

## **Estimation of the flooded area of the Inner Delta of the River Niger in Mali by hydrological balance and satellite data**

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**Abstract** The Inner Niger Delta in Mali is the largest flood plain of West Africa. It is an ecosystem where water regime, environmental dynamics and human activities (fishing, agriculture, livestock) are closely associated. It is home to a tenth of the population of Mali on an area of 35 000 km<sup>2</sup>. Rational management of this wetland subjected to a dry climate is essential for sustainable development in the region. Since the drought began around 1970, the Delta has been facing a problem of sustainability of renewable natural resources. Management strategies of these resources depend on the extent of flooded areas, the annual variability of which is still largely natural. The prediction of the flood extent, varying with runoff of the rivers Niger and Bani, is an important venture. Thus the objective of this study is the estimation of flooded areas of the Delta from conventional water balance methods and from analysis of satellite images. We examine the variability of the hydrological regime and processes of storage and release in the Delta. We then present the method of evaluation of flooded areas, from low-resolution multispectral data (1 km) NOAA/AVHRR for the period 1990–2000, using a distinction between the open water surfaces, vegetation cover and flooded vegetation. We then determine the flooded areas by this method and compare them with previous estimates. Finally, to produce a model for spatial-temporal forecasting of flooded areas, we study the correlations between the heights of water levels at gauging stations in the Delta and the flooded areas.

**Key words** River Niger; West Africa; Inner Delta; flooded area; AVHRR

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