

Adapting to climate change in Africa

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Overview

- **Volta**
- **Climate change**
- **Adaptation**



www.glowa-volta.de



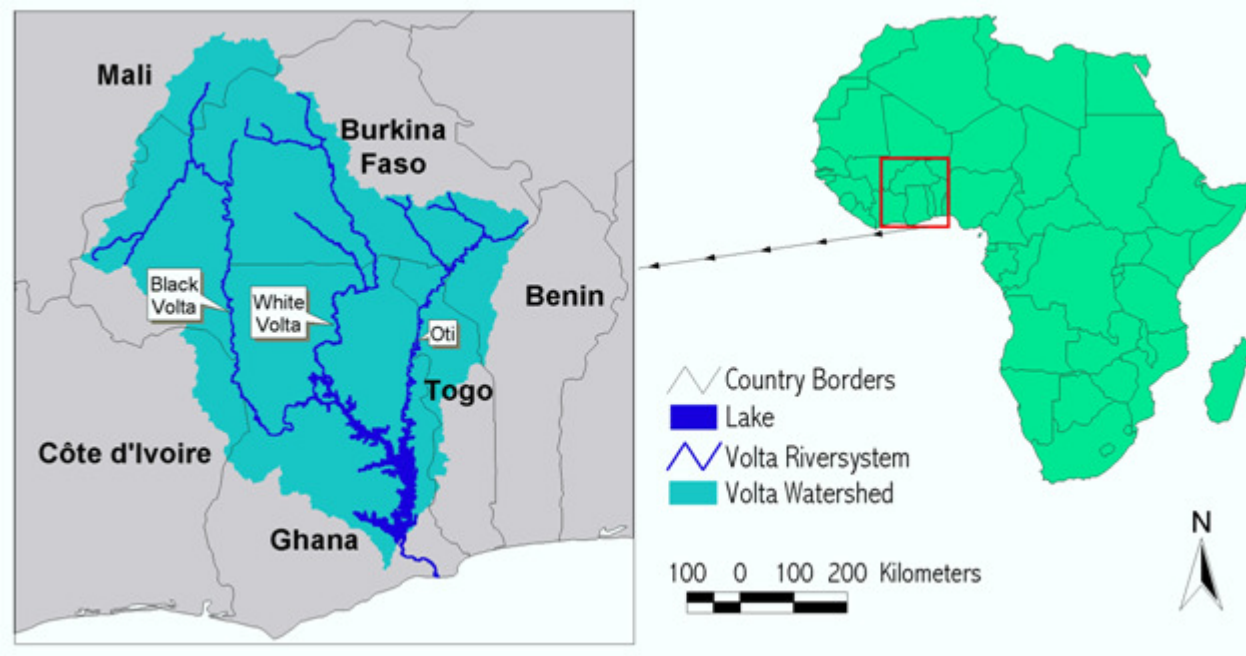
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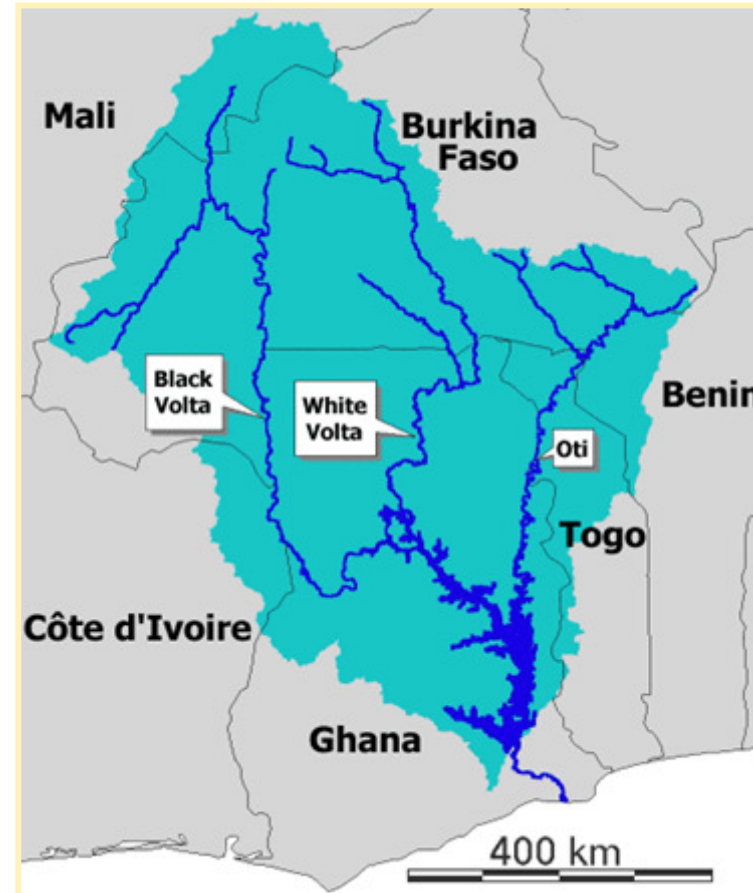
Volta



