

IMPACT OF THE JONGLEI CANAL DIVERSION ON WATER SURFACE AREA AND EVAPOTRANSPIRATION OVER THE SUDD WETLAND,

SOUTH SUDAN

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1 ABSTRACT

The Sudd wetland in South Sudan has been designated a Ramsar site since 2006. Due to high evapotranspiration, Sudd loses water, which causes a poor downstream flow. The downstream countries (Sudan and Egypt) proposed a plan to divert water from the Sudd wetland through the Jonglei Canal. However, there are concerns about the impact of the canal construction on the Sudd surface water area and the environment. Nevertheless, there is a lack of sufficient data to estimate the surface water area losses, the effect on the climate system and the hydrology of the river swamps system. Therefore, this study aims to evaluate the impact of diverting water from the Sudd wetland on the water surface area of the Sudd by assessing the seasonal surface water extent and analysing the effect of developing the Jongle Canal on the flooded area extent. To achieve these objectives, satellite images obtained from the Moderate Resolution Imaging Spectroradiometer (MODIS) for a period from 2008-2021 will be utilised to estimate the surface water area of the Sudd. The Sudd wetland's water area loss due to diversion was calculated using the linear regression model employing river flow at Mangala station and satellite-derived water surface area. This study considered an area of 68,282 km2 of the Sudd wetland and found that the lowest surface water area was 7,358 km2 in March 2008, while the largest surface water area identified was 19.792 km2 in October 2020. Moreover, the Jonglei Canal construction would lead to a significant decrease (3% 32%) in the Sudd surface water extent and evapotranspiration loss of 1.14E+03 [MCM/YEAR]

Key Words: Sudd wetland, Jonglei Canal, MODIS, high evapotranspiration, South Sudan

2 INTRODUCTION

BACKGROUND:

- South Sudan gained independence on July 9, 2011
- Boasts an abundance of Water Resources
- Grappling with numerous challenges in Water Mgmt. •Poor infrastructure,
 - •Mismanagement,
 - Conflict
- Susceptible to frequent and intense **<u>flooding</u>** and water-related disasters
- Sudd Wetland-Largest ecosystem in the Nile Basin
 High water losses (Dugan and Dungan 1990)
- •Unprecedented floods (Melesse, Abtew, and Setegn 2013) •Insufficient regional baseline information (Dugan and Dungan 1990).
- Increase of human activities
- Water development projects, Oil industry encroachment, and Water pollution, etc



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- ✤ The Sudd Wetland is in South Sudan (6.5° & 9.5° N; 30.167° E & 31.75° E).
- Designated as Ramsar site since 2006
- ✤ Pop. ~72,547 people (est.) (NBS, 2020)
- ✤ Study area; ~68282 sqkm

JONGLEI CANAL

Jonglei Canal dimensions

- ◆ L (360 km), W (75m & channel bed-width av. 38m), D (4-8m).
- ✤ The estimated water volume to be saved by the canal ranges

from 3.8 BCM to 6.6 BCM.

- ✤ Canal construction work began in 1978 (260 km dug) before it
 - was halted by a rebellion (1983).

OBJECTIVES:

- <u>AIM: "Evaluate the impact of Jonglei canal diversion on the water surface</u> area of the Sudd Wetland and Evapotranspiration Losses <u>"</u>
- OBJ 1. Assess the seasonal extent of the Sudd wetland
- **OBJ 2.** Analyze the effect of developing the Jonglei canal on the flooded areal extent of the Sudd wetland
- **OBJ 3:** Evaluate the Evapotranspiration Losses on the Sudd.



