



Vasilică-Dănuț HORODNIC<sup>1\*</sup>, Petruț-Ionel BISTRICEAN<sup>1&2\*</sup>, Dumitru MIHĂILĂ<sup>1</sup>, Vasile EFROS<sup>1</sup>

<sup>1</sup>Department of Geography, Faculty of History and Geography, Ștefan cel Mare University, Suceava, Romania (vasilica.horodnic@usm.ro)

<sup>2</sup>Regional Meteorological Centre of Moldova, National Meteorological Administration, Suceava, Romania (petricabistricean@gmail.com)

## INTRODUCTION

Romanian land use systems have been subject to an intensive research over the last decades, due to the complexity of land use change pattern which have occurred at the junction of human-environmental processes. A through insight into the land use change patterns and processes has accordingly been difficult to establish, not least due to the necessity of site specific information on land cover and use as well as on key driving forces of land use changes. The geographical position in the Central Europe and its socio-economic and institutional transformations after the fall of the socialism in 1989, determines the study area to represent an experimental territory for land use scientists. The present study aims to analyze the spatial and temporal dynamics of landscape pattern in response to land use and land cover changes in the Suceava river basin, Romania, between 1990 and 2012, by the application of a diachronic analysis of CORINE Land Cover datasets and GIS investigation techniques in a current way of interdisciplinary approach.

## STUDY AREA

The study area is situated in the north-eastern part of Romania (Suceava County) and in the south-western part of Ukraine (Cernăuți Region), having an elongated shape and is disposed approximately from NW to SE direction (Figure 1).

