

Built Water Storage and Human Health in Africa: Past Experience and Ways Forward

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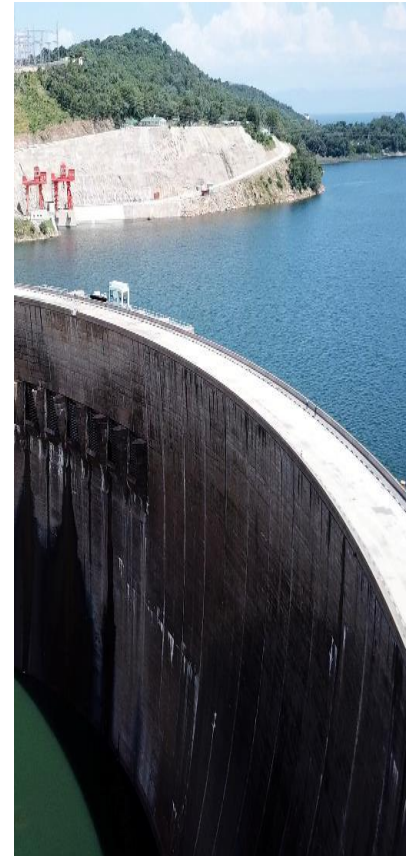
Innovative water solutions for sustainable development

Food · Climate · Growth

Dams and Health

Dams bring a lot of benefits

- Reduce effects of floods and droughts
 - Support irrigation expansion usually for food production
 - Enhance power production
 - Can support livelihoods through targeted flow release
- **These benefits** of dams raise incomes and support socioeconomic development that **improves human health**

