

## ***Interactive comment on “Investigation of the long-term variations in hydro-climatology of the Dinder and Rahad basins and its implications on ecosystems of the Dinder National Park, Suda” by Khalid Hassaballah et al.***

**Anonymous Referee #2**

Received and published: 27 November 2016

The topic is interesting and its content is useful for research and for development as well with clear objective of investigating the long-term variations of stream flow, rainfall and temperature over the D&R and its implications on the DNP wetlands ecosystems. However, the followings are my general comments

1. LULC changes occurred around early 1990's in the upper Dinder and Rahad was the assumption for the study and 1992 was the separating time period for the analysis of the changes for the IHA statistical comparison. However, this assumption can be proved or analyzed by LULC change detection techniques.

C1

2. The IHA technique computes 33 hydrologic parameters for each 10 year. But parameters and their ecosystem influences were not mentioned anywhere (figure 8) and also how parameters are calculated. Example, Mean or median value will tell us about the reliability of water for aquatic animals living in Mayas.

3. Observed and expected frequency were used to calculate hydrological alteration factor (HA) but it is not well described what is expected frequency and how to find or calculate expected frequency.

4. They used 12 stations for precipitation, 1 station for temperature and 2 flow stations. In my opinion 1 temperature station will not be enough to represent spatial variability of the catchments. Also, Gondar and Bahirdar cannot represent the two catchments as they are found at the highlands of UBNRB. Moreover, they used regression analysis between neighboring stations to fill in missing data, which is not clear how they fill the gaps of a single temperature station. There is no information how they filled the missing values of streamflow or how they detect outliers.

5. The IHA analysis indicated that the Rahad River flow was coupled with significant upward alterations in some of the hydrological indicators. In contrast, the Dinder River flow was coupled with significant downward alterations. Alterations in magnitude and duration of the annual flood peaks that reduce the amount of water flowing to the river-floodplain, may diminish the production of native flora and fauna, and animal migration that may be linked to floodplain inundation. This conclusion is too general as there is no any standard set for habitat suitability indices to quantify what percentage of flow variation affects the flora and fauna?

6. There is no any drawn conclusion from RVA analysis and also from change detected of precipitation and temperature. The rise in temperature may not or may be favorable for animals living in DNP.....

7. Figures are not well described or clarified in text. For example figure 4, 5 and 6 showed peaks or abrupt change points but nothing was mentioned what was happened

C2

during that time on the Mayas ecosystem or the historical impacts of the high and low flow. In general it lacks detail description of methodology and summarized result analysis and conclusion of the 33 parameters.

Some additional comments to specific paragraphs:

a) page 4, line 25-30: The ESS should be clearly distinguished. Seperate them into the common categories, also by using a table.

b) page 5, line 21-23: Which loss of biodiversity occurred? Give facts!

c) page 7, line 30-32: Which kind of significance tests are used for the HA?

d) figure 2: Which ET0 formula was used? How sensitive are the absolute ET0 values?

e) figures 5 -7: The significance of the decrease / increase is not explained or tested. Moreover, there are some 0-values which are probably "no data" values (e.g. Rahad River in August).

f) page 12, line 10-31: In this form not readable (you get "dizzy").

g)page 13, line 15-18: Quantify the LULC!

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-407, 2016.