

Mapping Potential Soil Salinization Using Rule Based Object Oriented Image Analysis

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Abstract : Land degradation, a leading environmental problem and a decrease in the quality of land has become a major global issue, caused by human activities. By land degradation, more than half of the world's drylands are affected. The worldwide scope of main saline soils is approximately 955 M ha, whereas inferior salinization affected approximately 77 M ha. In irrigated areas, a total of 58% of these soils is found. As most of the vegetation types requires fertile soil for their growth and quality production, salinity causes serious problem to the production of these vegetation types and agriculture demands. This research aims to identify the salt affected areas in the selected part of Indus Delta, Sindh province, Pakistan. This particular mangroves dominating coastal belt is important to the local community for their crop growth. Object based image analysis approach has been adopted on Landsat TM imagery of year 2011 by incorporating different mathematical band ratios, thermal radiance and salinity index. Accuracy assessment of developed salinity landcover map was performed using Erdas Imagine Accuracy Assessment Utility. Rain factor was also considered before acquiring satellite imagery and conducting field survey, as wet soil can greatly affect the condition of saline soil of the area. Dry season considered best for the remote sensing based observation and monitoring of the saline soil. These areas were trained with the ground truth data w.r.t pH and electric conductivity of the soil samples. The results were obtained from the object based image analysis of Keti Bunder and Kharo Chan shows most of the region under low saline soil. Total salt affected soil was measured to be 46,581.7 ha in Keti Bunder, which represents 57.81 % of the total area of 80,566.49 ha. High Saline Area was about 7,944.68 ha (9.86%). Medium Saline Area was about 17,937.26 ha (22.26 %) and low Saline Area was about 20,699.77 ha (25.69%). Where as total salt affected soil was measured to be 52,821.87 ha in Kharo Chann, which represents 55.87 % of the total area of 94,543.54 ha. High Saline Area was about 5,486.55 ha (5.80 %). Medium Saline Area was about 13,354.72 ha (14.13 %) and low Saline Area was about 33980.61 ha (35.94 %). These results show that the area is low to medium saline in nature. Accuracy of the soil salinity map was found to be 83 % with the Kappa co-efficient of 0.77. From this research, it was evident that this area as a whole falls under the category of low to medium saline area and being close to coastal area, mangrove forest can flourish. As Mangroves are salt tolerant plant so this area is consider heaven for mangrove plantation. It would ultimately benefit both the local community and the environment. Increase in mangrove forest control the problem of soil salinity and prevent sea water to intrude more into coastal area. So deforestation of mangrove should be regularly monitored.

Keywords : indus delta, object based image analysis, soil salinity, thematic mapper

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