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Temporal Change Assessment of Oxbow Lakes in Kerala, India Using Geographic Information System

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Abstract: ***It is increasingly realized that the planet earth is facing grave environmental problems with fast depleting natural resources and threatening the very existence of most of the ecosystems. Serious concerns are voiced among scientists, planners, sociologists, politicians, and economists to conserve and preserve the natural resources of the world. An oxbow lake is a U-shaped body of water that forms when a wide meander from the main stem of a river is cut off, creating a free- standing body of water. Oxbow lakes are Shallow open waters. They are small bodies of standing or gently flowing water that represent a transitional stage between lakes and marshes. "Kanichan thura" at Vynthala is considered to be the only one naturally formed "Ox-bow" lake in Kerala. The need to monitor land cover is derived from multiple intersecting drivers, including the physical climate, ecosystem health, and societal needs. Tropical ecosystem has undergone rapid land cover changes especially in the last few decades. Land use and land cover are dynamic Land use/ Land cover changes also involve the modification, either direct or indirect, of natural habitats and their impact on the ecology of the area. The land-cover changes occur naturally in a progressive and gradual way, however sometimes it may be rapid and abrupt due to anthropogenic activities. Land use/cover change has become a central component in current strategies for managing natural resource and monitoring environmental changes. Present study analyses the change in oxbow lake due to natural and anthropogenic reasons. A good portion of this Oxbow lake- like structure has been either encroached upon or degraded. A small portion remains undamaged.***

Keywords: Oxbow lake, GIS, Kanichamthura, natural resource

1. Introduction

Landscape changes, transformations and conversions, are results of various pressures on ecosystems and have been progressing largely in concert with human settlements. Land use change is the modification in the purpose and usage of the land, which is not necessarily the only change in land cover. It also includes changes in intensity and management (Verburg, et al, 2000). Information about land use change is necessary to update land cover maps and for effective management and planning of the resources for sustainable development (Alphan 2003). The composition and structure of vegetation can serve as bio-indicators for environmental changes to ecosystems that echo the interactions between human activity and the natural environment (Zhang *et al*., 2008). The land cover and landscape change in semi-arid and arid environments often reflects the most significant impact on the environment due to excessive human activity (Zhou *et al*., 2008a and Zhou *et al*., 2008b). Accurate and up-to-date land cover change information is necessary to understand and assess the environmental consequences of such changes. Over the years, remote sensing has been used for land use/land cover mapping in different parts of India (Gautam and Narayanan, 1983: Brahabhatt *et al*., 2000). Accurate and up-to-date land cover change information is necessary to understand and assess the environmental consequences of such changes.

Vegetation mapping is a product of the development of remote sensing, initially through aerial photography, remote sensing technology, because of the benefits it offers wide area coverage, frequent revisits, multispectral, multisource, and storage in digital format to facilitate subsequent updating and compatibility with GIS technology proved very practical and economical means for an accurate classification of land cover (Lillesand and Kiefer, 1999). A large number of plants and animals are inhabited in this oxbow lake. It is biodiversity Sanctuaries especially in the dry seasons. During the drought period, these ponds are refugee for almost all the fresh water organism. These local biodiversity hotspots are ideal for detailed biological investigations. . They are cradles of biological diversity, providing the water and primary productivity upon which countless species of plants and animals depend for survival. Many of these plants and animals have specially adapted to living in wet places

The floral diversity of this oxbow lake is very significant. Freshwaters support a large diversity of biota representing almost all taxonomic groups. Macrophytes Dominate in the lake. .Large number of rare and endangered species of plants are inhabited in kanichamthura oxbow lake. Variety of medicinal plants, which are rare endangered inhabited in oxbow. Wide verities of trees are present along the banks of the lake. The present analysis of land use and land cover change involves a quantitative estimation of land use and also reveals the periodic change that occurs in the oxbow vegetation in the area and its extent in detail. "Kanichan thura" at Vynthala is considered to be the only one naturally formed "Ox-bow" lake in Kerala,

2. Materials and Methods

Four suitable cloud-free images were available for this study, spanning the period from 1973 to the 2014. A Landsat Multi Spectral Scanner (MSS) image dated 20th March, 1973 was downloaded from the Global Land Cover Facility site hosted by the University of Maryland (http://glcfapp.umiacs.umd.edu). IRS-1C Linear Imaging Self Scanner (LISS)-III satellite data of 19 March 2014 covering path and row 101/68 was obtained from the National Remote Sensing Agency, Hyderabad. LANDSAT-MSS data with a spatial resolution of 80 m and spectral bands (B1 0.5–0.6, B2 0.6–0.7, B3 0.7–0.8, and B4 0.8– 1.1