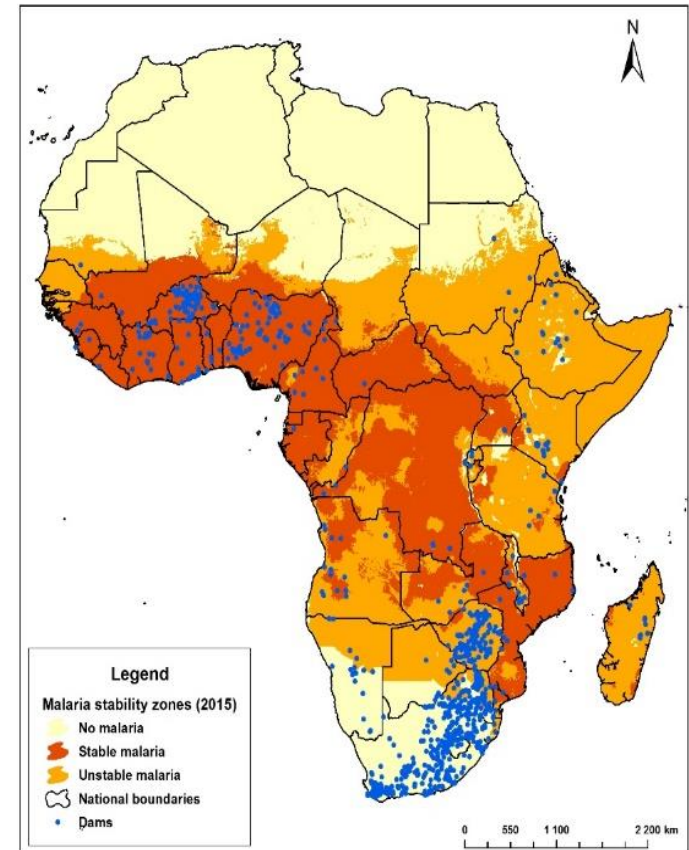


Dams and Malaria in Africa

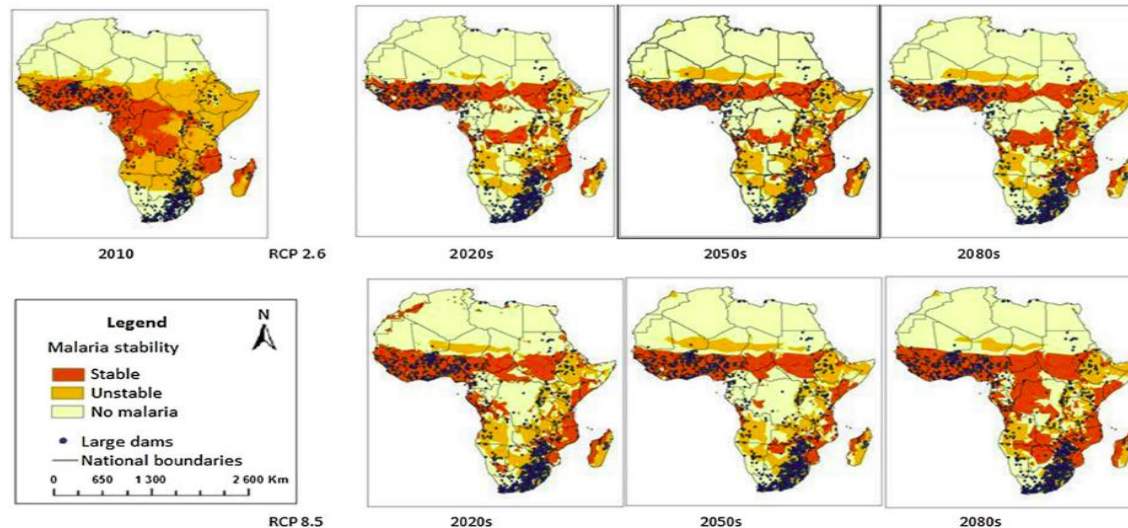
What is the aggregate effect?

- Mapped ~1000 large dams using ICOLD/FAO database
- Used MAP database to determine incidence close to vs. far from reservoirs
- Higher risk of malaria in communities living close to (<5km) African dams.
- More impact in areas of unstable transmission

- **1.1 million cases/year associated with large dams in Africa**
with georeferenced locations in 2015
- *This is impact from only ~half of all large dams*
- *Small dams not considered*



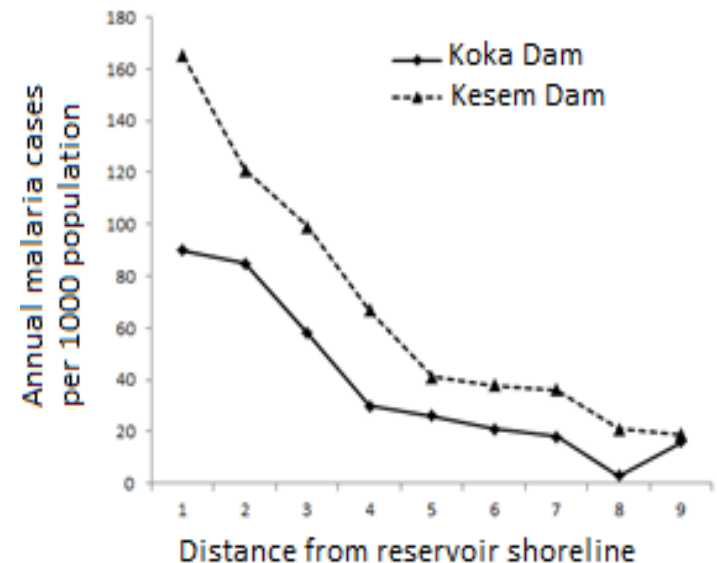
Malaria around dams in future climates



- Utilized climate models produced by Caminade (2014) to estimate malaria in the future
- Mapped distribution of malaria in the vicinity of georeferenced dams in SSA under IPCC Representative Concentration Pathways (RCP) 2.6 and 8.5
- Number of cases due to dams increases to **1.2-1.6 million in the 2020s, 2.1-2.9 million in the 2050s and 2.3-2.9 million in the 2080s** depending on RCP
 - More impact in unstable areas

