

## INTRODUCTION

City of Suceava, located in the NE Region of Romania, is an attraction pole for the regional inhabitants through its commercial, academic and tourist functions. The city population increased from 114 462 in 1992 to 122 654 in 2018. The urban area suffered major modifications between 1990 and 2018 which transposed themselves in the values of the climatic elements.

The general objective of the study consists in the evaluation of the climatogen impact of the mutations occurred in the city's demography, in the features of the active surface between 1992 (the period which followed immediately to the communist system) and 2018.

## STUDY AREA

The study area includes Suceava Municipality and the rural surroundings, totalling an area of 406.88 km<sup>2</sup> (Figure 1). Suceava City is one of the oldest and important urban area from Romania, being first mentioned in 1388. Suceava was the capital of the Principality of Moldavia during two centuries. The study area presents a specific type of relief, the hilly area being fragmented by river valleys, determining cuestas and structural plateaus as principal landform.

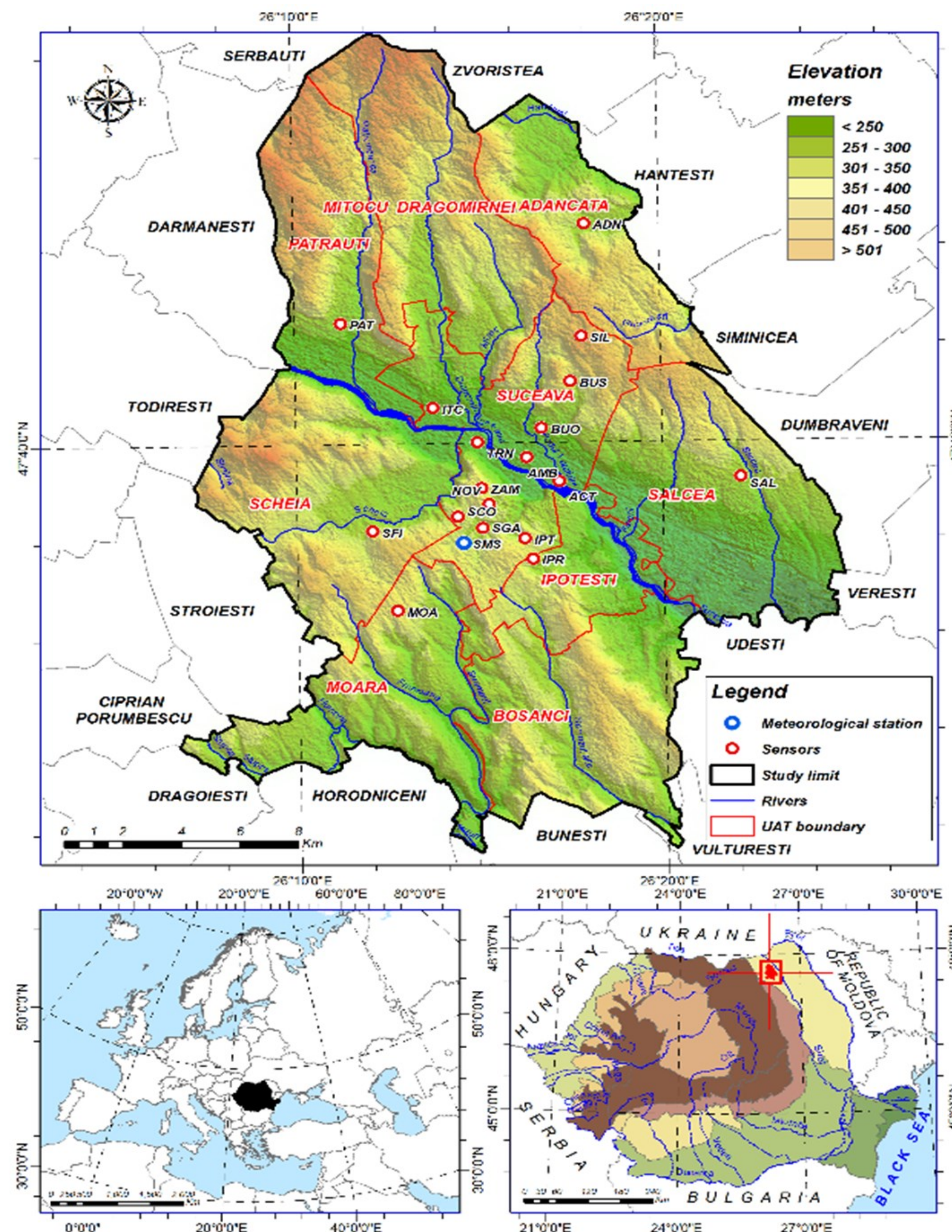


Figure 1. Territorial repartition of meteorological monitoring points from metropolitan area of Suceava (above). Localisation of Suceava City in Romania (right part) and localisation of Romania in Europe (left part).

## MATERIALS AND METHODS

For the meteorological monitoring of the Suceava metropolitan area, was used a 18 thermo-hygrometer sensors type DATA LOGGER DT – 171. The sensors have the capacity to register 32000 data, of which 16000 are for temperature and humidity, with the accuracy of 1.0°C for the temperature and  $\pm 3.0$  -  $\pm 5.0$  % relative humidity.

