Geophysical Research Abstracts
Vol. 18, EGU2016-11954, 2016
EGU General Assembly 2016

Analysing land cover and land use change in the Matobo National Park and surroundings in Zimbabwe

Valeska Scharsich (1), Kupakwashe Mtata (2), Michael Hauhs (1), Holger Lange (3), and Christina Bogner (1)

(1) Ecological Modelling, University of Bayreuth, Germany, (2) Bayreuth International Graduate School of African Studies, University of Bayreuth, Germany, (3) Norwegian Institute of Bioeconomy Research, Oslo, Norway

Natural forests are threatened worldwide, therefore their protection in National Parks is essential. Here, we investigate how this protection status affects the land cover. To answer this question, we analyse the surface reflectance of three Landsat images of Matobo National Park and surrounding in Zimbabwe from 1989, 1998 and 2014 to detect changes in land cover in this region. To account for the rolling countryside and the resulting prominent shadows, a topographical correction of the surface reflectance was required.

To infer land cover changes it is not only necessary to have some ground data for the current satellite images but also for the old ones. In particular for the older images no recent field study could help to reconstruct these data reliably. In our study we follow the idea that land cover classes of pixels in current images can be transferred to the equivalent pixels of older ones if no changes occurred meanwhile. Therefore we combine unsupervised clustering with supervised classification as follows.

At first, we produce a land cover map for 2014. Secondly, we cluster the images with clara, which is similar to k-means, but suitable for large data sets. Whereby the best number of classes were determined to be 4. Thirdly, we locate unchanged pixels with change vector analysis in the images of 1989 and 1998. For these pixels we transfer the corresponding cluster label from 2014 to 1989 and 1998. Subsequently, the classified pixels serve as training data for supervised classification with random forest, which is carried out for each image separately. Finally, we derive land cover classes from the Landsat image in 2014, photographs and Google Earth and transfer them to the other two images. The resulting classes are shrub land; forest/shallow waters; bare soils/fields with some trees/shrubs; and bare light soils/rocks, fields and settlements. Subsequently the three different classifications are compared and land changes are mapped.

The main changes are observable in the surroundings of the National Park, especially the common lands have lost their clear boundaries with time. In the National Park, the area of forest increases from 1989 to 2014 from 58% to 61% whereas the area of shrub land decreases by the same amount. The amount of each of the other two classes remains constant. These changes indicate an actual effect of the protection status of the National Park.

In our study remote sensing data are the main source to evaluate the effects and the benefits of a protected area without on-side studies. This could be important for regions, where field studies are not possible because of insecure political conditions and only remote sensing data are available.