THE MODELLING OF THE LAND COVER CHANCE IN SPACE AND TIME (PhD THESIS)

KATARZYNA OSTAPOWICZ

GIS LABORATORY, INSTITUTE OF GEOGRAPHY AND SPATIAL MANAGMENT

JAGIELLONIAN UNIVERSITY

Kostapowicz@gis.geo.uj.edu.pl

RESEARCH DESCRIPTION

DEFINITIONS:

LAND COVER IN THIS REASERCH: FOREST AND NON-FOREST AREA

LAND COVER CHANGE: LAND COVER CONVERSION (REFORESTATION AND DEFORESTATION)

MODEL: MATHEMATICAL OR STATISTICAL DESCRIPTION OF REALITY

AIMS:

- essential
- answer for questions: when?, where?, why? the forest are
- methodical
- find the best methods to answer for these questions
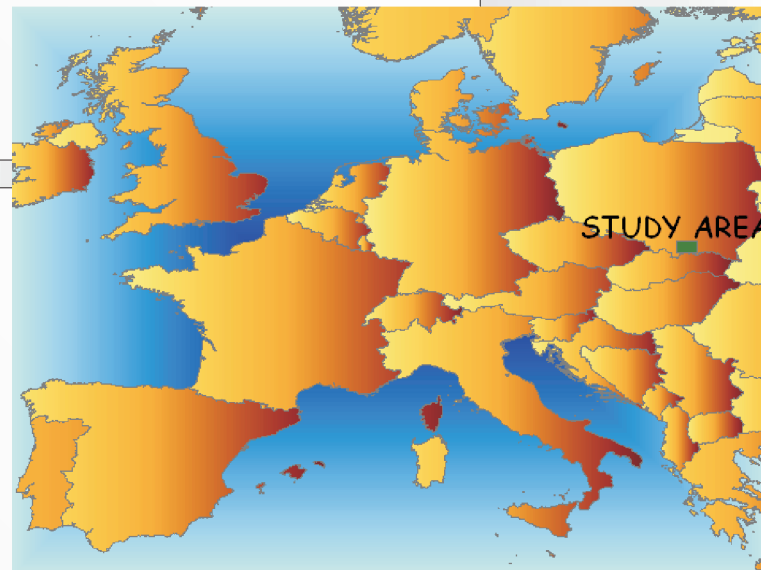
STUDY AREA

The research is carried out on the area of about 1650 km^2 in the western part of the Polish Karpaty Mts. The environment is characterized by parallel pattern of the main geological-tectonics-morphological structures and meridian running of axis of the main river abasement points out a spatial, horizontal regularity, on which vertical structure is overlapped expressed by climatic, vegetation and soil layers. In primeval vegetation cover forest was of main importance. The present state of forests is a result of anthropisation present for more than 500 years. It started in the thirteenth century with colonization, then in nineteenth century culmination of deforestation has taken place and clear cutting management and also "sprucerage". Next in twentieth century the repeated succession and experiments with a monoculture of spruce forest rebuilding have taken place. At present the slow succession of forest is observed, which is connected with policy transformation and following socio-economical changes.

STUDY AREA

SOURCE MATERIALS

- satellite forest maps for two point of time 1987 and 2000 (Kozak et all 2004)
- DEM STRM (Shuttle Radar Topography Mission digital elevation model)
- statistical data for two point of time 1987 and 2000 (GUS - Polish Statistics Office)

- digitalization
- resampling

DATA BASE

- terrain modeling
- hydrological modeling
- distans and cost analysis
- potential distribution

RASTER MAPS (resolution 28.5)

Forest features:
- type of land cover
- precentage of the forest area
- fragmentation

Factors:

natural:
- altitiude
- slope
- aspect
- distance from main rivers
- cost distanst from main rivers (weight - slope)

anthropogenic:
- population
- ownership (national/private)

METHODS AND MODELS

MODEL OF THE SPATIAL CHANGE FOR TWO POINT OF TIME 1987 AND 2000

- descriptive statistics
- nonlinear multiregresion
- logistic regresion
- trend analysis