The working algorithm adopted consisted of: i) identification of modifications in the active surface structure (Figure 2), ii) identification of the land cover flows which determine the evolution of the artificial surfaces from Suceava's topoclimatic area, iii) intersection of CORINE Land Cover sets, available for free on Copernicus Land Monitoring Services platform for the years 1990 (Figure 3) and 2018 (Figure 4) in ArcGis through the overlay technique at Level 3, iv) obtaining a matrix of land cover categories, v) highlighting the correlations between the modification of the artificial areas surfaces and the evolution of the climatic elements of Suceava's atmosphere.

## RESULTS AND DISCUSSIONS

There were identified three types of land cover flows specific to the artificial surfaces, caused by six types of processes. The biggest share is held by LCF2 (urban residential sprawl) represented by a single type of land cover flows, urban diffuse residential sprawl (lcf22) which cumulated an area of 861.74ha (2.12% of study area total). The second category shows the intraurban space conversion, defined LCF1 (urban land management) with the presence of two types of specific processes: urban development / infilling (lcf11) with a surface of 75.82ha (0.19% of the study area) and recycling of developed urban land (lcf12) with an area of 376.88ha (0.93% of study area). In the end, there was identified a small share of conversions which show the third category LCF3 (sprawl of economic sites and infrastructures) with a total of 284.66ha (0.70% of study area) and which contains three types of processes: sprawl of industrial and commercial sites (lcf31) with 129.09ha (0.32%), sprawl of airports (lcf34) with 10.27ha (0.03%) and construction (lcf37) with 145.3 ha (0.36%). In total, the anthropic space from the study area was affected by conversions on a surface of 1599.1 ha (3.93% of the total study area of 40685.73ha) for period 1990-2018. Meteorological data obtained from Suceava Weather Station (1961 -2018) and from the urban meteorological stations SV1 and SV2 for the interval 2009-2019 were correlated by the statistics of conversions.

