Introduction

Madagascar is rich in forest resources and a wide variety of wild animals and plants, which have been gained much reputation and should be protected for the natural gift. However, it is facing the threat of a sharp decline in biodiversity due to the deterioration of the natural environment and the growing population who depend on the forest for survival. While primary causes of forest loss, generally, have been slash-and-burn for agricultural land and for pasture, selective logging for precious woods or construction materials, the collection of fuel wood and in certain sites, forest clearing for mining. In recent years, people have realized that the protection of natural resources is not only as important as the economic and social growth. Lots of efforts have been made to save and recover the forests. Eden Reforestation Projects, along with help of the local and international volunteers, launched its Madagascar project sites in 2007 by restoring ecologically devastated mangrove estuaries in the northwest of the country. This project aims to find out how serious the deforestation was and if any efforts people have made had good consequence for recovering forests.

Results

Forest Change Between 1996 and 2006

Visually there was a large portion of forest areas had been lost, which was approximately 327.25 square kilometers. Even though forest gain can be noticed, they were not able to cover forest loss. Total forest gain from 1996 to 2006 was only 142.39 square kilometers.

Forest Change Between 2006 and 2016

The forest loss basically along the right side coastal line, lower right and some are in main forest on the left side. As a result, the forest loss was about 104.87 square kilometers, while forest gain was 201.25 square kilometers.

Possible Causes of Observed Trends

It has been discovered that deforestation was a big problem between 1996 and 2006 in Madagascar. No matter from the tree loss distribution in image or statistics, they show a huge forest reduction in this decade. Only if there has forest loss in the first decade, the change of forests in the following decade could be good to illustrate how the reforestation projects works. Surprisingly, the forest areas happened to increase between 2006 and 2016, which indicates that not only the rate of forests' loss had been under control, but more forests had been recovered. It is happy to know that most forest areas recovered from either scrub, probably density of trees getting higher, or bare lands. This pretty matches with the goal of reforestation projects, which are to plant trees on the bare lands. However, there still exists areas of forest loss after 2006. Generally, the forests in the northwest corner of Madagascar had been experienced a great reduction of trees and after variety of reforestation projects and efforts, local citizens made, they had turned to be in a relatively healthy situation. The reforestation projects had achieved success and deforestation had been under control.

Conclusion

1. Accuracy of Image Classification

The most important step for the project was image classification. Therefore, the accuracy of classified images about forest areas demonstrating what land cover types in images. It also had huge influence on the change detection analysis. Even though mapping process for remote sensing accuracy such as ground truthing or supervised classification algorithms needs, it was still controversial to guarantee the classified images had very high accuracy.

2. Seasonal Influence

Image obtained from 2006 showed it was in flooding season, while other two images were not. That decreased the accuracy and persuasiveness of this project, labeling there were relatively big areas of shallow water had been recovered to forests between 2006 and 2016, even that were supposed to be classified as shallow water had been as shallow water in 1996. That was main reason why lot of shallow water change to forests. As a consequence, forests had been recovered was actually even more than what is reality. Another reasonable approach will be using images from different dates that avoid flooding season to do change detection.

Limitations

It is important to note that the study is subject to certain limitations due to the nature of the data and the methods employed. These limitations include:

1. Accuracy of Image Classification

The accuracy of image classification is crucial for understanding forest dynamics. The methods used to classify images may not perfectly reflect the true distribution of land cover types.

2. Seasonal Influence

The seasonal variability of forests can affect the accuracy of classification and change detection. Forests may appear healthy during certain seasons but may be stressed or damaged during others.

3. Resource Availability

The availability of resources for reforestation projects may vary from year to year, affecting the success and sustainability of efforts.

4. Human-Caused Factors

Human activities, such as logging and agricultural practices, continue to impact forest health and distribution, despite efforts to mitigate these impacts.

5. Ecological Stewardship

Long-term ecological stewardship and management practices are essential for sustaining forest ecosystems and biodiversity over the long term.

Conclusion

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