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Perception of hydrological changes and adaptation strategies in the Inner Niger Delta in Mali

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INTRODUCTION

The Inner Niger Delta (IND) in Mali is subject to a transformation of its hydrologic functioning due to climatic variations. With a possible flooded area of up to 30 000 km^2, the IND is an ecosystem where hydrologic regime, dynamics of the natural environment and human activities (fishing, agriculture, animal breeding) are closely associated (Kuper *et al.*, 2000). One million people derive their livelihood from this ecosystem. Further to the variations of the climate, we in the IND assist decrease of flood height and reduction of flooded areas resulting in a decrease of the environmental productivity.

This study focuses on the local perception of the flood evolution of the local population. If the perception of the phenomenon of the floods is probably similar between stakeholder groups, our hypothesis is that the perceptions on the causes of this variation strongly from one group to another. A survey of three social groups of the delta allowed us to examine the perceptions of people relative to flood variations.

SURVEY METHOD

A survey was conducted among 250 farmers, fishermen and breeders in 16 villages in four municipalities of the delta (Djenné, Mopti, Tenenkou and Youwarou). The selected villages are all in a flooded area and individuals were randomly selected among the three main groups. The answers were analysed. A similar method was used earlier and a detailed description is available in Fossi *et al.* (2012).

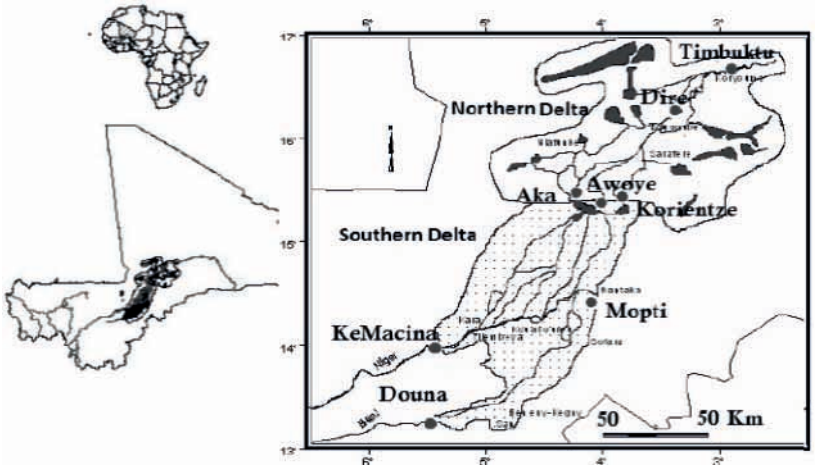

Fig. 1 Inner Niger Delta, Mali, and maximum extent of flooded areas (Mariko, 2004).

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RESULTS

People have noticed two significant periods for the change in the character of the flood. One during the 1970s and another from 1994. It emerges that 90% of the farmers, 85% of the breeders and 88% of the fishermen agree on the exceptionally good characteristics of the floods of the 1960s. Fishermen (93%), farmers (87%) and breeders (78%) agreed that the floods of the 1970s and 1980s were bad, i.e. characterized by a significant decrease of the flood level and a reduction of the flooded area. They note a new trend of the floods from 1994. Indeed, 92% of the farmers, 87% of the breeders and 90% of the fishermen believe that floods have been increasing since 1994.

Several studies have shown that since 1970, the basins of the Niger River and its tributaries were subject to a strong rainfall deficit causing a decrease of flood and a reduction of the flooded area. From 1950–1969 to 1970–2000, the average flow deficit was –33% and –40% in Koulikoro on the Niger in Dire (Sangaré *et al.*, 2002; Mahé *et al.*, 2011). In the Bani sub-basin, rainfall went down from 15 to 25% since the beginning of the drought of the 1970s and the annual flow rate in Douna has decreased by more than 65% (Paturel *et al.*, 2010). After 1970, the flood in the delta covered an area of around 12 000 km^2 at its maximum, which is 50% less than before the drought (Mariko *et al.*, 2003). Researchers confirm an increase of rainfall from 1994 (Mahé *et al.*, 2010; Paturel *et al.*, 2010), although levels of floods and rain have not reached those of the 1960s.

Local populations suggest the decrease of rainfall, God, and the upstream irrigated schemes as being the main causes of the variation of the floods. A large number of farmers blame the decrease of rainfall. However, the major cause for fishermen is seen to be the upstream irrigated schemes. As for the breeders, the main cause is of divine origin.

Scientists estimate that the majority of the 1970s flood variation is due to a lack of rainfall and to a lesser extent to the upstream dams and irrigation expansion. To deal with these changes, people have developed local strategies ranging from migration, diversification of activities and a change to production techniques.

CONCLUSION

The study of the social perception of flood variations showed that the farmers have a thorough knowledge of their living environment. The three main groups of actors have a similar vision; the opposite case would be problematic, given that it is the utilization of the same resource. Farmers, breeders and fishermen can find a consensus on issues related to the impact of floods variation.

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