Changes in the amount of rainfall runoff in the basin of Nysa Kłodzka river in the area of Nysa

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Grade Level: Higher Education
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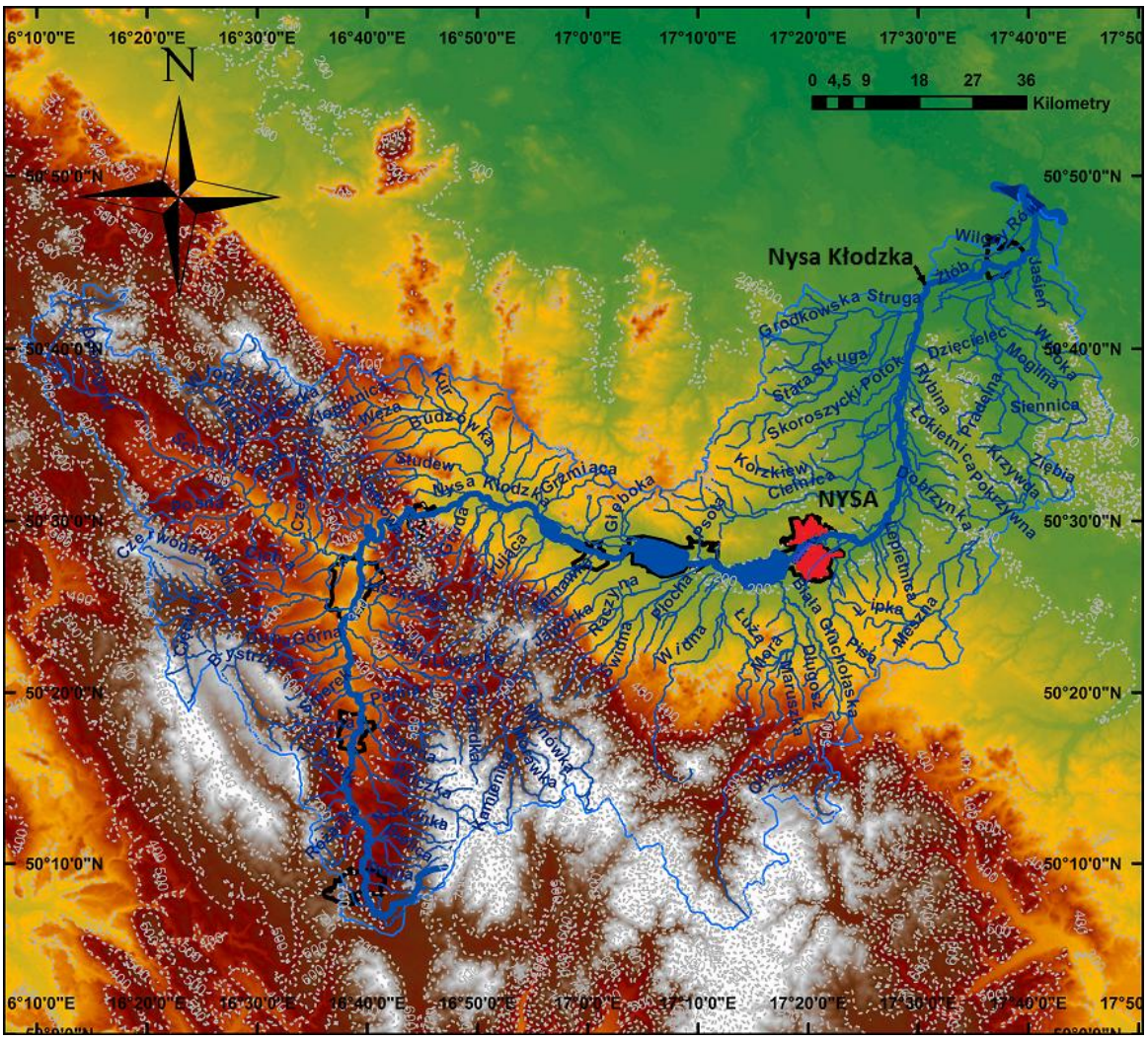


Location Nysa and Nysa Kłodzka river

1. Introduction

In July 1997 there was a flood in our town Nysa. It was caused by very heavy and intense rainfall. Such weather abnormalities can be seen more and more often not only in our region but in the whole country. As a result of that the water balance is distorted and we see the surplus of water which causes flooding. This comes as a direct effect of man's activity in the field of industry and economy. Such antropogenic changes to the environment weakened its ability to contain water for a longer period of time.

