AN INTERACTIVE DECISION SUPPORT SYSTEM FOR MANAGEMENT OF THE NILE DELTA SHORELINE OF EGYPT

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Abstract
The Egyptian Mediterranean Coasts in the south of Levantine basin is suffering from coastal erosion and accretion. Inspite of availability of data and information after measurements and models applications, its management still not advanced. This paper presents an effort done for using GIS application as a tool for making information available to decision makers. Data used are taken by field mesurements, Remote sensing and model applications to estimate the variables affecting shore processes, waves and currents.
Keywords : Coastal Management, Gis.

Remote sensing and linked database-geographic information system (GIS) have been combined to build an interactive decision support system to better manage the Nile delta coast of Egypt, 140 km long. This computer-based system is designed to support decision makers and planners to deal with beach protection, human infringements, dune, mining, water pollution, over fishing, beach restoration, archeological sites, set-back line, sedimentation in estuarine, lagoon inlet and navigation channels of the delta harbors. Acting in parallel with these issues are possible consequences and proposed adaptation of relative sea-level rise in the non-protected low-lying coastal areas.

The designed DSS is computer-based system for storing, manipulating, analyzing and displaying spatial and non-spatial coastal data at individual coastal stretch. It enables one to compare a large number of maps employing carefully geo-referenced data. Data collected in this system are essentially based on historic data-base comes from the Coastal Research Institute of Egypt and spanned the last two decades in addition to modeling results obtained in the present study [1-6]. This system enables users to automatically update and revise stored data. The designed system is build using visual basic language and consists of four subsystems:

(1) Collection of data and information such as beach profile surveys, grain size distribution of beach and seabed sediment, water circulation, bathymetry, coastal structures, measurements of wave, hydrographic conditions (Salinity, Temperature, Turbidity and pH), wind, current, and tide. Spatial maps obtained from satellite images and topographic charts are incorporated. This subsystem provides the user interface, operation modules, and the view subsystems with data and set of procedures to complete their functions.

(2) The mathematical operations subsystems are a set of procedures (modules), these modules applied on the system of data collection to obtain the results, which can be displayed through the view subsystem. These operations enable a user to calculate sediment volume change trends, sediment budget and rate of shoreline changes for a particular beach. Further, statistical analysis can be manipulated for waves, current, tide and other related parameters such as wave energy, beach slope, breaker heights on beaches, beach face slope, morphodynamic classification of beaches, and swash runup elevations on beaches induced by storm waves, depth of closure and sediment transport rates.

(3) User interface tool manages interactions between the three linked subsystems. The user interface subsystem has the windows manager, which contains all possibilities and operations to help the user to get the information or results.

(4) The system provides an environment, view subsystem, for displaying geographic reference layers such as illustrations, maps as well as tabulated data. A view is simply a user visible representation of the results and information (database).
The system provide the following assistances to decision-makers and planners:

1- Basic facilities for the manipulation, analysis, retrieval, distribution and storage of coastal related information as well as additional remotely sensed or other thematic information;

2- Technical assistance to outline shoreline management plans;

3-Design data to numerical models required to design protective projects;

4- Baseline data for any future EIA studies;

5- Temporal and spatial information on coastal changes, which will meet the immediate needs of authorities and other user groups; and Mapping positions of set-back distance along the delta coastline.

References

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