

LAND SURFACE TEMPERATURE CHANGES BY LAND COVER CHANGES OF INLAY LAKE AREA, MYANMAR

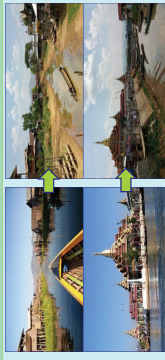
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ABSTRACT

The Inlay Lake is one of world heritage sites of UNESCO. The cultural traditions of numerous villages around it focus on the lake and have distinctive features. Inlay Lake is gradually degrading due to the impacts of human activities and climate variability as well as unsustainable natural resource use practices. So, the sustainable development of the relationship between Land Cover Changes (LCC) and Land Surface Temperature (LST) changes seriously important to manage the Inlay Lake area. This paper focuses on the application of remote sensing and geographic information system (GIS) on the surface temperature of the Inlay Lake area. Landsat images have been utilized to quantify the changes of the two periods. Firstly, the images were preprocessed with the calibration and geometric corrections that were performed for land cover changes. The overall accuracy is 85 percent. Secondly, the investigation using remote sensing and geographic information system was conducted to analyze the changes of land cover and land surface temperature of the study area. The findings of this paper revealed a notable land cover change and land surface temperature for the future sustainable environmental conservation of Inlay Lake area.

1. INTRODUCTION

Inlay Lake is gradually degrading due to the impacts of increasing population, climate change, climate variability and unsustainable natural resource use practices (Kyay Mone Daily Newspaper, 2015). (Thuvein N.M., 2015)
 Inlay Lake is also facing with the challenges of changing of land cover and rising of land surface temperature



AIM AND OBJECTIVES

- to focus on the serious changes of the land cover and land surface temperature of the Inlay Lake
- to examine the changes of land cover with change detection and change matrix by using satellite thermal bands, to measure the changes of the land surface temperature with thermal bands
- to analysis on the relationship between the land cover changes and land surface temperature changes and the environmental conservation for the sustainable development of the Inlay lake area

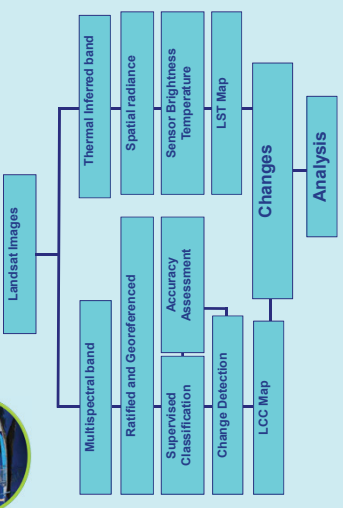
DATA AND METHODOLOGY

- Landsat 7 ETM+ (path 132, row 48) for 2003 (5 March 2003) and Landsat 8 (OLI) (27 March 2014)(path 132, row 48) for 2014 with cloudless area
- USGS (U.S Geological Survey), UTM zone is 47 and Datum is WGS 84.
- ground check points are 300 points
- land cover classification with training sample and calculation of change area by change detection
- surface temperature of 2003 and 2014
- data analysis of land cover and land surface temperature changes

STUDY AREA



- Inlay Lake and surrounding area
- North Latitudes 21° 18' 30" N to 20° 48' 00" N
- East Longitudes 86° 46' 30" E to 97° 06' 30" E
- area is 2288.7 sq km



2. CHANGES OF LAND COVER AND LAND SURFACE TEMPERATURE

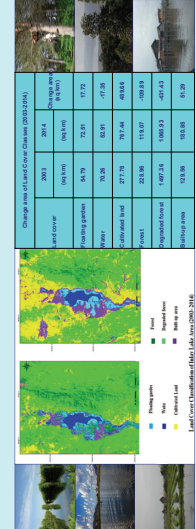
- Land Cover Changes (LCC)
- Landsat 7 (band 4, 3 and 2) and Landsat 8 (band 5, 4 and 3)
- supervised classification with the support vector machine classification algorithm of ENVI 4.8
- Imagine and ArcMap 10.2.1
- Landsat 7 TM and ETM+ thermal infrared (TIR) (band 6)
- Landsat 8 OLI normal infrared (NIR) (band 10 and 11)
- the DN's of thermal bands were converted to radiance based on the following formula

$$L_i = \text{gain} \times \text{DN} + \text{offset}$$

-the effective at-satellite temperature of the viewed Earth-atmosphere system, could be obtained by the following equation:

$$T_b = \frac{K_2}{\ln(1 + \frac{K_1}{L_i})}$$

3. RESULTS AND DISCUSSION



- Inlay Lake is one of the many amazing places
- Inlay Lake has about two hundred thousand residents which live mostly in floating villages
- The land cover changes of Inlay Lake
- land cover changes of human activities are changed the natural environment due to human activities results of land cover classification of 2003 and 2014
- floating garden, cultivated land and built-up area increased 1772 square kilometer, 488.66 square kilometer and 51.29 square kilometer
- Water area, forest and degraded forest are decreased 1735 square kilometer, 109.89 square kilometer and 109.89 square kilometer
- total 300 and the overall accuracy help to calculate the accuracy percentage
- overall accuracy is 85 %

4. CONCLUSION

- 389.41 meter above sea level stands a lake
- Inlay Lake has beautiful limnological features, high biodiversity and distinct livelihood styles of local ethnic people
- facing the devastating effects of climate change
- pointed out that land surface temperature is rising with the increasing human activities of land cover changes
- much research has yet to be done to understand present condition of livelihood of local people and identify vulnerable communities and aspects of their livelihood that is vulnerable to climate change
- watershed management requires coordinated action to internalize the externalities and to tap the linkages among the various resource uses within an area drained by a stream
- community forestry is also a land cover system devised to increase the productivity of the forest, and to reduce land surface temperature, soil erosion and sedimentation for future sustainable development of Inlay Lake and surrounding

LIMITATION

- using fewer remotely sensed data images, (Landsat 7 ETM+ data for 2003 (5 March 2003) and Landsat 8 (OLI) (27 March 2014) data for 2014, or focusing on the relatively the Inlay Lake and surrounding area

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