

Clear-cuts and Urbanization Change Detection by Image Comparison



The research focused on the urbanization growth in Slovenska Bistrica during the period from 1991 to 2011. It also searched for the clear-cuts in the Pohorje mountains. Both were done by use of the image comparison method of Landsat images. Some of our findings were also checked and confirmed by means of identification in the natural environment, using photographic evidence.



Problem overview

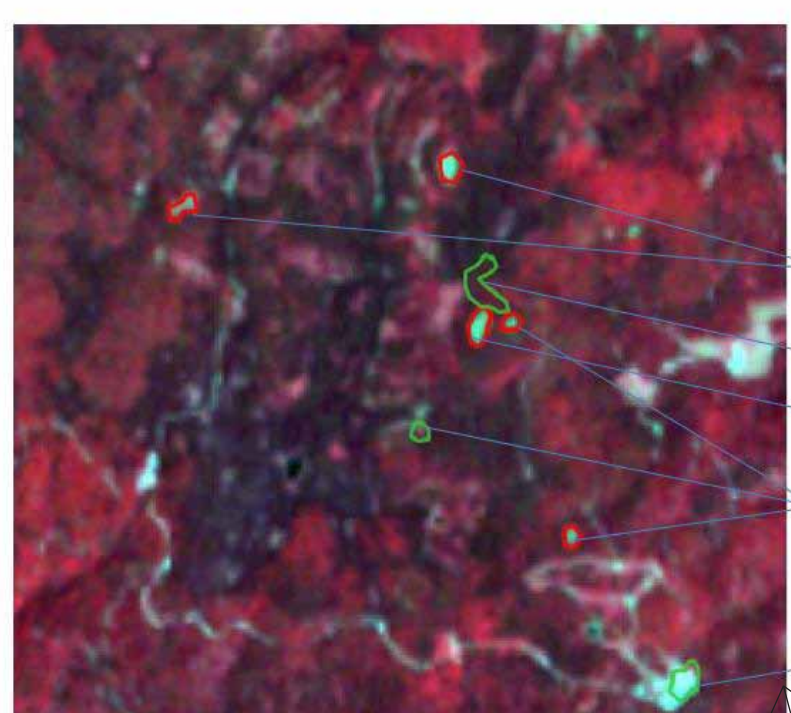
In the last two decades Slovenska Bistrica has expanded as well as become somewhat built-up. It has been engaged in house building and extended mostly with establishing commercial infrastructure. In the same period some clear-cuts in the nearby forest have appeared. The aim of the research was to determine the changes using the image comparison method.

Data

- Landsat 5 imagery for 1991, 2003 and 2011 (30 m resolution).
- Field observations.

Methods

- Acquiring satellite images in false and true colour.
- Visual interpretation for the time periods of 1991, 2003 and 2011.
- Image comparison and the search for differences in colour intensity.
- Highlighting and field checking the results.