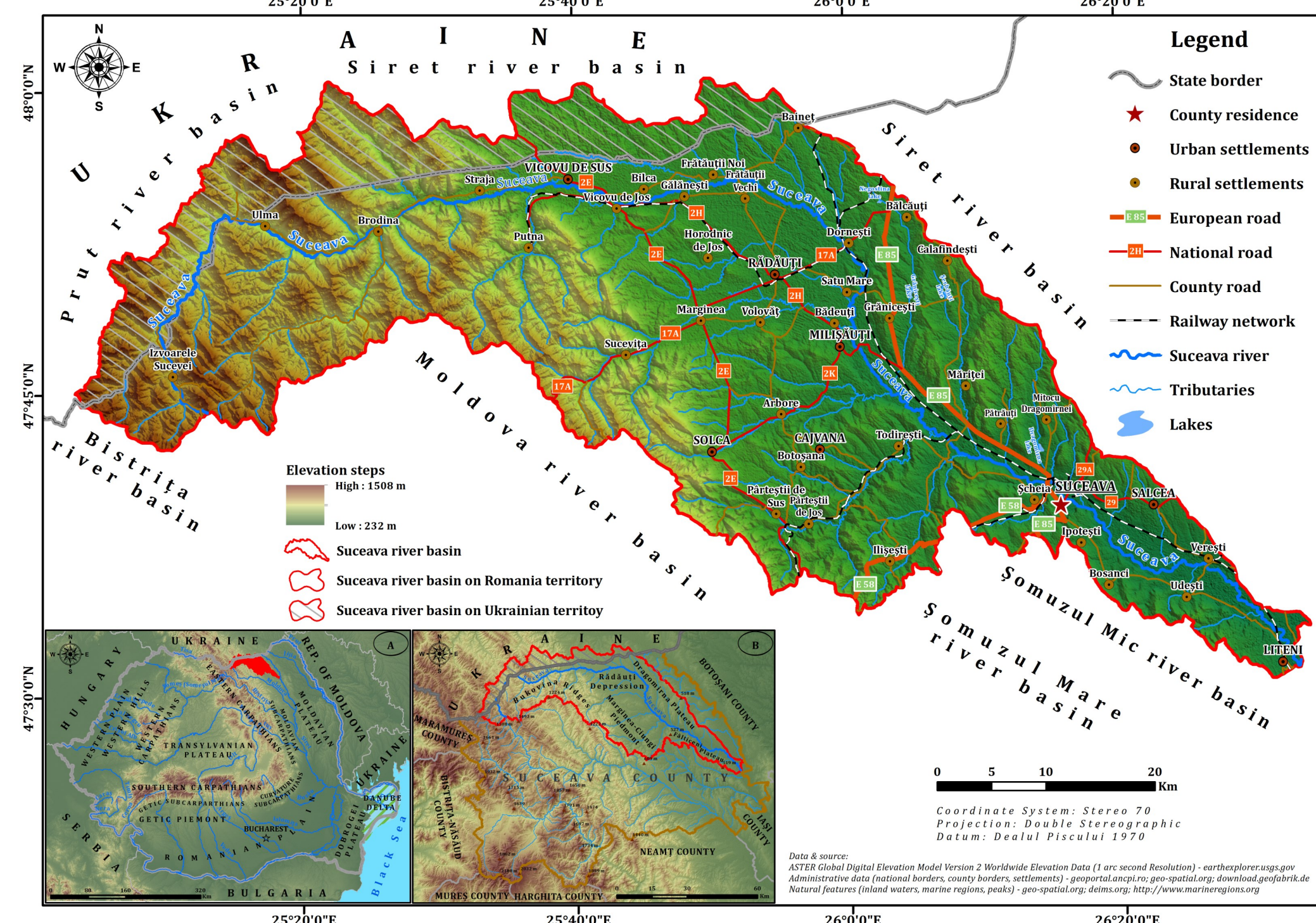


Figure 1. Geographical position of the Suceava river basin within Romania's main landform units (A) and Romania-Ukraine international border (B)

47°59' north latitude, and 25°05' and 26°33' east longitude.

## MATERIALS AND METHODS

The approach method employed in the present study was that developed by Scott and Haines-Young (1998), Haines-Young and Weber (2006), Weber (2007), Feranec et al. (2000, 2010) who grouped the changes in land use and land cover pattern by major land use processes. According to the previous methodology, eight land cover flows were identified and analyzed (Figure 2).

The methodological flowchart is based on several steps that are presented in (Figure 3). The first step includes data collection and GIS basic applications, such as, data acquisition, managing, basic analyzing and displaying of georeferenced data. We reproject the initial data in raster format with 100x100m resolution with Stereo 70 national coordinate system. The second phase of analysis consist of quantification of land cover changes and transformations processes (flows) during three different periods with distinctive socio-economic, political, technological and cultural characteristics, that were delimited by several particularities: (1) 1990-2000 (transition period to the market economy); (2) 2000-2006 (pre-accession period to the European Union) and (3) 2006-2012 (post-accession period to the European Union).

Finally, the presentation, the analysis and the interpretation of the results obtained represented the third phase of the research. In this way, we apply a cartographic approach in order to highlight the spatial and temporal pattern of land use/cover changes occurred at the level of the study area, on the one hand, while a statistical and graphical approach were employed for the presentation of the data strings, on the other hand.

