World Academy of Science, Engineering and Technology
International Journal of Geological and Environmental Engineering
Vol:11, No:09, 2017

Remote Sensing Reversion of Water Depths and Water Management for Waterbird Habitats: A Case Study on the Stopover Site of Siberian Cranes at Momoge, China

Authors : Chunyue Liu, Hongxing Jiang

Abstract : Traditional water depth survey of wetland habitats used by waterbirds needs intensive labor, time and money. The optical remote sensing image relies on passive multispectral scanner data has been widely employed to study estimate water depth. This paper presents an innovative method for developing the water depth model based on the characteristics of visible and thermal infrared spectra of Landsat ETM+ image, combing with 441 field water depth data at Etoupao shallow wetland. The wetland is located at Momoge National Nature Reserve of Northeast China, where the largest stopover habitat along the eastern flyway of globally, critically-endangered Siberian Cranes are. The cranes mainly feed on the tubers of emergent aquatic plants such as Scirpus planiculmis and S. nipponicus. The effective water control is a critical step for maintaining the production of tubers and food availability for this crane. The model employing multi-band approach can effectively simulate water depth for this shallow wetland. The model parameters of NDVI and GREEN indicated the vegetation growth and coverage affecting the reflectance from water column change are uneven. Combining with the field-observed water level at the same date of image acquisition, the digital elevation model (DEM) for the underwater terrain was generated. The wetland area and water volume of different water levels were then calculated from the DEM using the function of Area and Volume Statistics under the 3D Analyst of ArcGIS 10.0. The findings provide good references to effectively monitor changes in water level and water demand, develop practical plan for water level regulation and water management, and to create best foraging habitats for the cranes. The methods here can be adopted for the bottom topography simulation and water management in waterbirds' habitats, especially in the shallow wetlands.

Keywords : remote sensing, water depth reversion, shallow wetland habitat management, siberian crane
Conference Title : ICGRS 2017 : International Conference on Geoscience and Remote Sensing
Conference Location : Rome, Italy
Conference Dates : September 18-19, 2017