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MORPHODYNAMICS OF A WAVE-DOMINATED ESTUARY: CASE OF THE LANGUE DE BARBARIE BREACH

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ABSTRACT

In October 2003, the Senegal River basin experienced exceptional rainfall, causing the river's overflow and, at the same time, Saint-Louis city's flooding. The emergency measure taken was the opening of a relief channel, or breach, at the Langue de Barbarie, which helped to reduce flood levels. Over time, it has continued to widen southwards, due to coastal erosion. A tendency towards accretion has been observed on the northern side, due to longshore drift. The aim of this study is to understand the dynamics of the breach by examining its evolution. Archive images, available on Google Earth, have made it possible to track the width of the breach, from its opening until 2025. The phenomena of accretion and erosion were also studied by monitoring the evolution of the northern and southern boundaries of the relief channel, enabling the annual accretion and erosion of the breach to be determined over the period covered by the study.The annual change in the width of the breach showed that, following an exponential widening from 4 m at its opening to 5.5 km in 2024, the breach began to narrow in 2025, reaching a width of 4.82 km. A trend towards accretion was observed at the northern edge and a trend towards erosion at the southern edge. Quantification of the overall accretion and erosion of the breach showed that erosion (606.82 m/year) is more pronounced than accretion (413.64 m/year) and instead of narrowing, a continuous widening should have been observed. The impacts of the corrective measures undertaken (artificial beach nourishment at Pilote Barre), following the disruption caused by the progressive widening of the breach, have been identified, and the threat of Saint-Louis flooding and the degradation of the Langue de Barbarie.

Keywords: Accretion, Cartography, Climate Change, Erosion, Saint-Louis Breach.