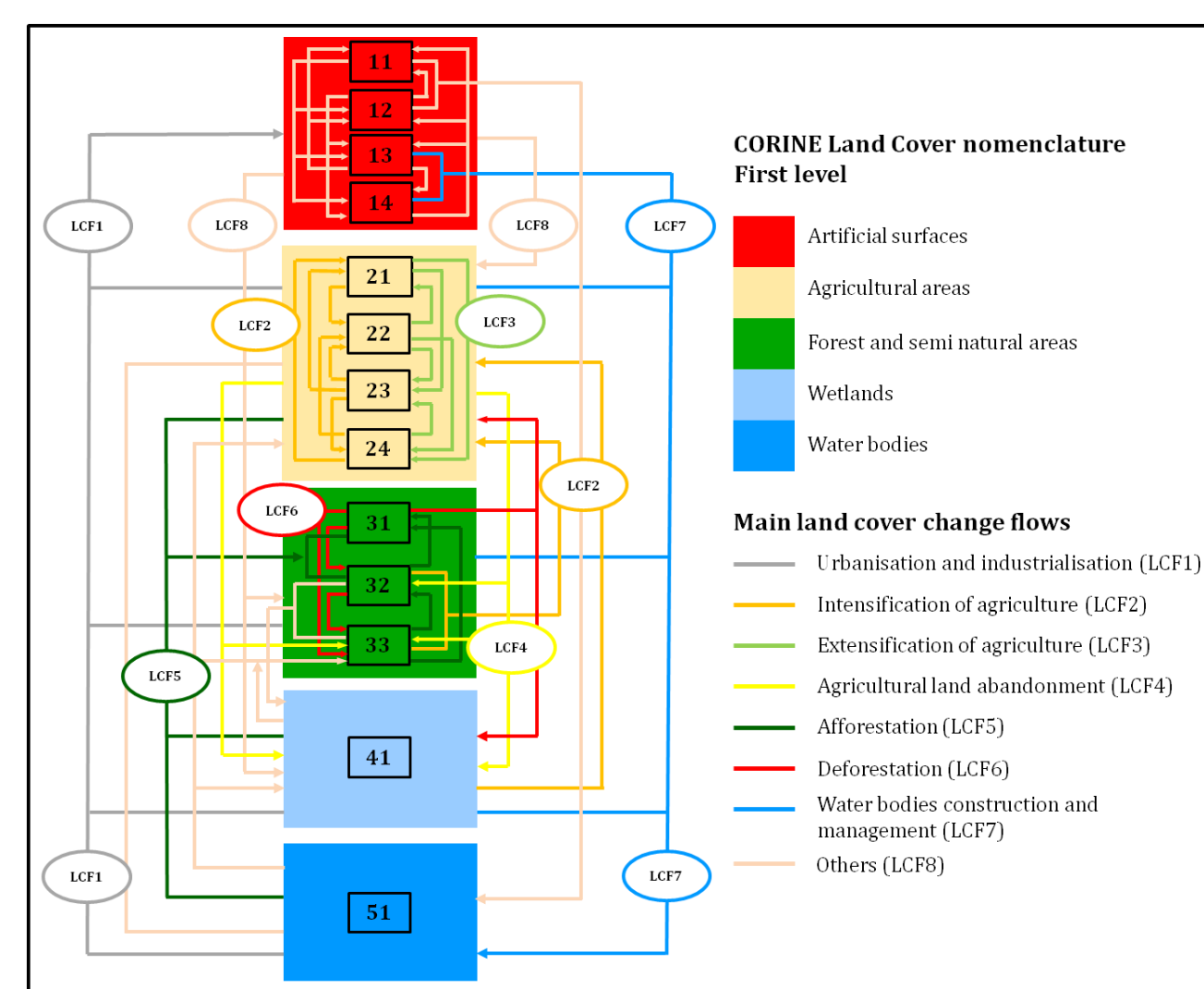


Figure 2. Conceptual framework of relation between land cover change flows and Corine Land Cover classes (after Weber 2007; Feranec et al. 2010), adapted the Suceava river basin

