Analysis, Prediction, and Impacts of Shoreline Change Rates along the Eastern Aransas National Wildlife Refuge, Texas

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ABSTRACT

The Aransas National Wildlife Refuge (ANWR) is home to the highly endangered Whooping Crane population during the winter months, and also lies adjacent to one of the most heavily trafficked sections of the Intracoastal Waterway. Because of this area's environmental and economic significance, a clearer understanding of the geographical changes that have and will occur along this section of the Texas coastline is imperative. While the extent of the study area only covers a small portion of the world's coastline, the same methods can be used to analyze and predict shoreline change in any area with a similar coastal environment. The overall objective of this research was to use geographic information systems (GIS) to determine how much erosion and accretion has occurred along the eastern ANWR shoreline over the last 84 years, how much erosion and accretion will occur along this coastline by the year 2114, what geographical shoreline change trends can be observed in this study area, and how well the Analyzing Moving Boundaries Using R (AMBUR) shoreline change software performed in analyzing and predicting shoreline change rates. Analysis was conducted using ArcGIS, the AMBUR shoreline change tool, fieldwork within the study area, and data examination. The project's results found that from 1982 to 2014, 18.6% of the total study area had changed, with 74.9% of that change coming from erosion, and 25% coming from accretion. It was also discovered that within the next 100 years, 45.7% of the entire study area would undergo shoreline change, with 62% of that change coming from erosional processes, and 36% coming from processes of accretion. The results from the research indicate that there is significantly more erosion occurring in the study area than accretion, and that there is a clear correlation between shoreline location and the amount of shoreline change taking place. In addition, because of the unique parameters needed for data output from the AMBUR software program that no other shoreline change software requires, more accurate results can be generated for highly curved shoreline environments. Further analysis of shoreline change is crucial as shoreline change processes continue to intensify over time. And for any study area that consists of islands, or highly curved coastlines, the AMBUR tool may generate more accurate data.

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