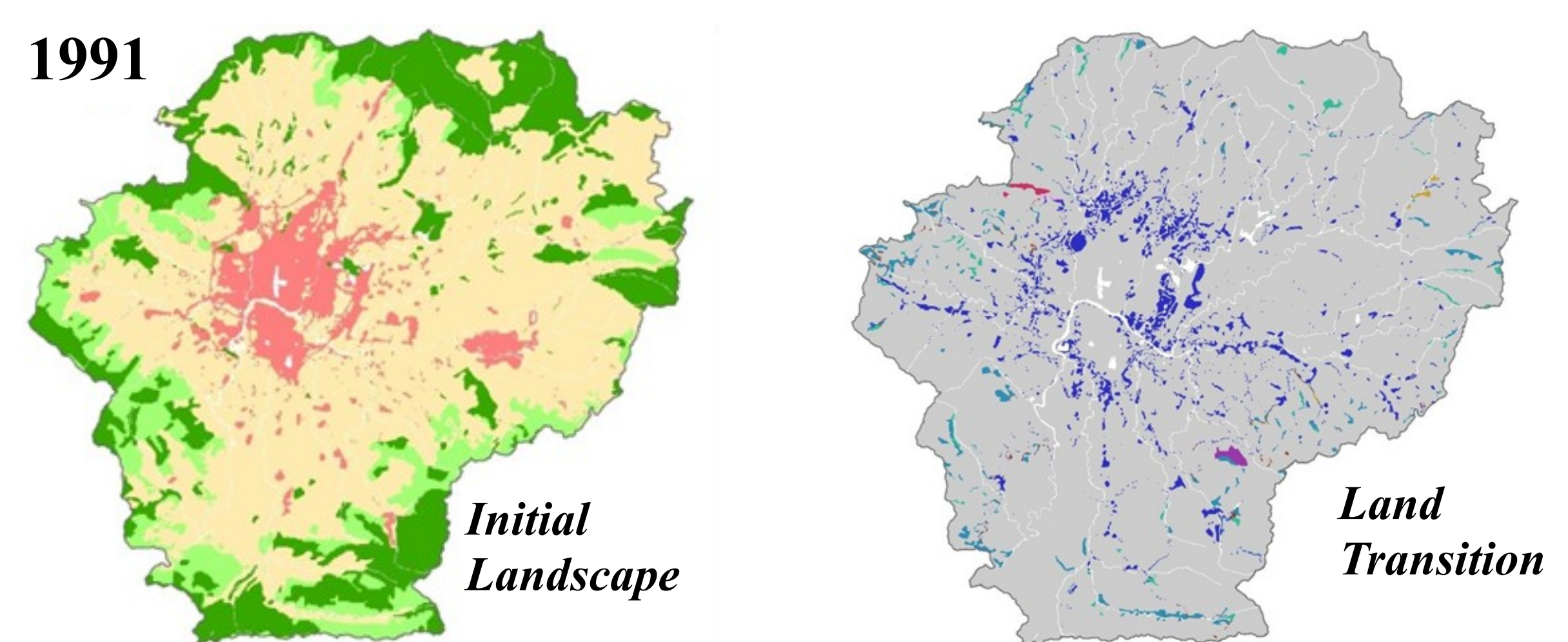
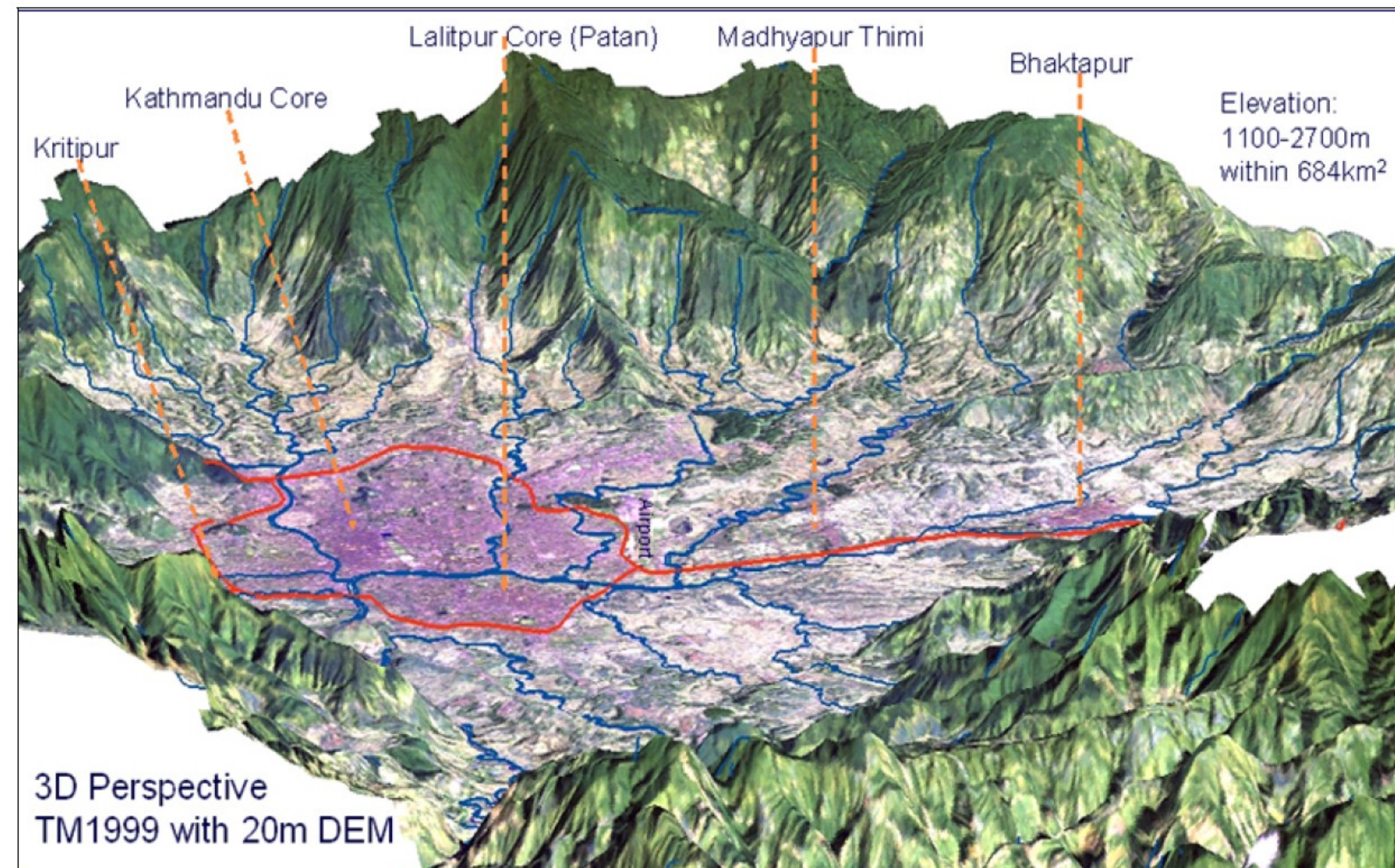
Graduate School of Life and Environmental Sciences, University of Tsukuba

