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Analysis of Rawa Pening Lake Morphometric Changes for Identification of Land Arises

Nurhadi Bashit, Bandi Sasmito, Fadillah Qur Ani, Abdi Sukmono

Abstract

Rawa Pening Lake is a natural lake with the status of a critical lake in Indonesia because there is an uncontrolled population of water hyacinths, so a layer of water hyacinths covers the surface of the water. Sedimentation causes indications of the appearance of soil to arise. Based on this, it is essential to monitor the presence of surface soil. This study aimed to determine changes in the morphometry and morphology of Rawa Pening Lake, to study changes in morphology, and the spatial distribution of land arising indicative of Rawa Pening Lake. The study This data used the satellite imagery of Landsat 5 in 1989, Landsat 7 in 2002, and Landsat 8 in 2015 and 2021. The method used is NDWI (Normalized Difference Water Index) and manual interpretation to distinguish between water and non-water areas. The results showed that the use of the NDWI method was not optimal for determining the firm boundaries of the lake. The manual interpretation method shows that in 1989–2002, Rawa Pening Lake experienced a narrowing with a change in the area of 75,639 Ha and the distribution of indicative raised land of 141,146 Ha. From 2002–2015, the lake experienced an increase in the area of 159,734 Ha, and the total area of indicative arising land distribution was 99,285 Ha, and in 2015–2021 there was a change in the area of 230,192 Ha with the distribution of raised land of 18.010 Ha.

Keywords

Landsat Imagery; Morphometry; Multitemporal; NDWI






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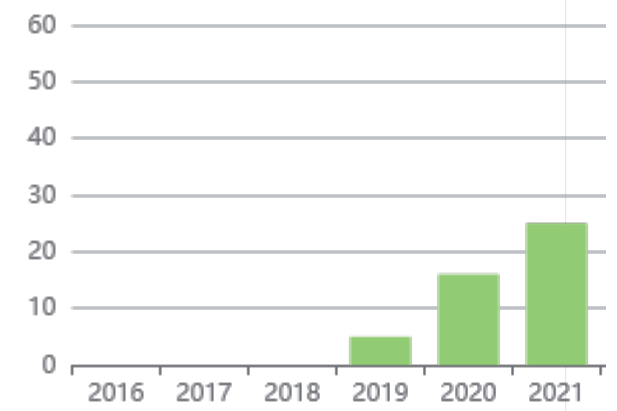
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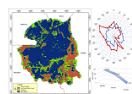
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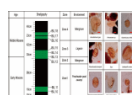
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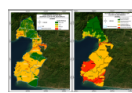
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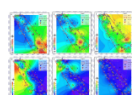
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Analysis of Rawa Pening Lake Morphometric Changes for Identification of Land Arises

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ABSTRACT

Rawa Pening Lake is a natural lake with the status of a critical lake in Indonesia because there is an uncontrolled population of water hyacinths, so a layer of water hyacinths covers the surface of the water. Sedimentation causes indications of the appearance of soil to arise. Based on this, it is essential to monitor the presence of surface soil. This study aimed to determine changes in the morphometry and morphology of Rawa Pening Lake, to study changes in morphology, and the spatial distribution of land arising indicative of Rawa Pening Lake. The study This data used the satellite imagery of Landsat 5 in 1989, Landsat 7 in 2002, and Landsat 8 in 2015 and 2021. The method used is NDWI (Normalized Difference Water Index) and manual interpretation to distinguish between water and non-water areas. The results showed that the use of the NDWI method was not optimal for determining the firm boundaries of the lake. The manual interpretation method shows that in 1989–2002, Rawa Pening Lake experienced a narrowing with a change in the area of 75,639 Ha and the distribution of indicative raised land of 141,146 Ha. From 2002–2015, the lake experienced an increase in the area of 159,734 Ha, and the total area of indicative arising land distribution was 99,285 Ha, and in 2015–2021 there was a change in the area of 230,192 Ha with the distribution of raised land of 18.010 Ha.



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1. INTRODUCTION

Lake is a water ecosystem rich in productive natural resources for human life and the environment. Natural resources are one of the factors in creating community economic activities to increase economic growth in a region (Fitriani et al., 2019). Rawa Pening Lake is a natural lake that has an essential role in the water ecosystem located in Central Java Province. The lake is a traffic stop and collects surface water for various human needs (Piranti et al., 2018). Rawa Pening Lake is a strategic area supporting the agriculture, tourism, and fisheries sectors (Apriliyana, 2015). However, the lake has severe problems regarding uncontrolled water hyacinth development, almost covering most of the water's surface (Utomo, 2016). Land use change causes the lake's condition to experience degradation, which was initially forest to become agricultural land on a sloped area of 25-40% (Apriliyana, 2015). The water quality of Rawa Pening Lake has decreased from 2013 to 15, so it can be said that the lake's trophic status belongs to the hypertrophic damaged group (Heriza et al., 2018). Rawa Pening Lake also experienced a decrease in the area from 1990 to 2009 due to the sedimentation that changed the lake morphometry (Hardini et al., 2012). These problems can lead to other problems, such as control