We have decided to check how retention and both surface and underground water runoff changed in the past few decades in the basin of Nysa Kłodzka river near our town.

2. Research questions and hypothesis

The research carried out was supposed to answer the following questions :

1.How did the land cover change in the area?

2. How did the retention change in our town and area?

3. How did the soil permeability change?

4. How did the evaporation change?

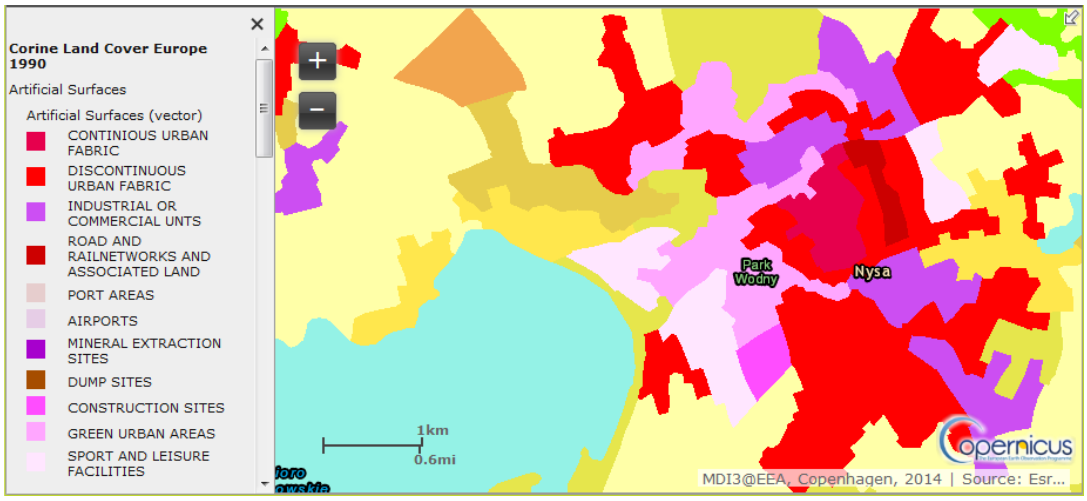
5. How did the ground and underground runoff change?

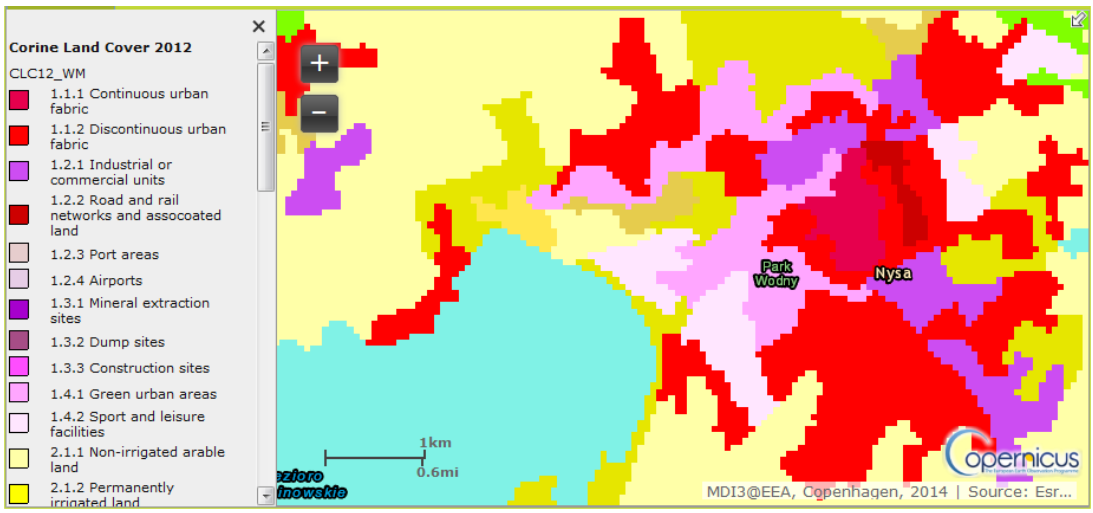
Our hypothesis: In the basin of Nysa Kłodzka river in the area of town Nysa there has been a change in the amount of rainfall runoff connected to the change in land cover.