- crosstabulation
- images differencing
- kappa index

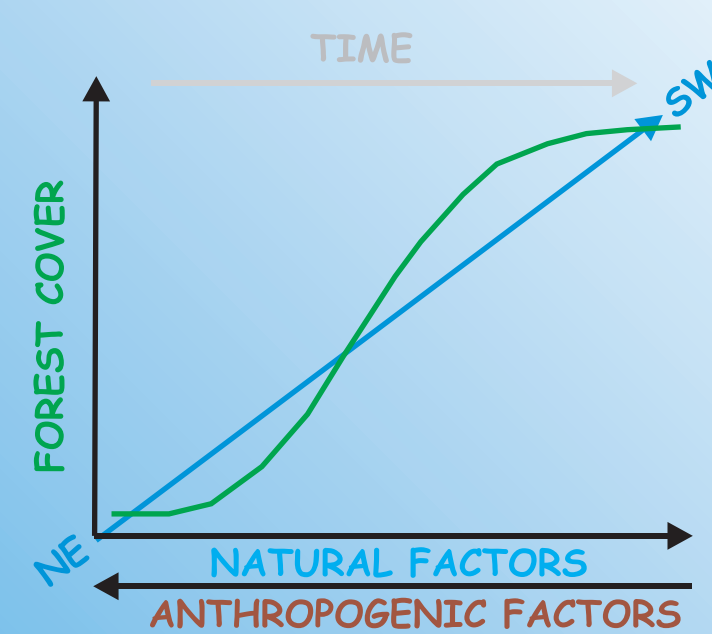### MODEL OF THE TIME CHANGE BETWEEN TWO POINT OF TIME 1987 AND 2000

- descriptive statistics
- nonlinear multiregresion
- logistic regresion
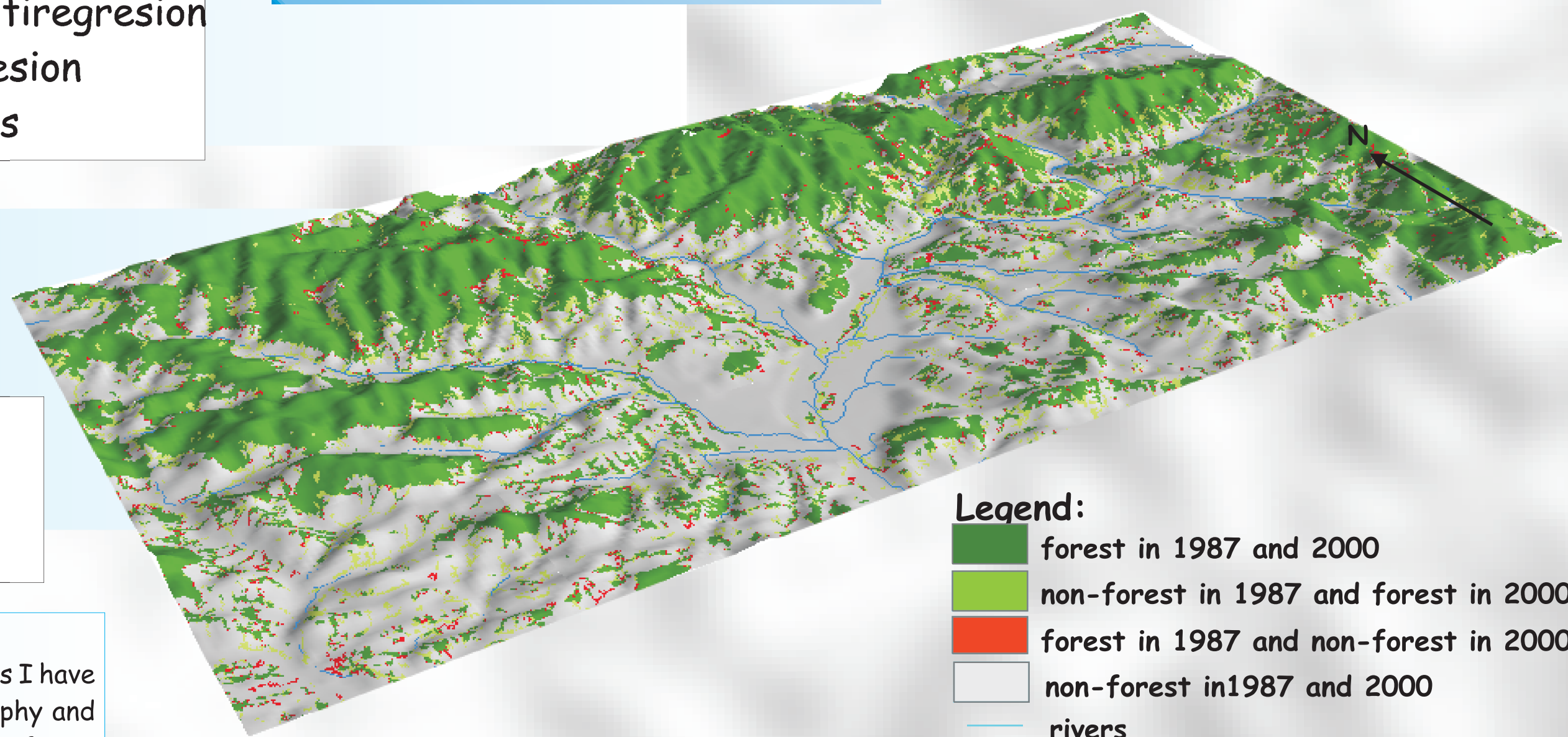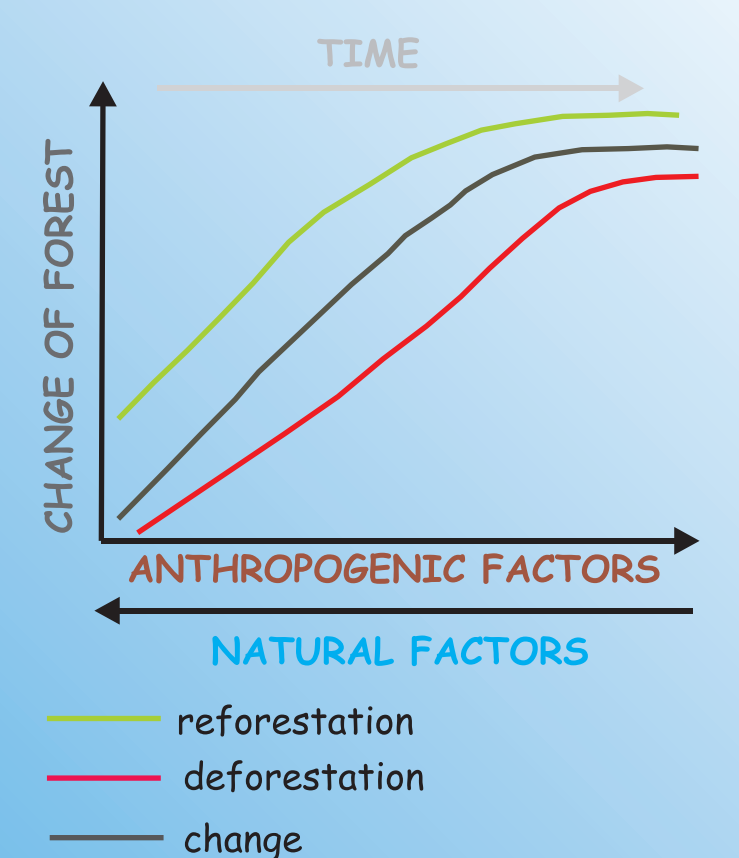- trend analysis

MODEL OF THE FUTURE CHANGE FOR 2013

- agent based model (cellural automata)
- multi-criteria evaluation

RESULTS

MODEL OF THE SPATIAL DISTRIBUTION OF THE FOREST AREA

MODEL OF THE SPATIAL DISTRIBUTION OF THE FOREST CHANGE

- reforestation
- deforestation
- change

Legend:
- forest in 1987 and 2000
- non-forest in 1987 and forest in 2000
- forest in 1987 and non-forest in 2000
- non-forest in1987 and 2000
- rivers

ABOUT THE AUTHOR:

I am the PhD student at the Jagiellonian University in Krakow (Poland). During the last three years I have been writing my PhD thesis and also I have been teaching students in the Institute of Geography and Spatial Managment The subject of my interest is related particularly to the development of new provisions for tools and mechanisms suitable for assessing and monitoring the new dimensions of Forest Focus, including this relationship to many other related factors.