Summer Course, Advanced Institute in Ecosystem Services Valuation and Modeling

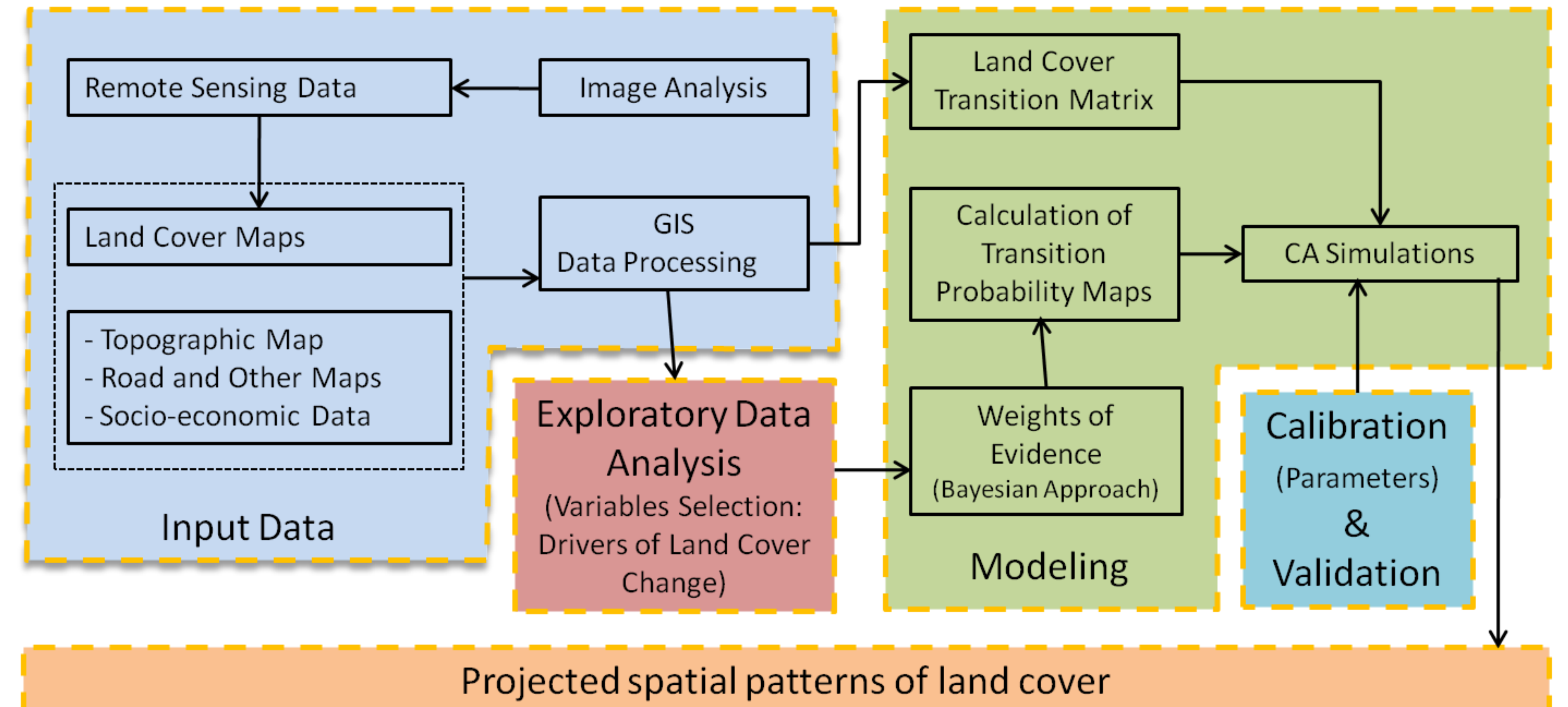
Hokkaido University, JAPAN (August 9-13, 2010)

**Motivation:** This research aims to simulate land cover change patterns using Bayesian probability function (weight of evidence) and cellular automata techniques. Kathmandu Valley, a river basin, forms the core of Nepal's most populous metropolitan region. With the complex mountainous terrain, it has very limited land resources for new developments. As similar to many cities of the developing world, it has been facing rapid population growth and daunting environmental problems.