3. Research methods

Changes in the forest area and land cover were evaluated based on maps such as Tree Cover Density, Corine Land Cover. Data taken from year: 1990, 2000, 2006, 1012. We also used topographic maps, town maps and statistics data.

Measurements and observations from year 2012 were used as well. Those can be found in land cover protocols.The results of research done within Climate Research Campaign module A (The forecasting and counteraction of the results of floods - http://globe.gridw.pl/projekty/badawcza-kampania-klimatyczna/modul-a) turned out to be very useful as well. Changes related to the land seal in Nysa and nearby area were determined based both on Impreviosness maps (2006, 2009, 2012) as well as town plans and topografic maps analysis from previous years.





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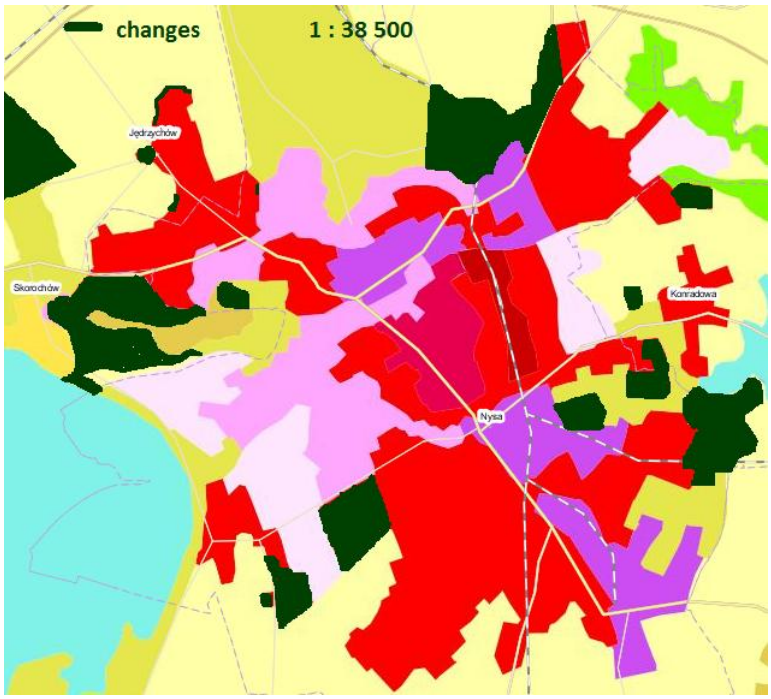
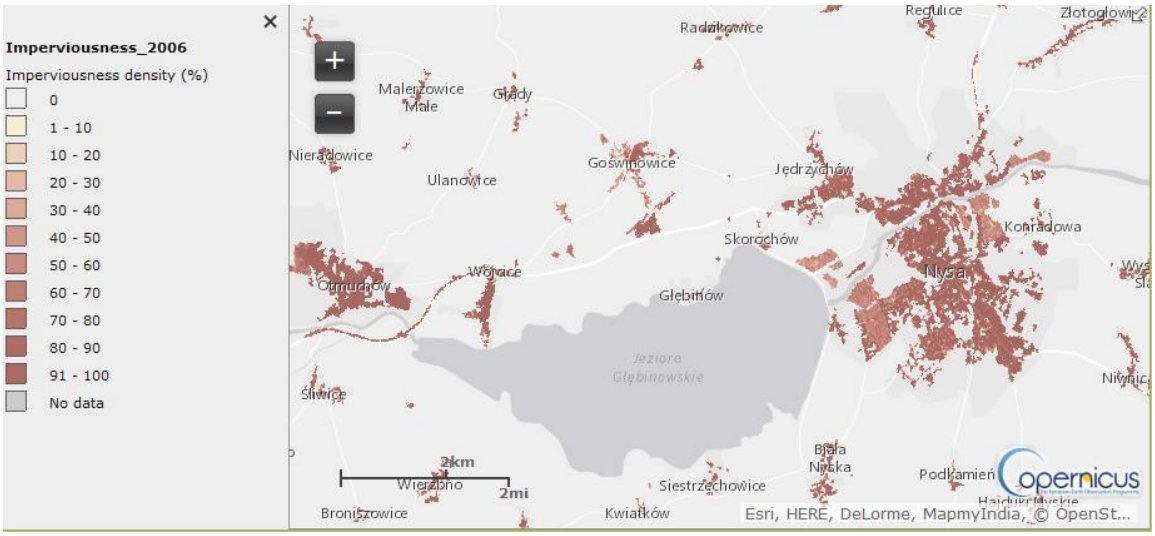
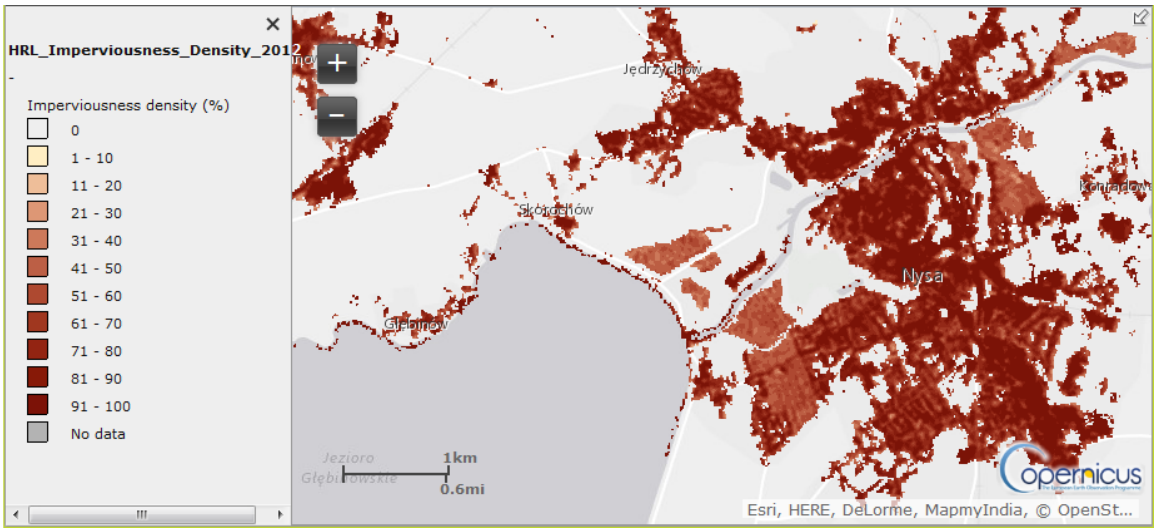