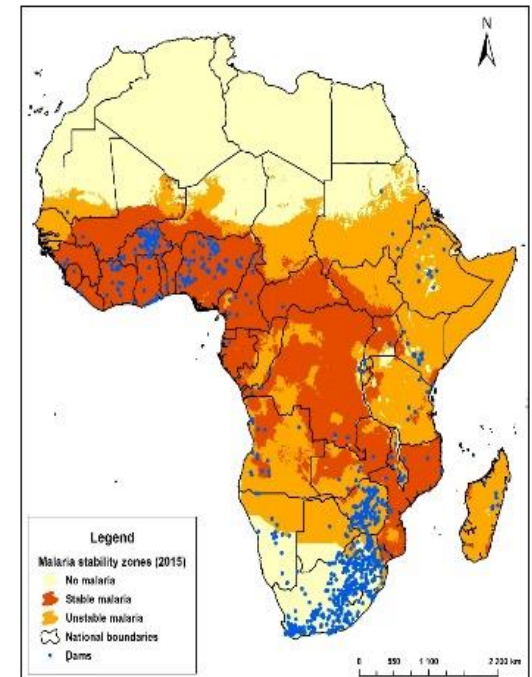
In Short...

- Dams are a major contributor to malaria
 - > 1million cases/year now
 - 2-3 million cases/year by end of century
 - Reflects impacts of ~half of large dams (ones that are geo-referenced)
 - Only large dams
- **Impacts not uniform**
- **What explains variation?**



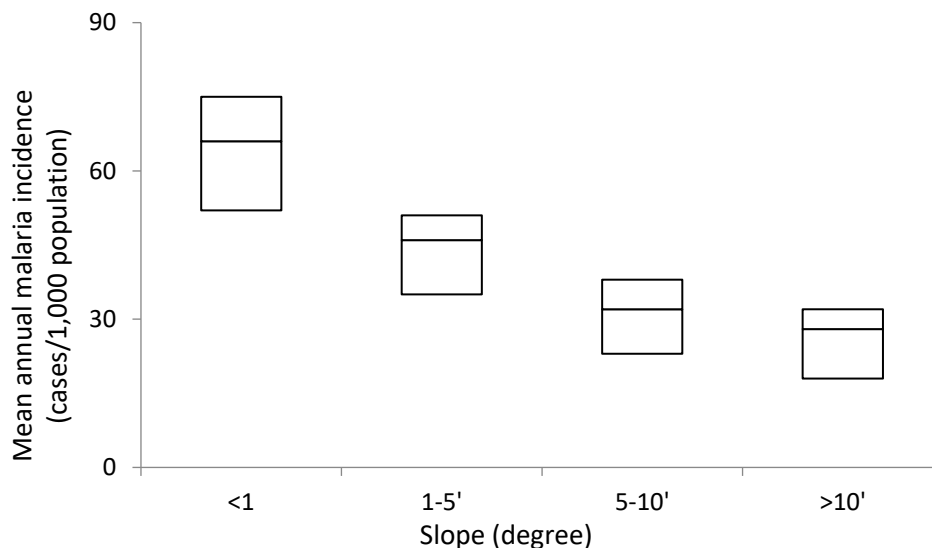
Understanding Variation

- Stability/Intensity of transmission in which a dam is built
- **Slope in seasonally-submerged areas around reservoir perimeter**
- **Water Levels/the way a reservoir is managed**
- Economic development



Unpacking Variation: Slope

Derived slope (in degrees) from DEM across the seasonally-submerged area was used to calculate the mean slope of the seasonally submerged areas

