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Hydrologic Research in the Congo Basin

THE PREDICTABLE EFFECTS OF THE INTERBASIN WATER TRANSFER PROJECT (IBWT) ON THE HYDROLOGICAL REGIME OF UBANGUI

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Figure 1. IBWT Project (Cima+ 2011; Lemoalle & Magrin, 2014)



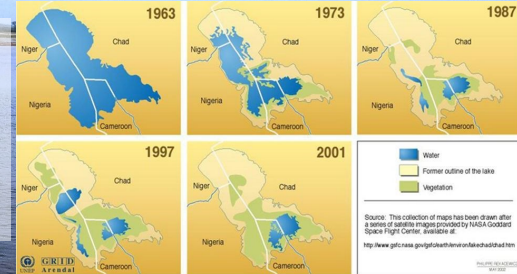
Introduction:

The controversial InterBassin Water Transfer Project (IBWT), is a project formulated in 2011 by the member states of the LCBC (Lake Chad Basin Commission) in order to transfer part of the water from the Ubangui basin to Lake Chad. Two dams have been planned for this purpose: the *Palambo Dam* on the *Ubangui River* and the *Bria Dam* on the *Kotto River* (Fig. 1). The project was first put forward around 1982 in an advertising publication of BONIFICA entitled: "TRANSAQUA, an idea for the Sahel".

Why do we transfer water from Ubangui to Lake Chad?

Lake Chad is indeed an endorheic lake on which more than 13 million people depend [Ngaressem & al., 2014]. Based on NASA images (Fig. 2), Coe and Foley (2001) have shown that in less than 40 years, the surface of Lake Chad has dried up by more than 90%. These alarmist results have caused enormous worry to the major international organizations (FAO, GEF, UNESCO ...).

Figure 2. Evolution of the surface of Lac Chad. NASA 2002

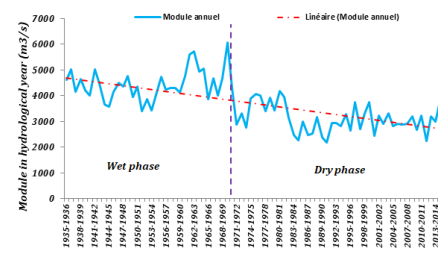


The ultimate lake rescue plan proposed by the LCBC concerns a water supply from Ubangui. However, the predictable effects of this transfer of water on the Ubangui ecosystem are unknown. *Does the Ubangi River have the water needed to revitalize the ecosystem of Lake Chad? What do we know about the recent hydrological dynamics of Ubangui? Would not this transfer have significant impacts on the Ubangui and Congo River hydrological regimes?*

Recent hydrological dynamics of Ubangui

The recent hydrological dynamics of Ubangui is under the influence of "climate" and "anthropic". The influence of climate is reflected in the effects of hydroclimatic forcings on the inter-annual flow regime (Laraque & al., 2013, Nguimalet & Orange, 2013). Since 1970, the Ubangui recorded a flow deficit of 30% (Fig. 3), which has the consequence of reducing navigability between Bangui-Brazzaville.

Fig. 3 - Interannual evolution of the Ubangui module in Bangui



In response to hydrological variability, the Ubangui adjusts its fluvial morphology (Fig. 4).

Fig. 4 - Evolution morphosédimentaire de l'Oubangui à Bangui

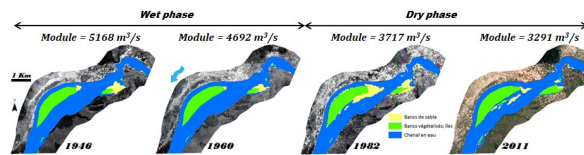


Photo 1 - Sand extraction on Ubangui in Bangui



The anthropogenic influence is reflected by the impacts of river developments: sand extraction (photo 1) and hydraulic dam. Few studies have been done on the effects of river developments on Ubangui. The dam of Mobaye for example, is indeed a half-dam built between 1986-1989 on ubangui. Its construction led to local morphological changes in Ubangui (fig. 5), but this did not significantly affect the Ubangui flow regime.

Fig. 5 - Morphosedimentary evolution from Ubangui to Mobaye

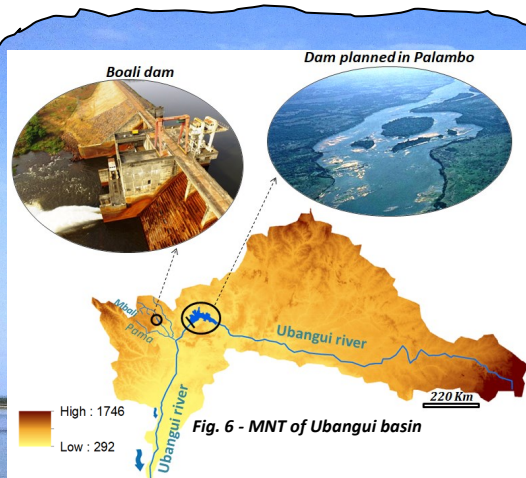
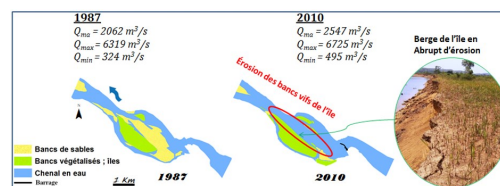


Fig. 6 - MNT of Ubangui basin

Methodology:

The main hypothesis of this study is that the transfer of Ubangui water from *Palambo* would have significant impacts on the Ubangui hydrological regime. As a result, we have implemented a methodological approach to explore the predictable hydrological impacts of the IBWT project on Ubangui. The applied method is the "project station method". It consists in transposing the effects of a « dam of references » having the same characteristics as the dam planned in *Palambo*. Thus, the dam of *Boali* on the *Mbali River* (under tributary of Ubangui) served as reference dam for our extrapolation (fig. 6). A hydrological diagnosis was made on the Boali dam for transposition purposes.

Results:

- ◆ The regulation of Ubangui in Palambo would significantly alter the Ubangui hydrological regime. An artificial diet under the control of the pulsations of the dam gates would replace the initial regime.
- ◆ The maximum flow rates of floods will be rolled while low water flows will be supported. Ubangi river dynamics would be affected downstream due to reduced lateral movement of the channel.
- ◆ The planned Palambo dam would result in a break in the sedimentary and biological continuity of Ubangui.
- ◆ At the inter-basin scale, the ecosystem of the Tomi, Fafa, Ouham and Chari rivers would have been altered.