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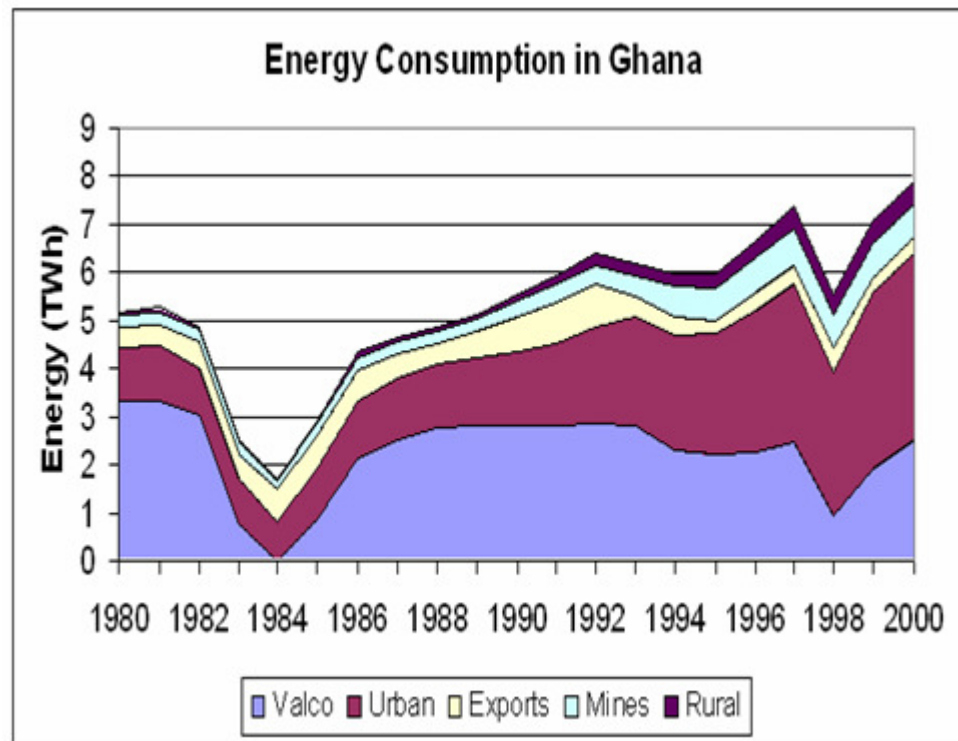
Volta

- 400,000 km²
- 15 million people, \$650/yr
- Average rain 1000 mm/year
- 9% in rivers
- Lake Volta