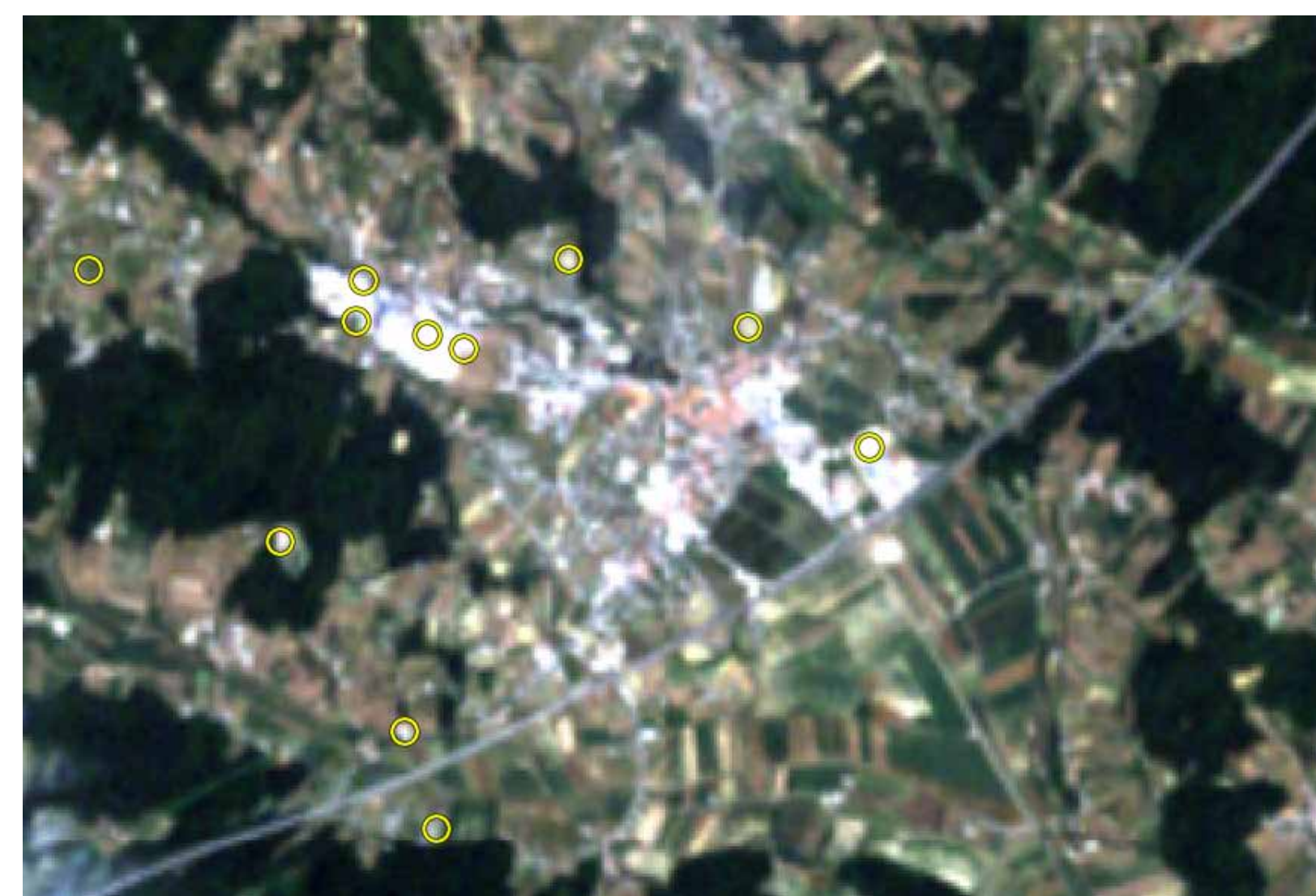
Magnified infrared image of Trije Kralji showing calculated surface of the clear-cuts over the years.

Clear-cut photo taken in 2012 (created 1991 to 2003).



Infrared satellite image of Pohorje (ranging from Rogla on East to Polskava on west):

- Green areas denote clear-cuts created in the period 1991 to 2003.
- Red areas denote clear-cuts created in the period 2003 to 2011.



Satellite image of Slovenska Bistrica, including changes from 1991 to 2003.



Satellite image of Slovenska Bistrica, including changes from 2003 to 2011.



Apartment blocks were built during the period from 2003 to 2011.



The shopping centre was built during the period from 2003 to 2011.

Conclusions

- The method of image comparison is difficult owing to the fact that it is difficult to assess the actual difference. This was especially problematic in the case of Pohorje, while it was a bit easier within the city.
- This method is valid for the scale assessment of the clear-cuts and urbanization.
- The amount of clear-cuts has decreased over the years.
- There were fewer changes of urbanization between 1993 and 2003 than in the period from 2003 to 2011.
- Only big alterations could be traced due to poor satellite image spatial resolution.