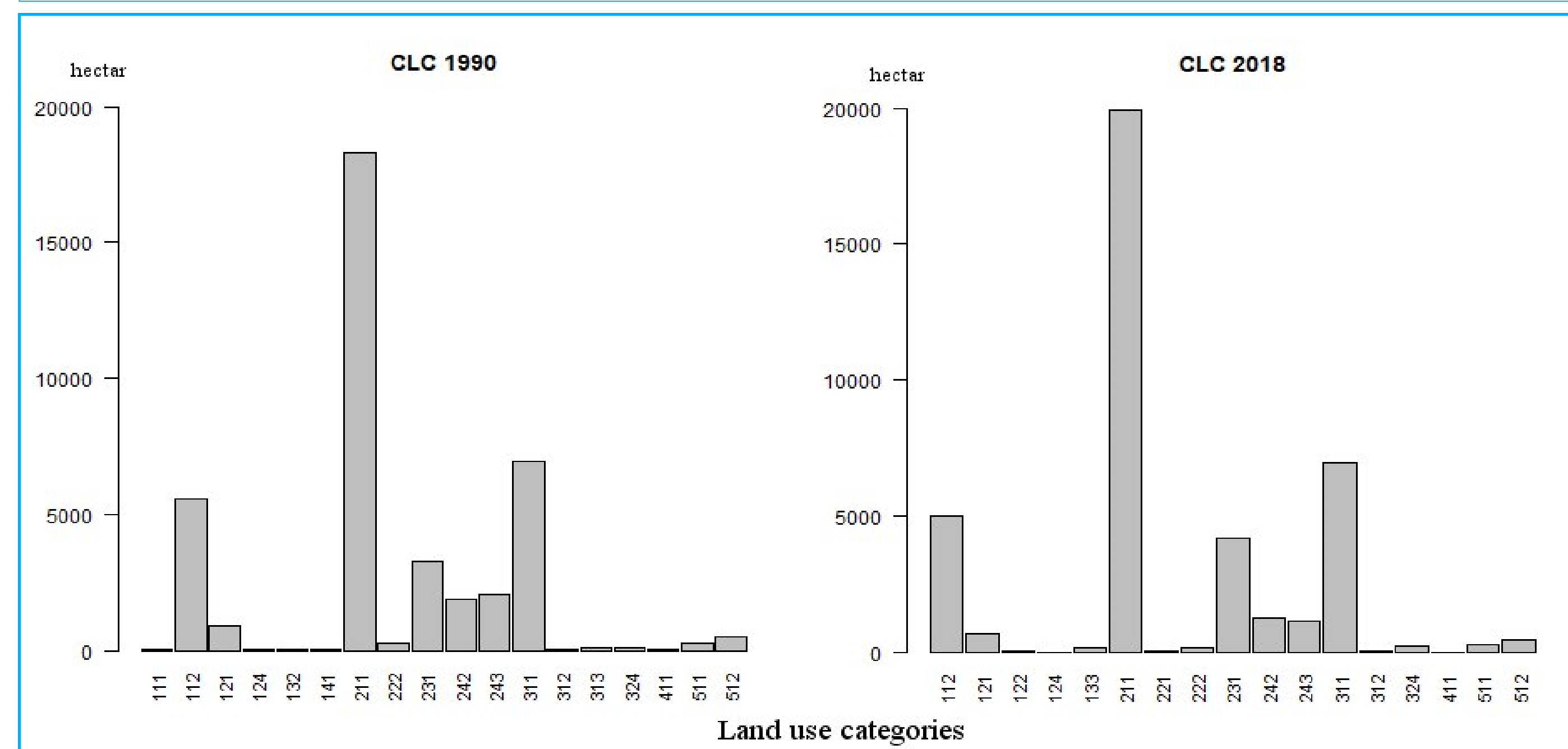


Figure 2. Variation of land use categories in 1990 and 2018

## REFERENCES

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- Kohler, M. et. al. 2017 – Impacts of several urban-sprawl countermeasures on building (space heating) energy demands and urban heat island intensities. A case study, *Urban climate*, vol. 19, pp. 92 – 121.