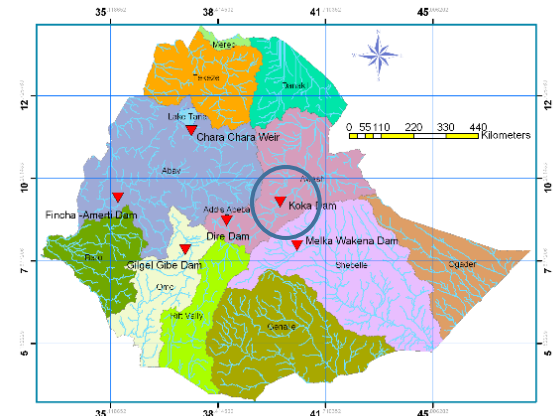
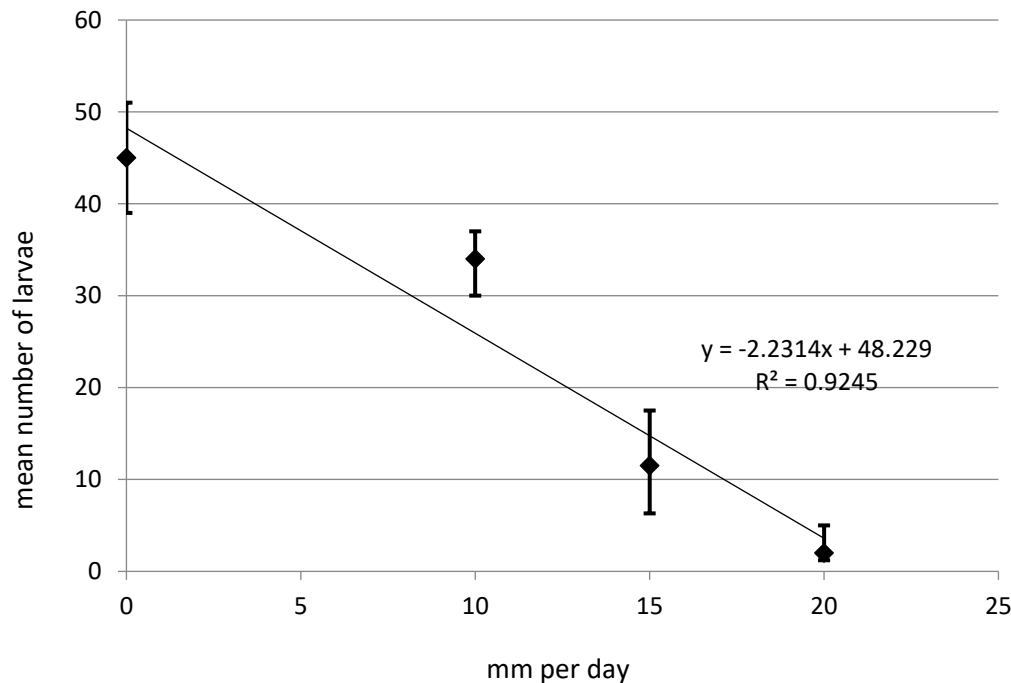


➤ Shallower slope, more malaria

Unpacking Variation: Water Levels

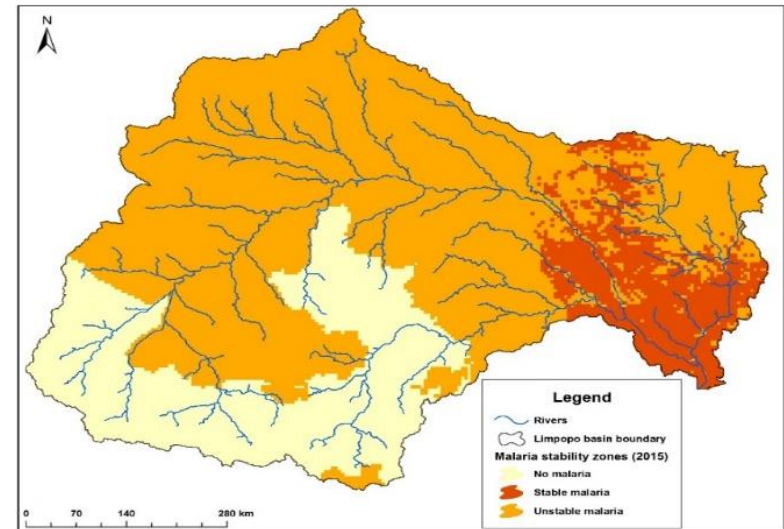
Relationship between drawdown rate, larval abundance, adult Anopheles mosquitoes and malaria transmission around Koka

