

A General Algorithm for Estimating Secchi Disk Depth from Landsat 5 TM and 7 ETM+ data in Indonesian Lakes

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Secchi Disk Transparency (SDT) or simply known as water clarity is one key parameter for evaluating water quality. Long term SDT monitoring data is urgently needed to conduct a better water environment study and management. However, lack of available data measured from past to now and even in the future is a common problem in developing countries. Generating SDT data over long periods will give a substantial contribution for that matter. Remote sensing is the most appropriate option for recording a spatially continuous vast coverage of environment change condition. Among the operational satellites, Landsat has the longest continuous mission for earth observation with the fine spatial resolution. Accordingly the objective of this research is to develop a general algorithm to estimate SDT using time series of Landsat 5 TM and 7 ETM+ images. The general algorithm will be applicable for Landsat image collections with different dates and locations. The images acquired on different location, date and atmospheric conditions were standardized by performing Rayleigh correction using 6S with no aerosol computed. Further the aerosol effects were minimized by subtracting it using band 5. Extracted corrected reflectance from Landsat images and corresponding in-situ SDT measurements collected from 2011 to 2014 (ranging from 0.5 m to 18.6 m) were used for model calibration. The other in-situ SDT measurements collected in 1992 or 1993 and corresponding Landsat images were used to validate the developed algorithm. As a result, the model calibration involved band 1 and the ratio between band 1 and band 3 gave high determination coefficients of .97 and the model validation provide acceptable result. Consequently, the developed model can be used to generate long term SDT value to fill or complement the data gap for further water environment study and management.

Keywords: Secchi Disk Depth , Remote Sensing, Landsat, Water quality