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Use of Satellite Data to Map Flood Extension Around the City of Saint-Louis in the Senegal River Estuary

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ABSTRACT

The Senegal River basin is located in West Africa and occupies an area of roughly 300 000 km². The entire basin, including the upstream catchments is drained by the 1700 km long Senegal River and its tributaries. Hundreds of thousands of people live along the Senegal river which rises in the Fouta Djallon mountains of Guinea and flows north towards the edge of the Sahara desert before swinging west to empty into the Atlantic Ocean. Flooding in the Senegal River Basin is a recurring event and the severity of floods in the estuary varies from year to year. Extreme floods in the lower Senegal Basin have in the past caused calamitous socio-economic and human losses. Recently in 1999, the western part of Africa experienced higher precipitation rates, resulting in higher river discharge in the Senegal River and its tributaries and thus larger inundations in the river valley and delta than seen during the last 30 years. The result was the destruction of many villages and irrigation infrastructure and substantial parts of low lying city of Saint-Louis in the estuary near the Atlantic Ocean was struck by flooding. Thousands of kilometres of roads also were damaged or washed away. Flood impacts have been severe during these last year because of the high levels of vulnerability and low levels of resilience of the population, the lack of adequate physical protection infrastructure and changing flooding patterns due to environmental change and the impact of the dam's structures. The specific objectives of my research are to: .Assess the rain fall variability and its hydrological impacts in the Senegal River estuary. .Develop and test new methods to dynamic flood monitoring using satellite data. .Set up a GIS-based model based on the satellite data allowing predictions of impacts of extreme scenarios. .Combine the above with a flood-forecasting model in an early warning system In this project the issue of flood hazard mapping has been addressed from the perspective of different mapping scale in a GIS environment. The flood hazard map is particularly handy for the planners and administrators for formulating remedial strategy. It also makes the process of resource allocation simple resulting in a smooth and effective implementation of the adopted flood management strategy. Mapping the flood risk is planned as a decision making tool, and also as an information tool for the concerned public. Such maps, allowing a clear and detailed diagnostic at any scale, allow negotiations and the adequate decision to be taken. In order to assess the impacts of different flood scenarios, a GIS-based model is being developed in order to predict areal extent of inundation a round the city of Saint-Louis considering different discharge scenarios from the Diama dam. This model will have relevance to the overall planning of land use in Saint-Louis. The discharge scenarios will be generated from statistical analysis of historical data and scenarios from climate change models.

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