Faster drawdown has positive results (0.5 m/month)



Toward Constructive Tools: Planning

- Opportunities to consider differential impacts according to **stability zone** in planning
- Opportunities to predict degree of adverse impact based on **slope**, and incorporate this into planning
- Need to **consider** not just present, but **also future impacts** which may change due to CC

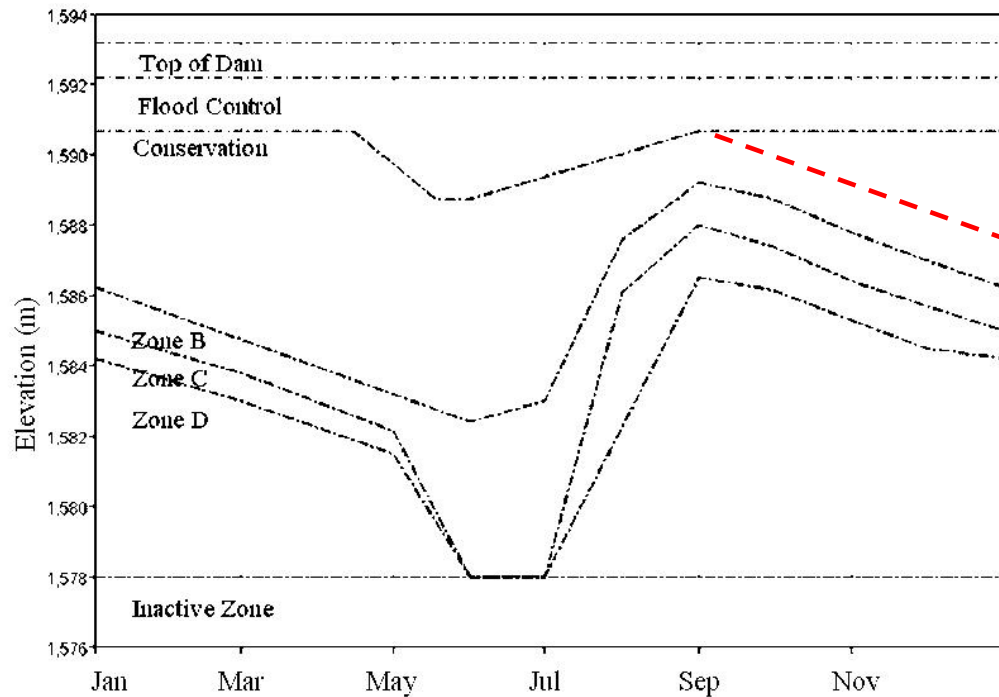


Toward Constructive Tools: Planning

Targeted implementation
of malaria parameter on
other dam objectives at Koka

Minimal impacts on firm hydro
production that can be offset if part
of a broader system

- No impacts on irrigation downstream
- Minimal positive impacts on floods



Summing Up

1. Dam-building to continue, accelerate in Africa → Adverse malaria impacts may increase
2. There are a (re-)emerging set of tools that the water community can use to reduce disease burden, in particular:
 - Planning the way river basins are developed
 - Dam Management to reduce malaria now featured in RBM guidelines



A GUIDE TO MULTISECTORAL ACTION AGAINST MALARIA

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**PLEASE PROVIDE FEEDBACK BY 30 JUNE TO
JOSHUA.LEVENS@ENDMALARIA.ORG**

Thank You

More info: IWMI Policy Brief 40

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