Sensitivity of land cover analysis to category aggregation

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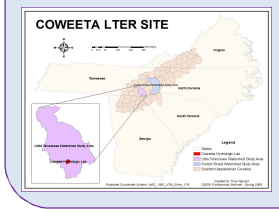
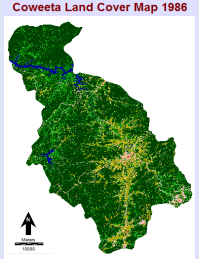
Introduction

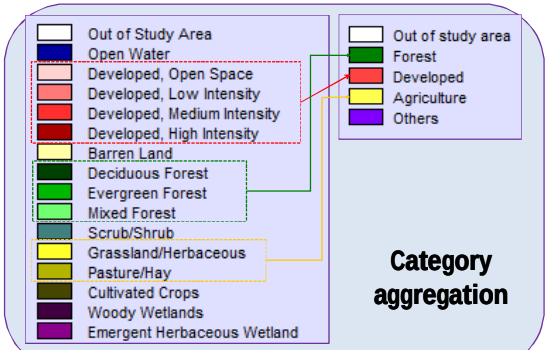
A typical challenge in the analysis of land cover change is that maps frequently have so many categories that make it difficult to interpret the results. Category aggregation is one method to reduce the number of categories, but category aggregation must be performed strategically so that it highlights important transitions and ignores unimportant transitions. This study examines how the analysis of land cover transitions over time can be sensitive to category aggregation. Land cover categories are aggregated based on their characteristics that categories with the same characteristics, or in other word categories representing the same feature with different types, are combined into one new category. Cross-tabulation matrices and intensity analysis are carried out for both sets of categories, the original set and the aggregated set. The results are then compared to find the differences between the old and new amount of change, in both swap and net change, together with the test of activeness and dormant of categories.

Study area



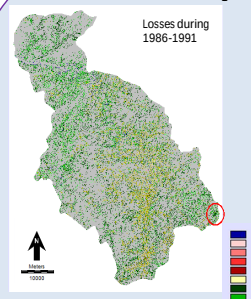


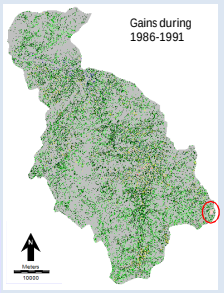
Category aggregation

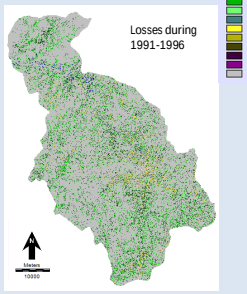


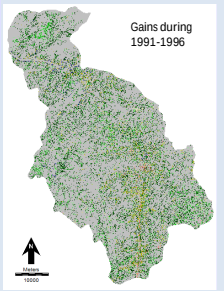
Results

Original 15 categories

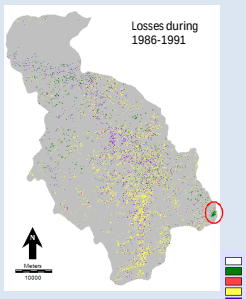


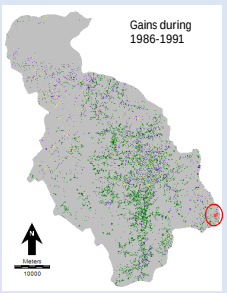


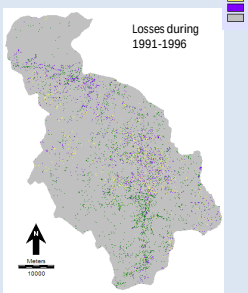


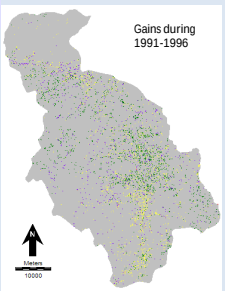


4 aggregated categories

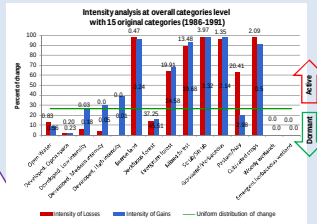


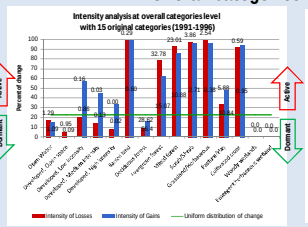


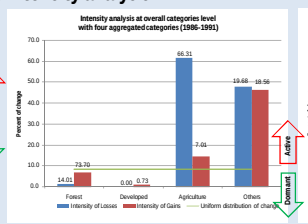


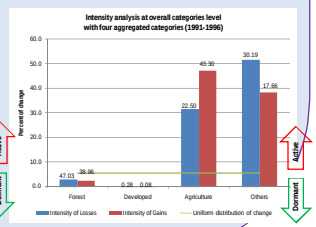


Overall categories intensity analysis









Discussions and Conclusions

1) The transition analysis after aggregation shows that aggregation of categories with the same characteristics such as Developed, Forest and Agriculture reduces greatly the amount of total change and swap change while net change only decreases slightly or stays stable. This result may be explained by the fact that swap changes were occurred among categories with same characteristics so the aggregation only reduces this part but does not affect the transitions between the aggregated category and other categories in overall landscape.

2) Aggregation of Developed and Forest really works well as it simplifies the swap change and still keeps the important transitions to other categories. This aggregation works well if we want to focus only on the overall category but not detailed classes of each category. Nevertheless, if researchers are interested in studying how different types of forest were replacing each other or how developed land with different levels of intensity interacts with each other, the aggregation is not recommended.

Acknowledgement

I want to send my special thanks to people in Coweeta LTER site and University of Georgia for providing all the data. I want to thank Safaa Alwaik for writing all the codes to run the intensity analysis. I also want to give my thanks to Prof. Robert Gilmore Pontius for his guidance and advice.

Reference

1. Alo, C. A. and R. G. Pontius (2008). "*Identifying systematic land-cover transitions using remote sensing and GIS: the fate of forests inside and outside protected areas of Southwestern Ghana.*" Environment and Planning B: Planning and Design, volume **35,** pp 280-295.
2. http://coweeta.ecology.uga.edu/
3. Pontius, R. G. and N. R. Malizia (2004). "*Effect of category aggregation on map comparison.*" GIScience **LNCS 3234**.