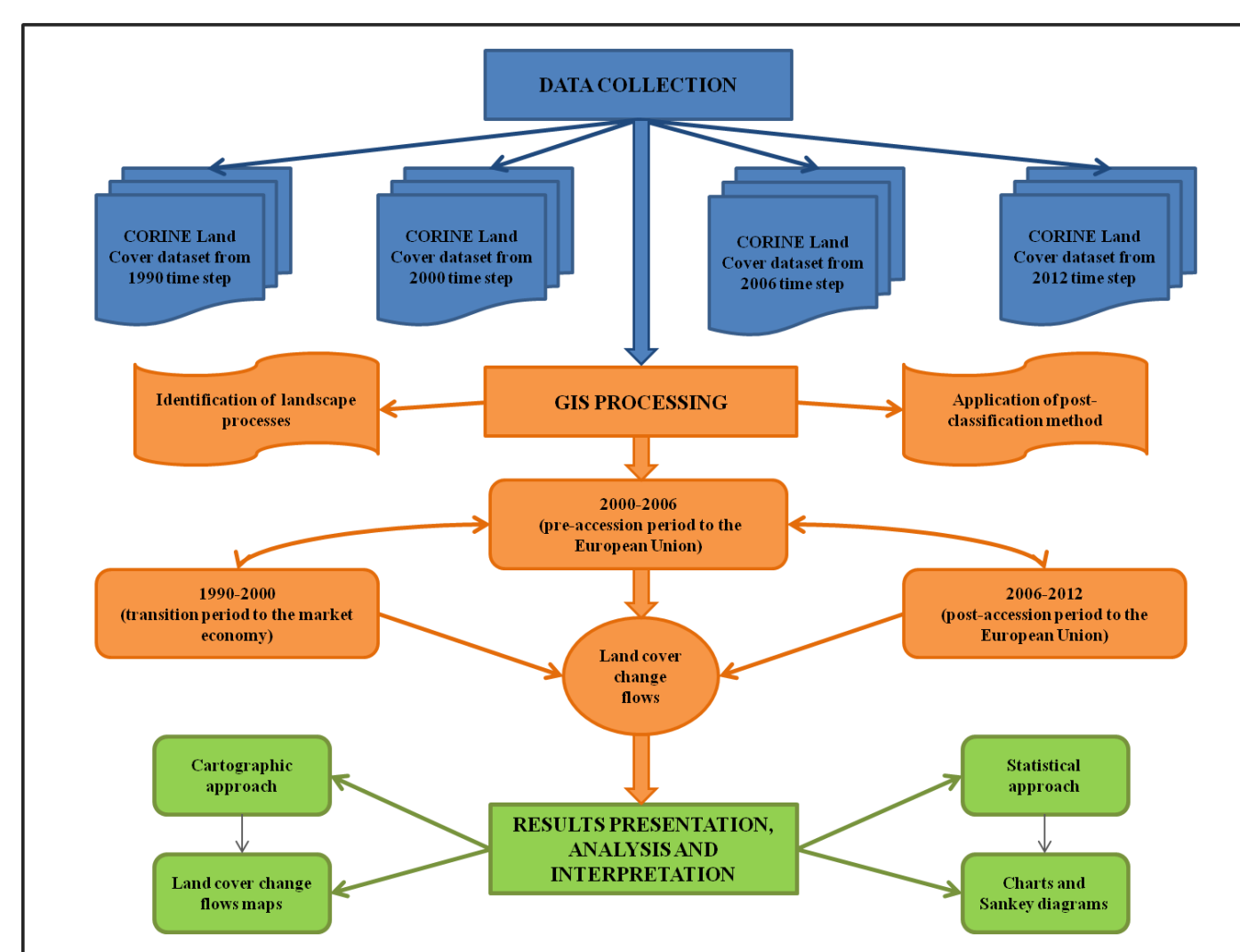


Figure 3. Flowchart of the methodological research steps

## RESULTS AND DISCUSSIONS

Spatial analysis of land cover processes throughout the inventory period (1990-2012) was done using the second level of nomenclature as shown in the land cover distribution maps (Figure 4).

