CLIMATE VARIABILITY AND RAINFALL TYPOLOGY OF THE BIA RIVER WATERSHED

MELEDJE N'diaye Edwige Hermann [(1)], KOUAME Yao Morton [(2)], KOUASSI Kan Martin [(1)], KOUASSI Kouakou Lazare [(1,2)]

(1) Marine Geology, Sedimentology and Environment Laboratory, Center of Ecology Research, University NANGUI ABROGOUA, Abidjan, 225, Ivory Coast
(2) Technical Sciences and Environment Laboratory, University Lorougnon Guédé, Daloa, 225, Ivory Coast
(3) Geosciences and Environment Laboratory, University Nangui Abrogoua, Abidjan, 225, Ivory Coast

Correspondence: Meledje N. E. Hermann (meledjendiay@yahoo.fr)

ABSTRACT

Studies have shown that water reservoirs in Côte d'Ivoire are increasingly facing siltation. At the Ayamé 1 dam, this problem could be exacerbated by uncontrollable variations in water level drops and floods. Managers of these structures are unable to find a plausible interpretation of the hydrological variations recorded in recent times. It is in this context that this study was initiated with the aim of characterizing the historical hydro-pluviometric variability of the Bia watershed. For this study, rainfall and hydrometric data from 1901 to 2020 were analyzed and homogenized using the Roche method. Variability was studied using the Standardized Precipitation Drought Index (SPDI), Pettitt, Buishand, Lee-Heghinian break tests, and Hubert segmentation. Frequency analysis (lognormal distribution, Gumbel distribution) and the hydrological balance of the Ayamé 1 dam were also conducted. Rainfall follows a marked north-south gradient, with maxima in June (158-342 mm). A sharp reduction in rainfall is observed in the 1970s; this reduction is pronounced in the 1980s, during which we note a significant decrease in annual rainfall. This deficit period has since been characterized by its intensity (-11% relative to the average) and its duration (39 years). From the late 1960s until 2000, a significant break is observed in 1970 for all stations, with rainfall decreases varying from 18% in Côte d'Ivoire in the Bianouan region to 29% in the Ghanaian region. Water availability in the basin is therefore decreasing, with high rainfall variability and increasing potential evapotranspiration. The lake level fluctuated between 80.90 m (minimum in 1983) and 90.74 m (maximum in 1968), with a downward trend since the 1980s.

Keywords: Côte d'Ivoire, Ghana, Bia watershed, pluvio-hydrological variability.