

COMPARISON OF RAINFALL AND RUNOFF IN THE HUMID SOUTH-WESTERN AND THE SEMIARID NORTHERN SAVANNAH ZONE IN GHANA

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ABSTRACT: *Rainfall and streamflows of rain forest catchments in the humid South-Western Rivers System and the semiarid northern savannah zone in the Volta River basin of Ghana are compared in this paper. The comparisons were done over two different time periods. The first period of 1950-1970 represents relatively forested vegetation and a relatively low population, whilst the second, 1971-1991, represents a period of intense logging and changing land use practices that severely degraded the environment. Comparisons were made between the mean annual rainfall and mean annual flows for the two periods under consideration. It was observed that whilst the mean annual rainfall for the second period (1971-1991) and for the humid South-Western region is reduced significantly by 19.3% and 20.6%, respectively at Kumasi and Sekondi/Takoradi, that of the semiarid northern savannah zone has largely been reduced by only 1.5%, 2.3%, 7.2% and 11.3%, respectively at Tamale, Yendi, Navrongo and Wa. The mean annual runoff for the second period has reduced by about 43.7% at Twifo Praso on the Pra river and 44.1% at Sefwi Wiawso in the Tano basin, both in the humid South-Western region. The corresponding reductions, which are only about one and half times lower than those of the humid South-Western region, are 23.1% at Nawuni on the White Volta and 32.5% at Saboba on the Oti river, although both are located in the semiarid savannah zone. Also discussed in this paper are the possible causes of the reductions in rainfall and runoff in the different climatic zones.*

INTRODUCTION

The population of Ghana increased from 6.7 million in 1960 to 8.6 million in 1970 and 12.3 million in 1984 to 18.9 million in 2000. With increased human activities resulting in deforestation due to unsustainable levels of timber extraction, poor agricultural practices (i.e. slash and burn), surface mining, use of fire for illegal hunting and the cutting of trees for fuel wood and charcoal production, the need arises for information on their effects upon the hydrological characteristics of both the rain forest and the savannah zone.

In the early twentieth (20th) century, Ghana had some 8.2 million hectares of moist forest and by 1989 the forested area covered less than 2.1 million hectares. Currently, only about 1.4 million hectares of the original forest exist (The International Institute for Environment and Development, 1992). This means that through deforestation about 70,000 hectares of forest are lost annually on the average. The

rate of deforestation increased after 1970, due not only to population pressures, but also due to foreign currency demands from increased unsustainable timber logging. Deforestation has been relatively intense in the humid South-Western forest region of Ghana. However, rain forest catchments are necessary since they act not only as water storage, both surface and underground, for human consumption, agricultural and industrial activities and for hydropower generation among others, but also play an important role in maintaining micro level biodiversity, which is so vital for human existence.

In order to appreciate the hydrological changes, which have occurred in the South-Western rain forests due not only to external factors but also anthropogenic activities such as deforestation and land-use changes among other factors, the statistical parameters of rainfall and runoff from these rain forest catchments have been compared to those of the semiarid savannah region. The objective of this paper is therefore to compare the rainfall and runoff of