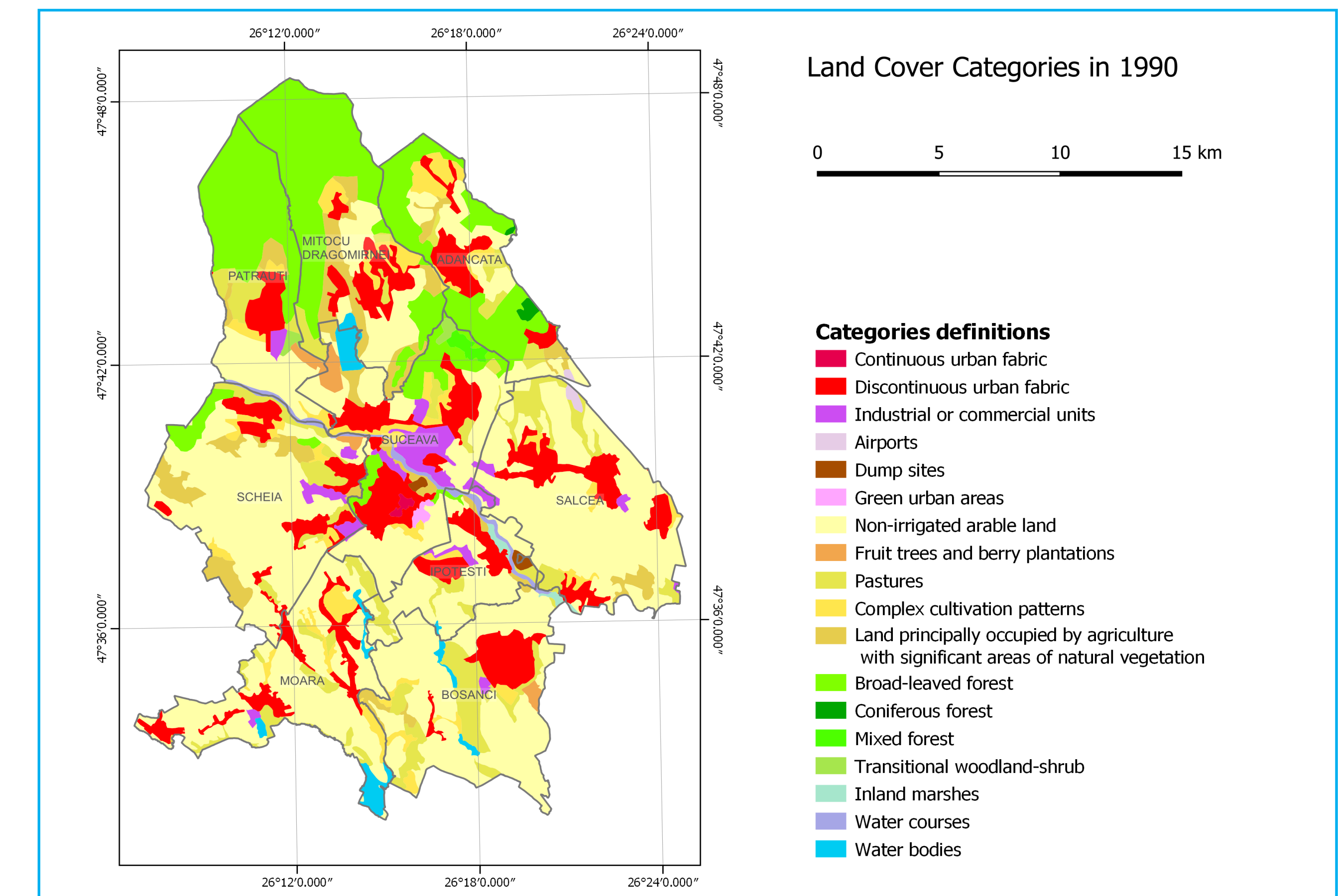


Figure 3. Land use categories in the metropolitan area of Suceava, according to CLC 1990

