**Main conclusions so far**

* **Penman used to determine evaporation, for while climatic data is acquired from the CRU database**
* **Determining the exact area of reservoirs is difficult because it varies throughout the year, and limited resolution prevents tracking the volume and area of very small reservoirs**
* **Order of magnitude is known for Burkina Faso, but the relationship between e.g. depth and evaporation (should shallow lakes dry up faster because they heat up more quickly?), are difficult to establish**
* **The fact that 60% of the retained water evaporates may be used for a global estimate**
* **precise calculations of evaporation makes error propagation very likely as approximations are necessary at each stage, and data comes from different sources (for different years even, perhaps).**
* **how to access ‘official inventories provided by DGRE’**

Fowe, T., Karambiri, H., Paturel, J.-E., Poussin, J.-C., & Cecchi, P. (2015). *Water balance of small reservoirs in the Volta basin: A case study of Boura reservoir in Burkina Faso. Agricultural Water Management, 152, 99–109.* doi:10.1016/j.agwat.2015.01.006Diagram

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Using pan evaporation measurement data, Fowe et al. (2015) found that 60% of the reservoir water evaporates, whereas only 20% is actually used, implying ‘underperformance’.

* The average daily evaporation rates recorded in evapora-
* tion pan ranged from 4.1 to 9.4 mm month−1 . In 2012/2013 and
* 2013/2014, total evaporation pan was 2240 and 2630 mm, respec-
* tively. Evaporative losses from the Boura reservoir ranged from 3.6
* to 9.9 mm day−1 in the dry seasons and between 1 and 7 mm day−1
* in the rainy seasons (Fig. 3). These daily evaporation rates are near
* those ranging from 2 to 10 mm day−1 proposed by Nicola (2005) in
* the Volta basin in West Africa.

<https://www.zef.de/fileadmin/template/Glowa/Downloads/thesis_liebe.pdf>

* We can use the potential evaporation as the actual evaporation for free water surfaces such as the reservoirs in BF:
* Text

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“(...) mean temperature, diurnal temperature range, wet day frequency, vapor

pressure and cloud cover were used in the derivation of Ep” **using CRU data**

* possibly from this website: <https://climateknowledgeportal.worldbank.org/country/burkina-faso/climate-data-historical>

* appendix 4 of this paper summarizes the calculation procedure for open water evaporation

* uses remote sensing data from LANSAT to determine the water bodies
* paper might elaborate on how it uses info on the waterbodies to compute evaporation
* uses remote sensing techniques to determine the total area of water bodies in nothern Ghana

**paper that might give an overview of the reservoirs in BF**

[**https://www.researchgate.net/publication/223996631\_Towards\_an\_atlas\_of\_lakes\_and\_reservoirs\_in\_Burkina\_Faso**](https://www.researchgate.net/publication/223996631_Towards_an_atlas_of_lakes_and_reservoirs_in_Burkina_Faso)

* “On the other hand, small reservoirs located in relatively unpopulated areas (where there are fewer external driving pressures associated with human behavior) are of questionable value”
* “Two large reservoirs (Bagré and Kompienga, 1.7 and 2 km3 respectively), both in the Southern part of the Nakambé basin (see Map 3) account for more than 60 % of national water storage capacity (Fig. 3). Conversely, **the nearly 900 small reservoirs, each with a capacity of less than 1 Mm3, together account for less than 4% of national storage capacity.“**
  + paper suggests that the smallest reservoirs are not fully registered and therefore underestimated by DRGE, but proper representation would lead to 4 → 7 percent of national storage cap (so not that much more)

* **DRGE data shows the location and approximate volume of 1450 reservoirs in 2001, while remote sensing analysis from the IGB (geographic institute shows a much lower amount (620), neglecting the smallest of reservoirs. As mentioned above, these small reservoirs only contain a small portion of the total volume of retained water in the country.**
  + **paper suggests that this is because some reservoirs are too small to detect through RS, which is probably a consequence reservoirs drying out during the dry season.**
* **IGB remote sensing (only detecting lakes >5 ha) found 1050 km2 of resevoirs (620 total), leaving the small and dried up reservoirs unobserved.**
  + **seasonality becomes apparent in the largest reservoirs, of which only 70% of their max size (end of rainy season) was observed.**
  + **paper suggests only an underestimation, so the area used should be larger than 1050 km2 for sure**
* **it is difficult to conclude how much surface area this paper really assumes there to be, though they do mention the low volumetric contribution of the small (IGB unobserved) reservoirs.**
  + paper establishes relationship between the surface area (size) and number of lakes (high confidence), which could be used to determine how much lakes of each size there are, but it remains unclear to me how (and if) the paper does this.
  + paper tries to establish a relationship (low confidence) between the volume and area of reservoirs, which could be used together with DRGE data to determine reservoir size based on their data on the volume of each reservoir in the country. Again this would be a very rough estimate.

as this paper is not geared towards evaporation losses, linking it to our analysis is difficult

* **The following map of DRGE shows most of the reservoirs (2001):**

**Map

Description automatically generated**

* **paper suggests a connection between volume and area,**

**Map

Description automatically generated- map shows little purple in the linguistic area while the Nakambé region (most populated) outside of this area does have a lot of purple, paper implies that elites are steering development of water security towards this red area even though it may not be the most effective from a utilitarian viewpoint.**

* **more importantly, this map shows all the water bodies with a surface area over 5 hectares. The most logical approach may be to use the surface area from this map and add a margin for the small reservoirs (and perhaps also if necessary some factor to account for seasonal differences) to get a mean area, or one area for the rainy and one for the dry season, accompanied with the methodology from the german paper above this one, to compute the evaporation.**
* **or just apply the 60% to the total amount of retained water, which is possibly also estimated somewhere, though we might be expected to use evaporation actually.**