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Hyperspectral remote sensing of water quality parameters in lakes: A case study of Hyderabad city, Telangana state, India

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The proposed research work is intended for a comprehensive water quality modeling for predicting five optical water quality parameters in typical inland lake environments (Hussain sagar, Shamirpet, Miralam tank and Umda sagar) using hyperspectral remote sensing technique. The five water quality parameters are chlorophyll (a), turbidity, secchi depth, total suspended solids and total phosphorus which are estimated through regression models by combining the field spectro-radiometer reflectance values with concurrent *in situ* ground data (analytical) collected in the study area and correlated and validated with the available hyperspectral data (hyperion). The optical indicators efficiently indicate the lake water quality in a very cost-effective manner over spatial and temporal variability. The formulation of these five band ratio models was based on data collected and processed from sample locations. The trained set of the pixels, extracted from the hyperspectral data for pure spectra is processed for preparing the water quality distribution maps. When subjected to multi-variant statistical tests of significance, the models have seen to yield satisfactory R² values. The model versus *in situ* analysis results, demonstrated 0.79% correlation and that of model versus satellite data exhibited 0.65% mean efficiency. Study of *in situ* spectra for the lakes in the study area reveals a few important spectral characteristics of quality parameters. It is seen that all the parameters SD-710/550 nm, Chl-a-710/670 nm, TSS-850/550 nm, turbidity-710/740 nm, TP-467/560 nm studied has dominant absorption bands respectively. The most appropriate bands for algorithms were selected based on the correlation analysis. Evaluation results indicated that the methods of reflectance ratio were highly correlated ($R^2=0.79$) with the measured quality parameter's concentrations. Thus, this study on the application of hyperspectral techniques proved to be more convenient and better approach in estimating the optical parameters of water quality in inland waters than the scope of traditional empirical methods. The present research work also orients the researchers to explore hyperspectral remote sensing further, more widely for inland water quality monitoring and modeling.

Biography

Anji Reddy Mareddy has more than 28 years of teaching and research experience in Remote Sensing and GIS, Geoinformatics for Environmental Management. He is presently working as a Professor and Director in JNTUH, Hyderabad India. He has executed number of research projects in remote sensing and GIS in environmental management and planning and E I A. He has been the Principle Investigator of Development of 3D City Models and its application in urban planning. His expertise includes Remote Sensing and GIS, Geoinformatics for Environmental Management, Digital Image Processing and Environmental Science and Technology and EIA: Theory and Practice. He is the National Expert Committee Member for number of operational developmental projects. For his outstanding contribution in Environmental problem solving, pollution control, health and safety, GIS and Remote sensing applications for water quality, transportation planning, assessment of sedimentation distribution pattern, EIA, Socio- economic development through scientific means, he has won a number of national and international awards.

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