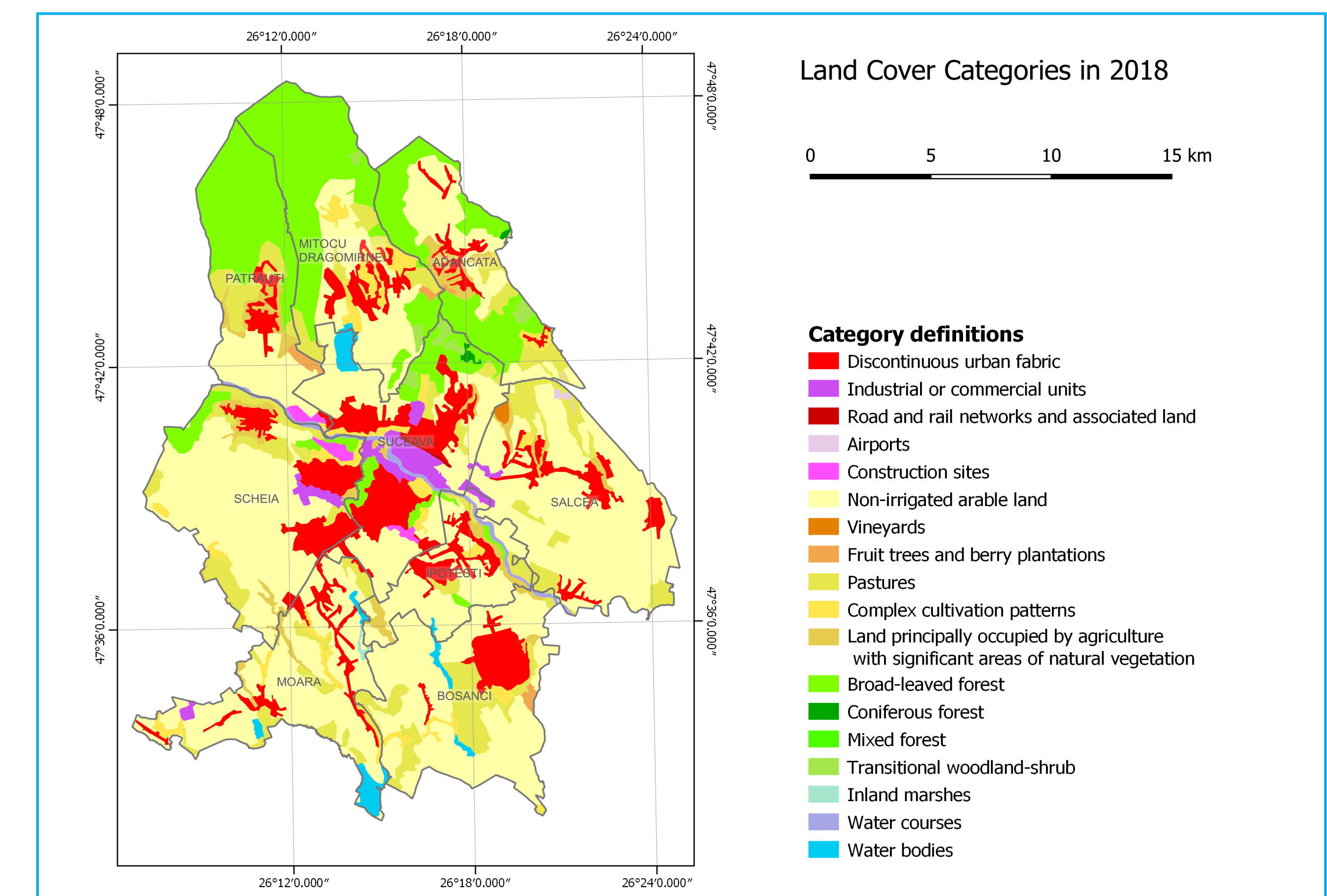


Figure 4. Land use categories in the metropolitan area of Suceava, according to CLC 2018

## CONCLUSIONS

At Suceava suburban weather station temperature increased with 0,4°C in the decade 1991-2000, with 0,5°C in decade 2001-2010 and with 0,9°C more in decade 2011-2019. Only in the interval 2009-2019 with hourly data from all 3 stations, the urban-suburban thermal difference was of +1,7°C in the city's favour. If the increase of temperature from suburban is allocated to the regional heating, the urban-suburban thermal difference was attributed to the amplification of the city's topoclimatic role per se.