



Water Trophic Status Mapping of Tecto-Volcanic Maninjau Lake during Algae Bloom using Landsat 8 OLI Satellite Imagery

Anggia Rivani (1) and Pramaditya Wicaksono (2)

(1) Ministry of Agraria and Spatial Planning, Survey and Thematic Mapping, Indonesia, (2) Department of Geographic Information Science, Remote Sensing Program, Faculty of Geography, Universitas Gadjah Mada

Maninjau Lake is a tecto-volcanic lake that benefit its surrounding in various aspect, so it is necessary to preserve the quality of this lake. The objectives of this study were 1) Mapping out the concentration of chlorophyll-a, total phosphor and transparency of Maninjau Lake through analysis of Landsat-8 OLI image and field survey, 2) Identifying trophic status of Maninjau Lake using Carlson method through Landsat-8 OLI and surveys; and 3) Mapping the trophic status of Maninjau Lake using OLI Landsat-8 image analysis.

Identification of trophic status are conducted using the TSI Carlson method that is widely used by water quality researchers. The parameters used to determine the Carlson TSI are chlorophyll-a, total phosphorus, and Secchi Disk Transparency (SDT). The Carlson TSI parameter are modeled from Landsat 8 OLI image. The modeling was derived from field survey and laboratory data is re-coded with the image pixel of Landsat 8 OLI using stepwise regression method. The result of this stepwise regression will show the highest determination coefficient (R^2) which is considered to be aviable variable to be modeled.

The variables that fulfill the prerequisite of stepwise regression is band 4 that strongly correlated with SDT data ($R^2 = 0.82$). Band 5 and 6 band ratios are also strongly correlated with a-chlorophyll data ($R^2 = 0.64$). Band ratios of 3.4 and 5 are strongly correlated with total phosphorus data($R^2 = 0.46$). The TSI Carlson mapping results show that Maninjau Lake is in a light eutrophic to hypereutrophic position with the greatest distribution being heavy eutrophic. Modeling that has been mapped requires validation test. The estimated error standard (SE) SDT was 0.2 m with a maximum content of 74,06%, SE total phosphorus maintained 0.14 mg/ l with a maximum content of 76.69%, and SE chlorophyll-a 0.02 mg/ l with. Landsat-8 OLI is capable to estimate the conditions of each trophic status parameter.