## Study Area: Kathmandu Valley, Nepal



## Modeling Flow



Land change drivers (biophysical, infrastructure and social)	Year
1) Digital elevation model at 30m spatial resolution	1995
2) Slope in degrees	1995
3) Distance to rivers	1991, 2000
4) Distance to industrial estates	1991, 2000
5) Distance to five urban centers (Kathmandu, Lalitpur, Kritipur, Bhaktapur, & Madhayapur Thimi)	1991, 2000
6) Distance to major roads and highways	1991, 2000
7) Distance to ring road	1991, 2000
8) Distance to feeder roads	1991, 2000
9) Distance to existing built-up surface	1991, 2000
10) Annual population growth rate	1991, 2000

### NOTE:

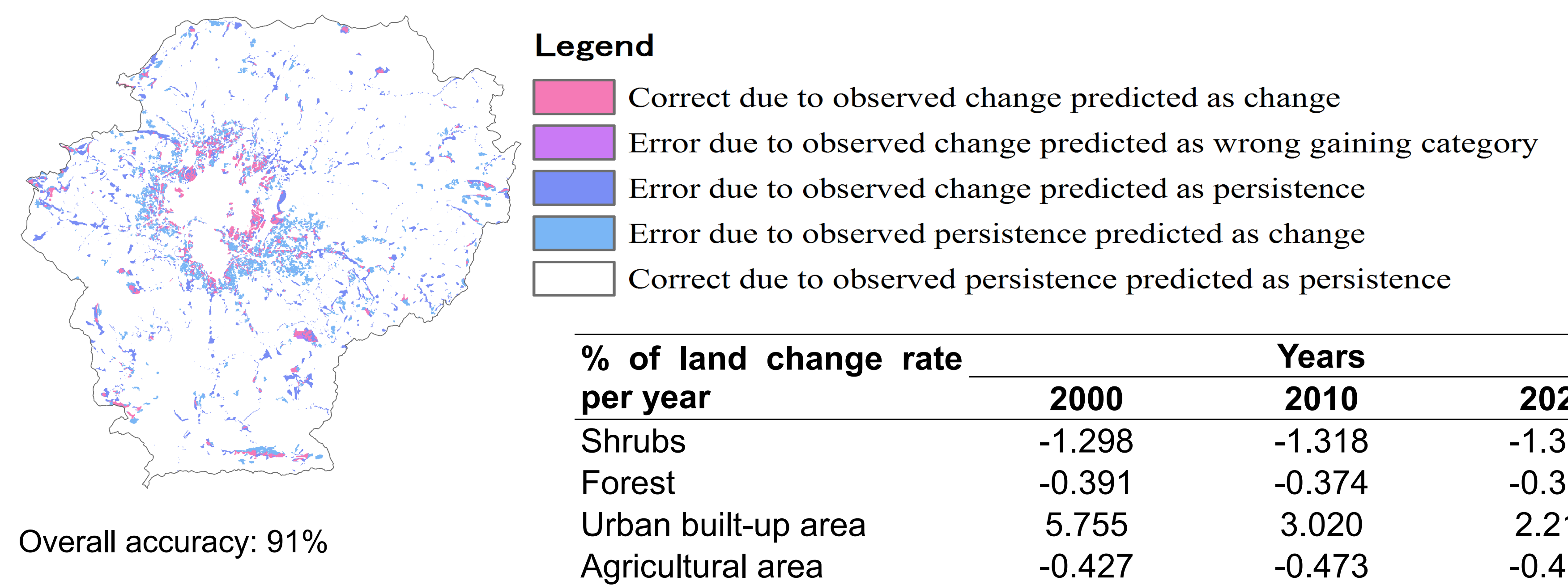
**Data source:** LANDSAT Satellite Image, University of Maryland. ICIMOD/UNEP (2001). Kathmandu Valley GIS Database, Kathmandu, Nepal. Thapa, R. B. and Murayama, Y. (2009). Examining spatiotemporal urbanization patterns in Kathmandu Valley, Nepal: Remote sensing and spatial metrics approaches. *Remote Sensing*, 1(3), 534-556. More information at: <http://publicationslist.org/rajesh.thapa>

**Software used:** ArcGIS 9.3 for data processing and DYNAMICA 1.4 for modeling.

### Next step:

Scenario based analysis and forecasting.

## Error analysis (three maps comparison approach)



Land cover	2000 (in %)	
	Actual	Simulated
Shrubs	10.71	10.72
Forest	20.04	20.10
Urban built-up area	13.02	13.02
Agricultural area	56.23	56.16

