Application of MODIS Products to Infer Possible Relationships Between Basin Land Cover and Coastal Waters Turbidity Using the Magdalena River, Colombia, as a Case Study.

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Abstract

Basin development and consequent change in basin land cover have been often associated with an increased turbidity in coastal waters because of sediment yield and nutrients loading. The later leads to phytoplankton abundance further exacerbating water turbidity. This subsequently affects biological and physical processes in coastal estuaries by interfering with sun light penetration to coral reefs and sea grass, and even affecting public health. Therefore, consistent estimation of land cover changes and turbidity trend lines is crucial to design environmental and restoration management plans, to predict fate of possible pollutants, and to estimate sedimentary fluxes into the ocean. Ground solely methods to estimate land cover change would be unpractical and traditional methods of monitoring *in situ* water turbidity can be very expensive and time consuming.

Accurate monitoring on the status and trends of basin land cover as well as the water quality of the receiving water bodies are required for analysis of relationships between the two variables. Use of remote sensing (RS) technology provides a great benefit for both fields of study, facilitating monitoring of changes in a timely and cost effective manner and covering wide areas with long term measurements. In this study, the Magdalena River basin and fixed geographical locations in the estuarine waters of its delta are used as a case to study the temporal trend lines of both, land cover change and the reflectance of the water turbidity using satellite technology. Land cover data from a combined product between sensors Terra and Aqua (MCD12Q1) from MODIS will be adapted to the conditions in the Magdalena basin to estimate changes in land cover since year 2000 to 2009. Surface reflectance data from a MODIS, Terra (MOD09GQ), band 1, will be used in lieu of *in situ* water turbidity for the time period between 2000 and present. Results will be compared with available existing data.

Forest and wetland decrease along with an increase in agriculture, pasture, urbanization and mining have been accounted for the overall increasing trends in sediment yield on a regional scale.

fixed geographical locations at fixed intervals may not be representative of the mean water turbidity in estuaries between intervals,