Application of remote sensing for waterlogged area environmental monitoring in coal mining area

WENMING PEI[1], SUPING YAO[1], SHAOCHUN DONG[1], CHONG XU[2] AND YONGCHUN CHEN[2]

[1]Nanjing University, Nanjing, China, (peiwenm@126.com, spyao@nju.edu.cn,dsc@nju.edu.cn)

[2]National Engineering Laboratory of Coal Mine Ecological Environment Protection, Huainan, China, (hkhj001@163.com)

Long-term massive underground coal mining activities destruct the stability of the overlying rocks and result in surface distortion and land subsidence, which are prone to form a large scale of seasonal or perennial waterlogged areas, especially in the area of shallow underground water. Multi-temporal Landsat and Pleiades images from 1989 to 2013 were used to analyze waterlogged area change using OBIA(Object-Based Image Analysis) in the Panxie coal mining area, where underground coal mine exploitation has been ongoing since 1980s. The waterlogged area increased to about 2900 ha in 2013, approximately 80 times as large as the area of waterlogged areas in 1989. Like other inland waters, the main problem of water quality in waterlogged area is anthropogenic eutrophication from agriculture fields, untreated residential and industry waste. Surface spectral and constituent concentration data for water in waterlogged area at two different sampling periods were obtained. Inherent optical properties (IOPs) were measured to analyze the variation of colored dissolved organic matter, phytoplankton, and non-pigment suspended matter. As a key water quality parameter for the evaluation of trophic state of inland waters, the concentration of Chlorophyll-a (Chl-a) was accurately estimated using a three-band algorithm. Therefore, it was proved that remote sensing could provide important support for anthropogenic environmental changes in coal mining area.