Geomatics Aided Mapping of Saltwater Intrusion Zones in Lower Pennar Basin, (A.P) India

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ABSTRACTGeomatics (Remote sensing and GIS) technologies can be effectively employed for the identification of salt-water intrusion zones in river deltas. The present study deals with the Pennar river basin in the East Coast of India. Pennar delta has one of the largest irrigation systems of canals and distributes. A significant proportion of fresh water resources in this delta is used for agricultural and aquaculture purposes. Owing to the limited fresh water resources and increase in demand for irrigation water the base flow discharge to the sea has been reduced significantly in the delta. The water management practice in coastal region with high emphasis on increasing the agricultural yield and least concerned for the environmental implications has disturbed the groundwater travel path in regions near Bay of Bengal. This study was aimed to determine the water quality and also to identify the saltwater intrusion zones in the Pennar delta integrating Remote sensing and GIS techniques. Methodology adopted for the present study involves creation of spatial database and non spatial database and integrated study in ARC / INFO GIS environment.Baseline studies are carried out to quantify the level of seawater intrusion by analyzing the water quality data using remote sensing data, GIS and field studies. Space borne data is used for the preparation of various thematic layers like land use/land cover, soil, geomorphology, drainage and slope using visual interpretation technique. Non spatial database consists qualitative analysis of 100 ground water samples analyzed for physico-chemical parameters like pH, alkalinity, hardness, total dissolved solids, sodium, potassium, sulphates, nitrates etc. as per the standard protocol (APHA 1998). With the help of integrated study in ARC /GIS environment using overlay analysis and proximity analysis, maps showing spatial distribution of various parameters were generated using curve-fitting technique of ARC / INFO and ARC VIEW GIS software. From the results obtained, total area is classified into fresh, slightly saline and moderately saline zones. Moderately saline zone was observed near brackish water and in areas with poor drainage. Slightly saline zones are observed in areas where aquaculture is in practice and fresh water zone was observed in the remaining parts of the study area. The outcome of the study, facilitates in monitoring and management of the coastal environment.