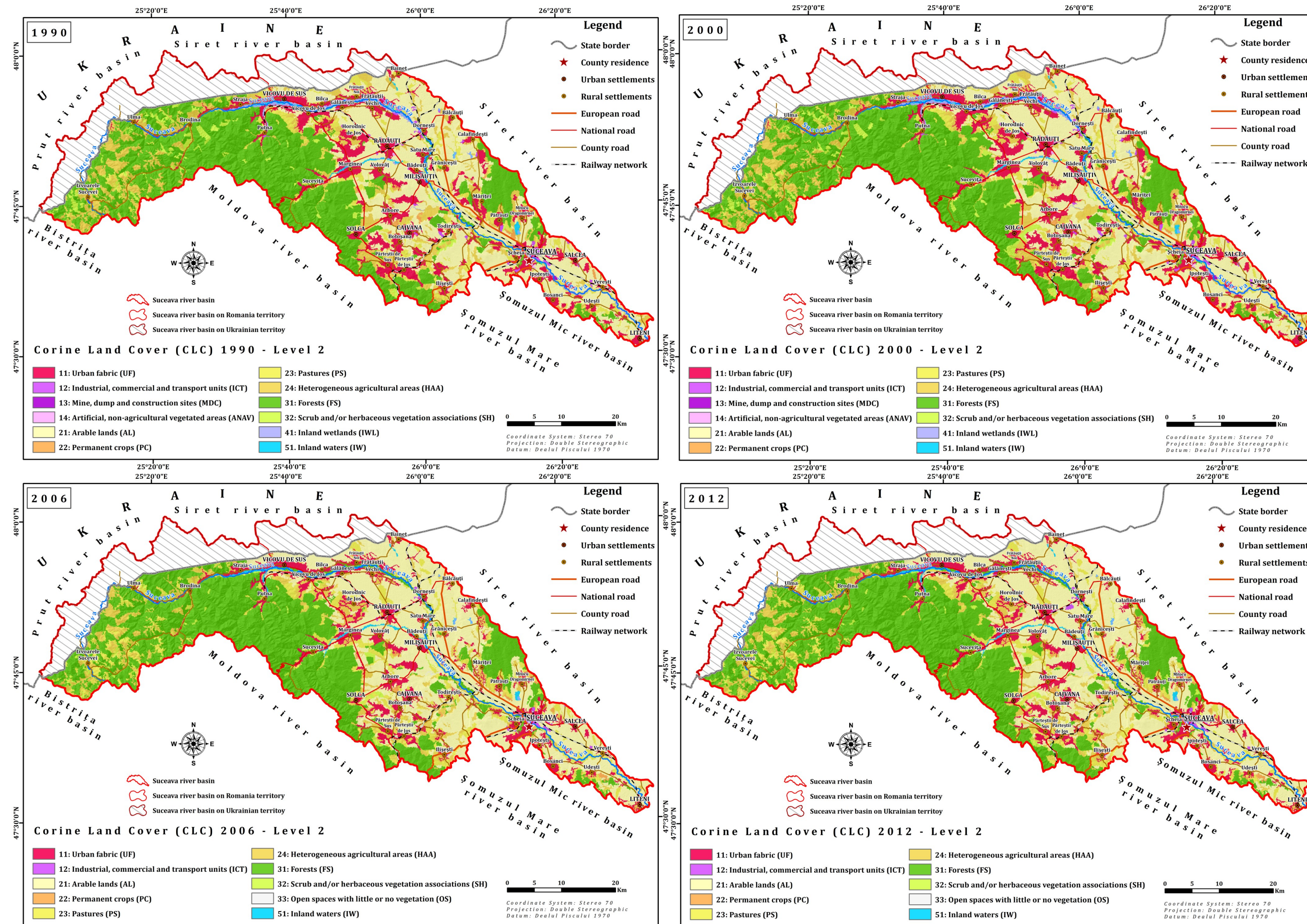


Figure 4. Spatial distribution of land cover classes in 1990, 2000, 2006 and 2012 time steps