Changes in land cover 1990-2012. Source: our own work





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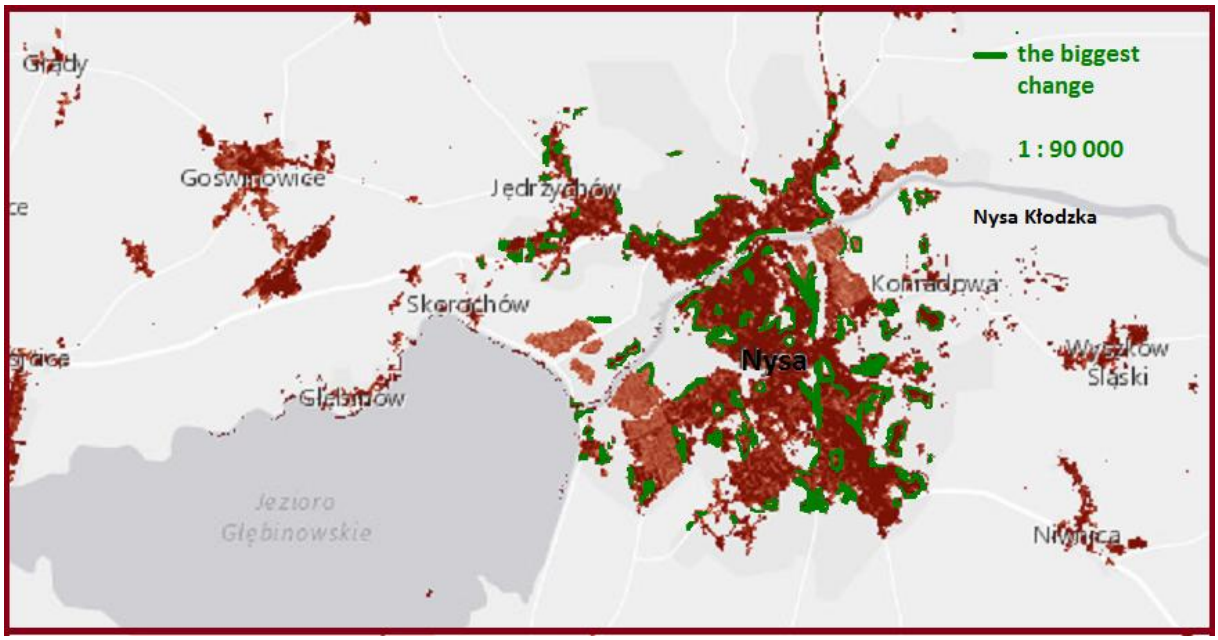
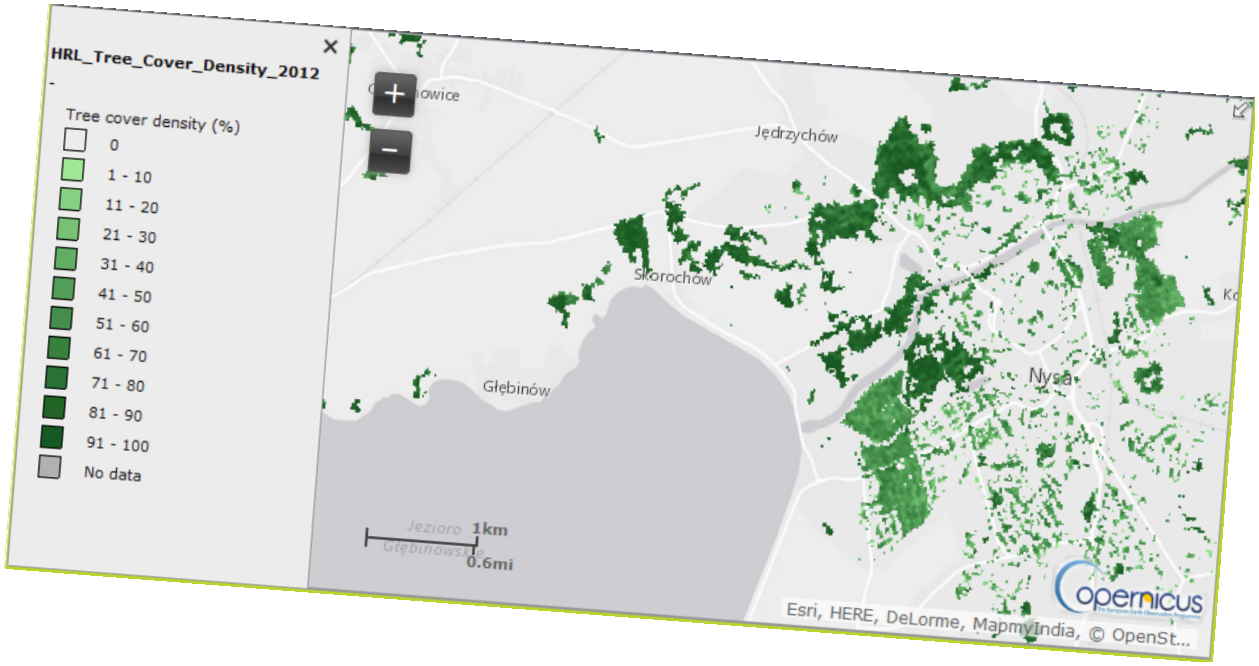


