**Consider if the water quality of the runoff from a small reservoir is worth looking into for the scope of the project.**

# Issues

* **Human Health**
  + General [PDF Health]
    - “In West Africa the main diseases associated with the implementation of the small reservoirs are schistosomiasis, malaria and diarrhea, the latter of which is actually a symptom that can have many causes. Positive health impacts may occur as well, related to better nutrition, increased income and improved hygiene.”
    - “the identification of half a million inhabitants, mainly rural, described as the population at risk from water-related diseases” p12
    - “On the demographic level, the establishment of small reservoirs led to a redistribution of the human population” p12
  + Schistosomiasis
    - “The development of schistosomiasis around small reservoirs is an indicator of the relation the human population maintains with this water resource since its transmission takes place through water contact during activities of a domestic (e.g., bathing, laundry) or productive (e.g., irrigation, fishing) nature”
      * *Few thorough/detailed studies on disease available, but the spread of disease was noted alongside the development of small reservoirs in West Africa*
    - “This productive activity attracted important concentrations of people around these reservoirs leading to their overexploitation, much water contact and subsequent high infection rates”
    - “Temporary and perennial water bodies such as those created by small dams offer ideal conditions for the aquatic and amphibian snails that are potential intermediate hosts of human and bovine ***schistosomiasis***” [PDF health]
      * “In general, irrigation systems and small permanent water bodies are preferred breeding sites of the snail hosts as well as principal points of contact between people and the parasite” [PDF Health] p13
      * “To summarize, transmission of urinary schistosomiasis did increase after the construction of dams, especially in the semiarid north, where the reservoirs provide perennial water bodies in an area where previously the intermediate snail host depended on temporary pools” [PDF Health] p15
        + Statistically significant findings indicating that urinary schisto. Is more prevalent in villages with dams
        + “However, the actual transmission of schistosomiasis is also strongly influenced bythe water use patterns of the community” p16
    - Transmission has more to do with water use and water scarcity, not necessarily concrete that introduction of small reservoirs will lead to increased infection rates
  + Malaria
    - ***Malaria*** 🡪 proximity to small reservoirs and irrigated areas [PDF Health]
    - “Irrigation schemes downstream of the small dams may constitute favorable biotopes for the development of Anopheles mosquitoes that can be vectors of malaria.”
    - “The increase in mosquito-vector density caused by the presence of a small reservoir and irrigated area is a real risk. But as with schistosomiasis, the actual incidence of malaria will vary according to the climatic zone and local socioeconomic circumstances” p18
    - “Certain environmental modifications in these two zones can disturb the local transmission pattern of malaria. This can be caused by rivers or lakes and also by the construction of dams and irrigation systems. These may increase the availability of stagnant water and create breeding sites, and also lengthen the transmission period during the dry season” p19
    - “The presence of three small reservoirs around Ouagadougou strongly increased malaria risk during the rainy season. A resident living near the reservoirs receives on average three to four Anopheles bites per night during the rainy season against a single bite for those living in the city center. Parallel to the spatial decrease of mosquito density, the infection rate in children also decreases with increasing distance from the reservoir from 51 to 23%.” P 19
      * “The case of Ouagadougou may be unique for West Africa in the sense that it combines large water surfaces and more mosquitoes with very high human density. This same situation of more mosquitoes leading to more malaria may not occur in rural areas.” P19
  + Other
    - In the Sahel 🡪 “many people depend on water from the small reservoirs, though this is rarely suitable for consumption. As a result, diarrhea still constitutes one of the major causes of mortality among children in rural areas, especially where part of the drinking water comes from the reservoirs”
    - “After schistosomiasis and malaria, the vector-borne diseases ***onchocerciasis*** (river blindness), ***trypanosomiasis*** (sleeping sickness) and ***lymphatic filariasis*** (of which elephantiasis can be a symptom) have the potential to be influenced by small reservoir development in Burkina Faso.” [PDF Health] p21 🡪 not many studies on these diseases!
    - **Drinking water considerations**
      * “In rural areas where access to drinking water is difficult, small reservoirs constitute an important source of water supply to the population” p 22
      * Many villages still exist where there is no safe water supply for drinking, and even those that have wells 🡪 wells may dry out fast enough that water from smaller reservoirs still needed for supply.

# Potential Solutions

* **Schistosomiasis**
  + “Environmental approaches to schistosomiasis control have the triple aim to eliminate the snail population in the water bodies, prevent (re)infection of people and limit contamination of the water by infected urine or feces.” p25
  + “Removal of aquatic vegetation from the banks of the reservoir, and from canals and drains, will deprive the snails of food, shelter and refuge from strong currents, and has been proven successful in a comparable situation” p25
    - In Burkina Faso, many of the small reservoirs are shallow and hectares of wooded savanna and forest were covered by a few meters of water. As a result, many trees and bushes can be seen sticking out of the water and may provide an excellent substratum for algae that the snails feed on.” p 25 🡪 vegetation is sometimes used by communities for feed/local medicine, so removal may not be feasible
    - Alternatives: could include free-draining structions and canals that can be drained/flushed”
  + “The small reservoirs are often used as places for bathing, exposing people to infective Schistosoma cercariae. The use of soap will make the bathing safer as most soap is toxic to the larvae” 🡪 could also manage/regulate use of the reservoirs for bathing, or make sure that popular bathing points are absolutely free of vegetation to reduce transmission opps
* **Malaria**
  + Standard recommendations: bed nets, prevention, but also reducing excessive insecticide use by commercial farmers (leads to resistance in mosquitoes)
* “The fight against water-related diseases around small reservoirs requires two essential actions: health education and integrated management of the infrastructure.” p 28
* **General**
  + “Areas around reservoirs can be “zoned” for different activities, such as livestock watering, washing clothes or brick-making that can be a profitable activity in some areas” p 29
  + “Vegetative cover can act as a buffer to influxes of pollutants into reservoirs, for which reason maintenance of vegetation along reservoir shores is highly recommended (Atwill et al. 2002). Wells or boreholes can be constructed downstream of the dam. Because of horizontal filtration, seepage water into these wells may be of generally higher quality than water in the reservoir and would be suitable for drinking and cooking. In favorable circumstances, rainwater harvesting can be used at the community (watershed) or individual household level.” P 29

Overall, construction of small reservoirs does have drawbacks related to human health, but benefits appear to outweigh the negatives (nutritional improvement, agricultural improvements, water access for more)

# Sources

[PDF Health] (2009) <https://www.researchgate.net/publication/241760971_Health_impacts_of_small_reservoirs_in_Burkina_Faso>