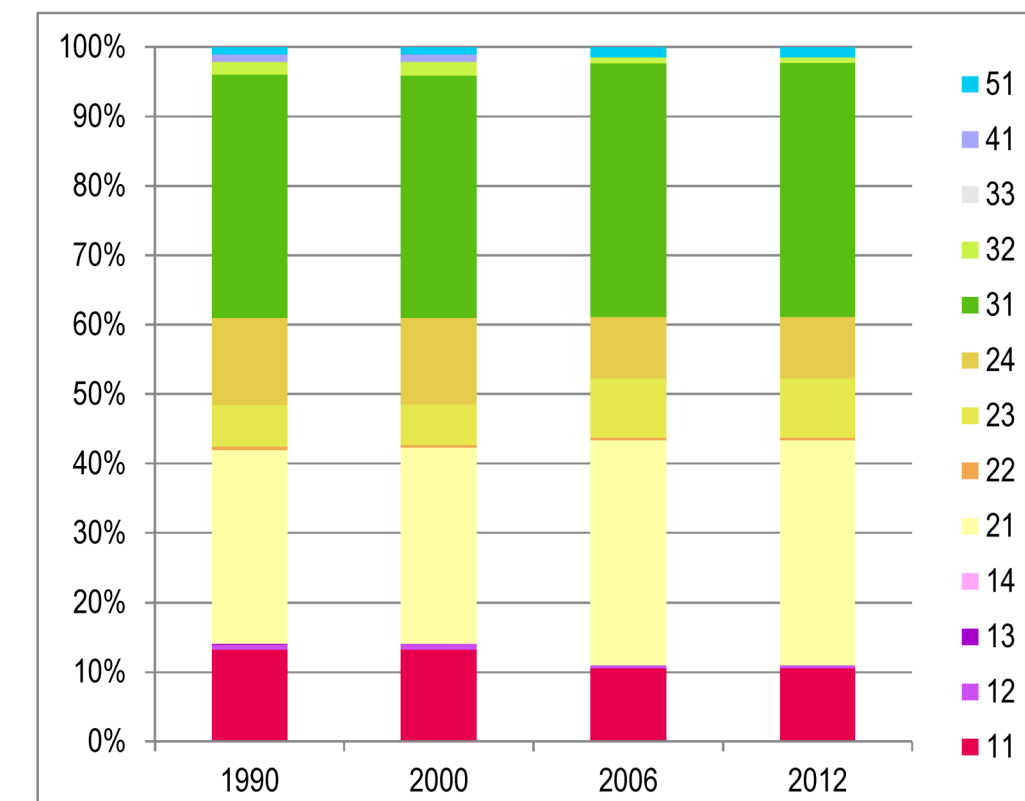


Figure 5. Comparative percentage distribution of land cover classes

According to the second level of CORINE Land Cover nomenclature, in the Suceava hydrographic basin it is noted the presence of 13 of 15 classes of classification scheme. Of these, forest class dominates the landscape in the Suceava basin with a share of over 34% of the total study area, followed by arable lands (over 27%), urban fabric (over 10%) and heterogeneous agricultural areas (8.80% - Figure 5). Thus, we can notice that the landscape of Suceava drainage area is dominated by three major landscapes: agricultural (47%), forest (35%) and urban (13%). Semi-natural areas and landscapes defined by wetland and water areas (5%) complete the general structure of the landscape from the Suceava hydrographic basin. Results showed the surface that suffered no changes in the entire period (1990-2012) was 1657.13 km<sup>2</sup>, representing 72.65%, while the changed areas represented 623.99 km<sup>2</sup> (27.35%).