Changes to seal the area 2006-2012. Source: our own work



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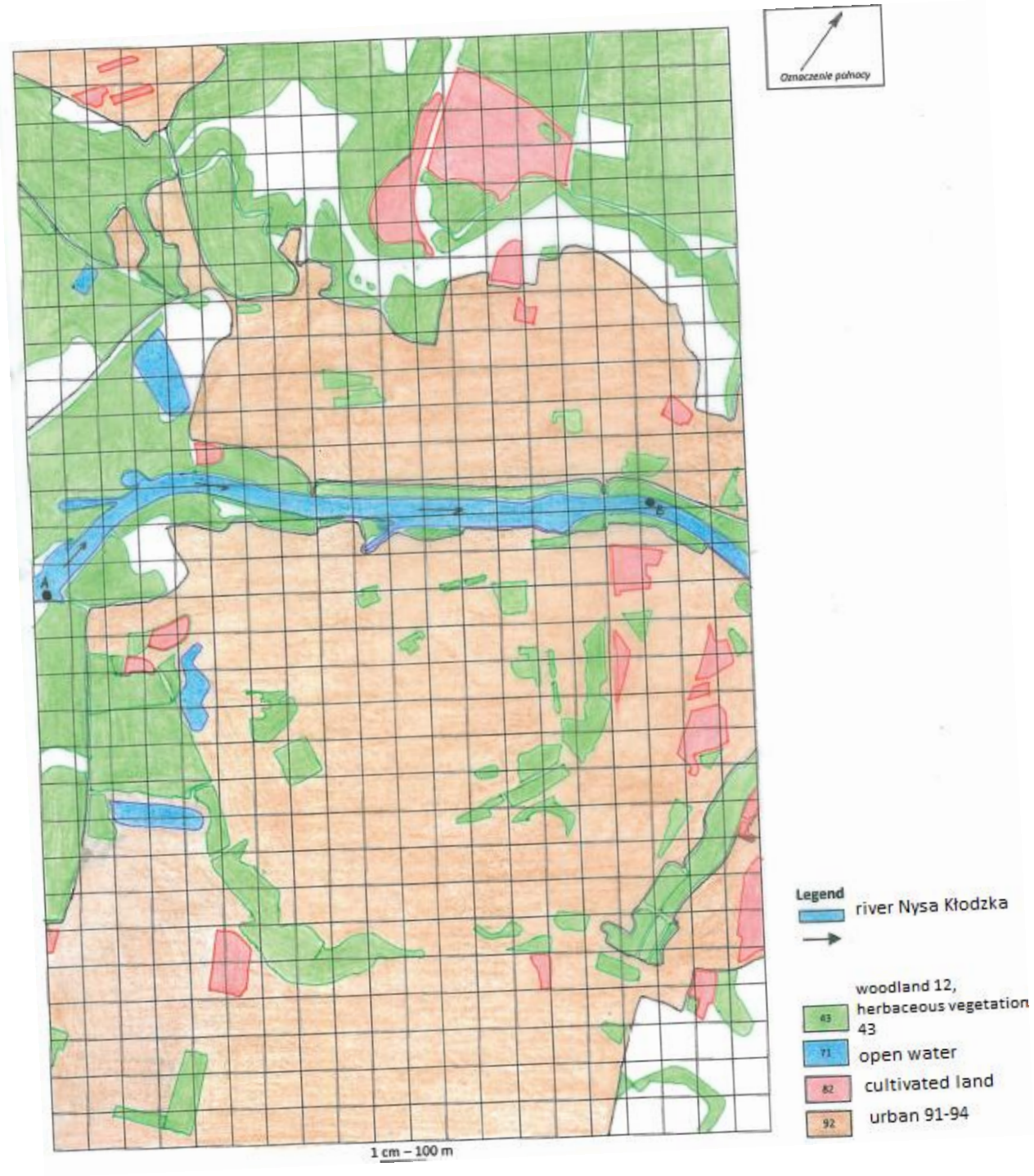

Land cover, 2006 in Nysa. Source: our own work

4. Conclusion

Based on the analysis of land cover changes since 1990 to 2012 we can conclude that in Nysa Kłodzka river's basin in the nearby of Nysa the rainwater runoff has increased. In the recent years in Nysa's area we can notice more residential buildings, buildings related to the business, commercial and sport facilities, roads, car parks, cycling paths and pavements. An extension of infrastructure and building density were the causes of land seal increase.

The consequence of these condition is decreasing retention and land permeability. The area of the town (covered with asphalt, concrete, dence urban fabric) prevents or highly reduces water infiltration.
Therefore, the runoff is much higher in the city than outside it, while groundwater flow is lower. It causes low retention.

In this period of time in the town, the amount of higher green areas like trees has decreased, too.
When on the vegetation area retention is considerable, the runoff is delayed. However, the retention of sealed surfaces is much lower. From these areas we can observe quick and considerable runoff.

Furthermore precipitation is discharged out of the town by the sewage system, so it doesn't infiltrate in the town area. The area with sewage system is systematically increasing which has contributed to the increased risk of flooding in Nysa.

5. Resources

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http://www.lasy.gov.pl/nasze-lasy/mapa-lasow

http://maps.opolskie.pl/start

http://www.igik.edu.pl/pl/corine-mapy

http://globe.gridw.pl/projekty/badawcza-kampania-klimatyczna/modul-a