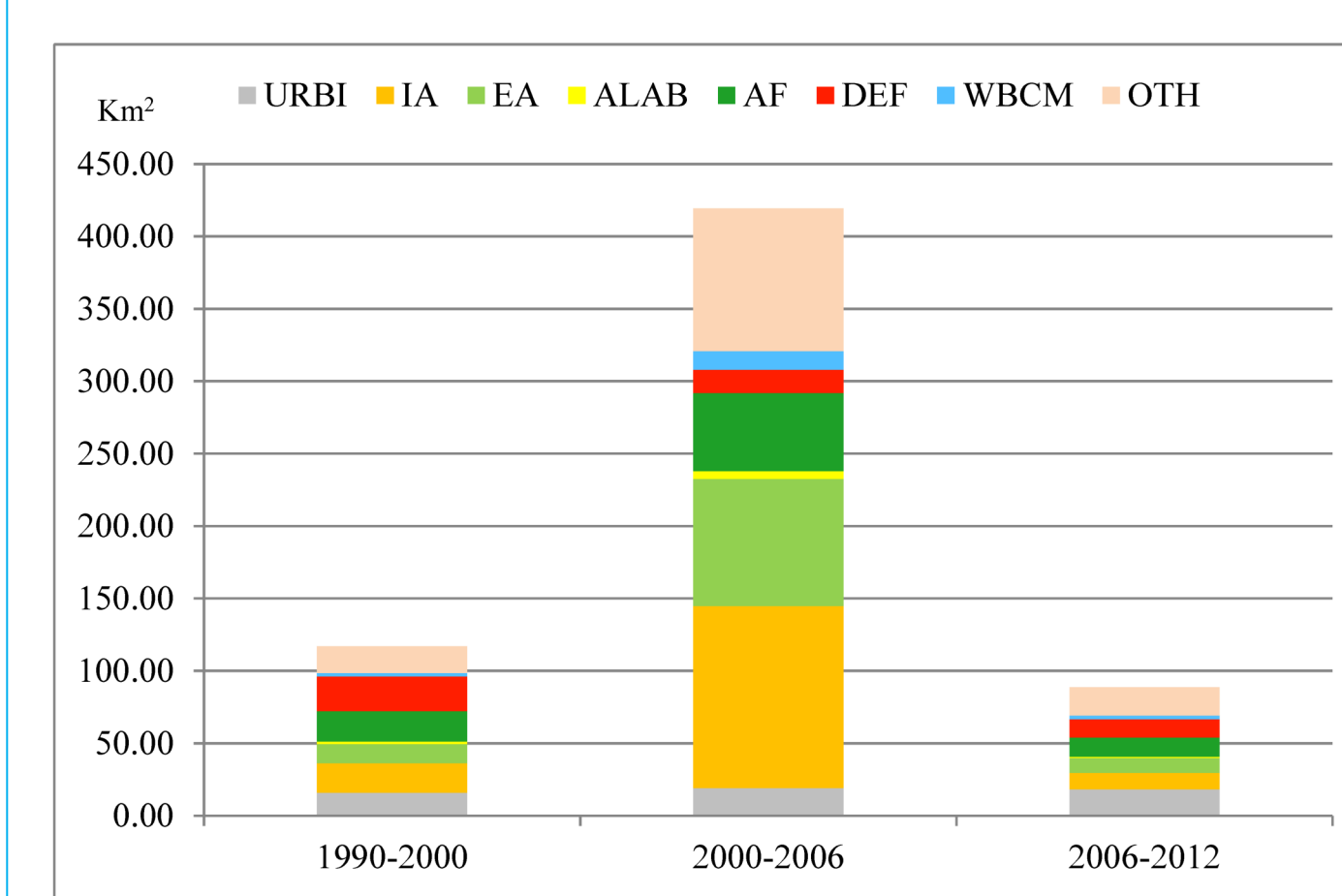


Figure 6. Flowchart of the methodological research steps (For the full name of processes abbreviations, see Figure 2)

Agricultural Policies (Figure 7 and Figure 8). Secondly, the deforestation had also a high degree (20.47% of total changes between 1990 and 2000), as a consequence of illegal logging by implementing of the Land Reform (Land Law 18/1991), which has ruled a restructuring process and basic mutations in the ownership of land, resulting a high degree of privatization of land, especially.

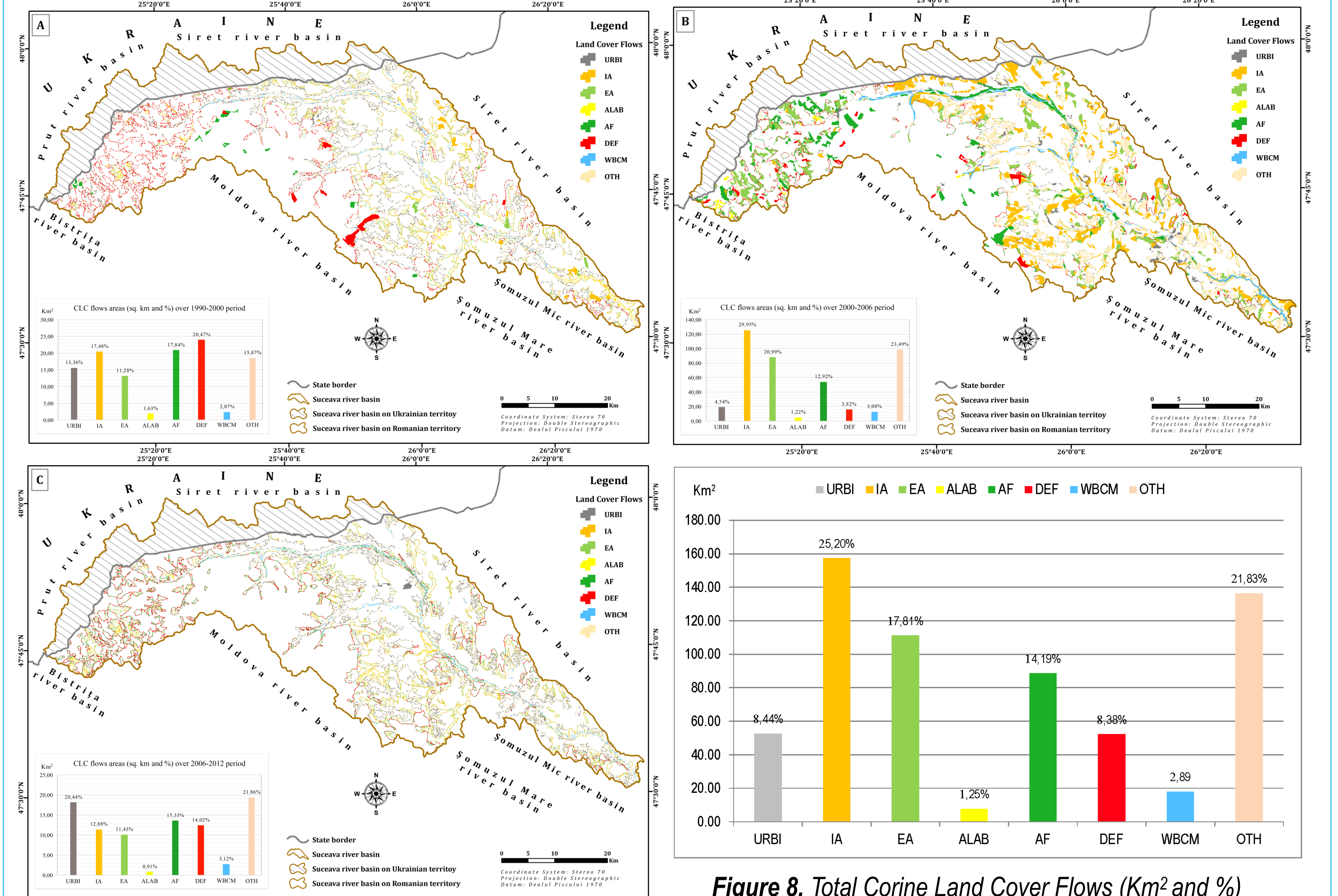


Figure 8. Total Corine Land Cover Flows (Km² and %)

Figure 7. Spatial distribution of land cover flows over three time horizons: 1990-2000 (A), 2000-2006 (B) and 2006-2012 (C)

Possible limitations are inherent to the use of CORINE data, including misclassification, and different classification schemes and resolutions from one period to another (Petrișor Al. & Petrișor Elza, 2018). Similarly, the decreasing total affected area from one period to another may be explained by the different length of the three periods.

## CONCLUSIONS

Summing up the findings, the results show the consequences of an unplanned territorial development, as a consequence of the inappropriate implementation of legislative measures. The results highlight that the intensification of agriculture, extensification of agriculture, afforestation, urbanisation and industrialisation and deforestation are the most dynamic processes in the study area.

We hope that the present approach will improve the sustainable management of the Suceava river basin, taking into account a future rational use of natural resources adapted to societal needs in a constantly changing world.

## REFERENCES

- Feranec, J.; Jaffrain, G.; Soukup, J.; Hazeu, G.W. (2010) - Determining changes and flows in European landscapes 1990-2000 using CORINE land cover data. Applied Geography, 30 (1), pp. 19-35. <https://doi.org/10.1016/j.apgeog.2009.07.003>;
- Petrișor, Al. I.; Petrișor Elza Liliana (2018) - Transitional Dynamics Based Trend Analysis of Land Cover and Use Changes in Romania During 1990-2012. Present Environment and Sustainable Development, 12 (2), pp. 215-231. <https://doi.org/10.2478/pesd-2018-0042>;
- <https://land.copernicus.eu/pan-european/corine-land-cover> (accessed 16 November 2018).