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Volta

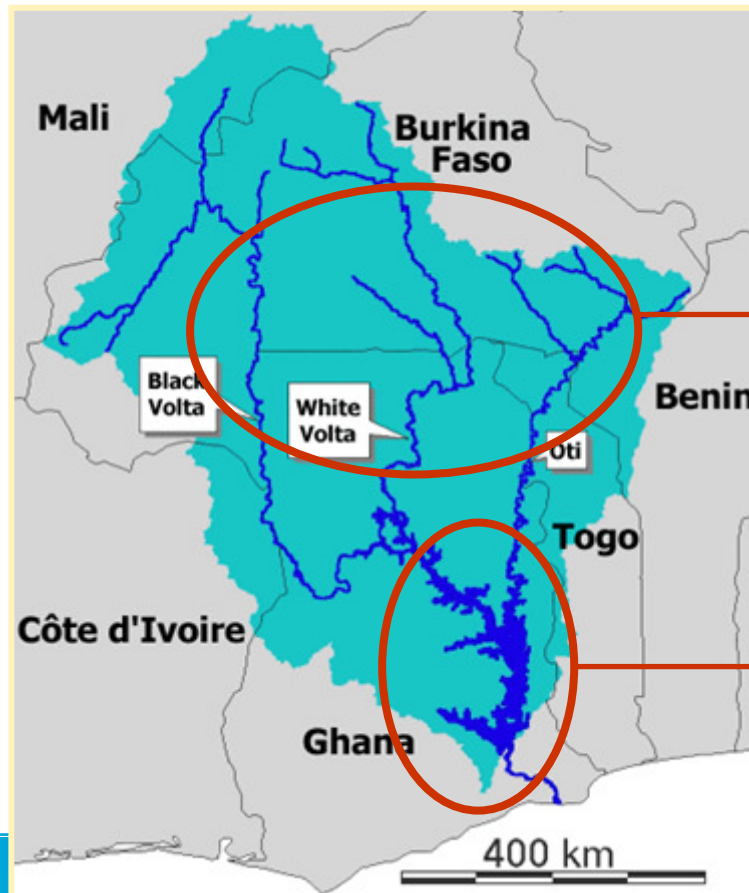


Akosombo



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Volta



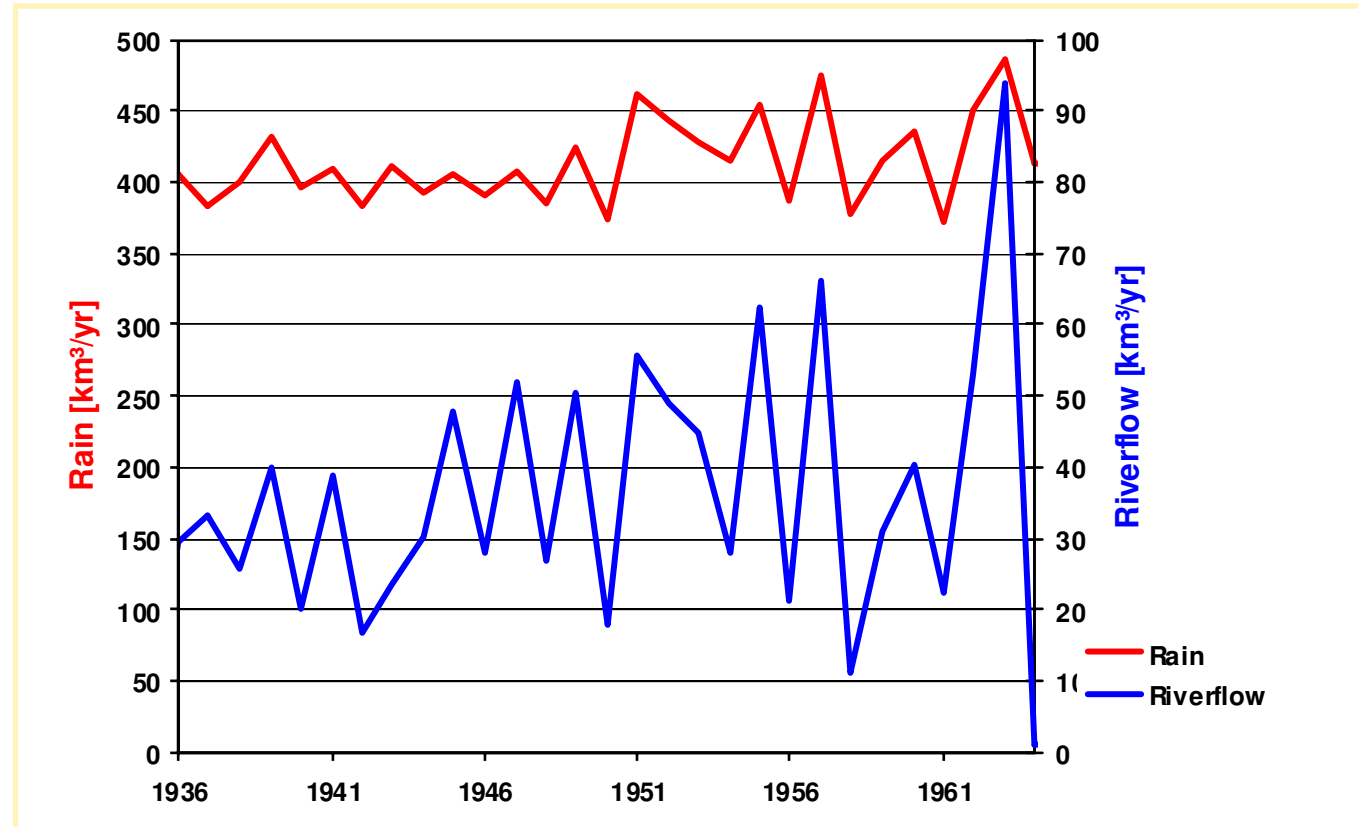
Irrigation

Hydropower



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Volta

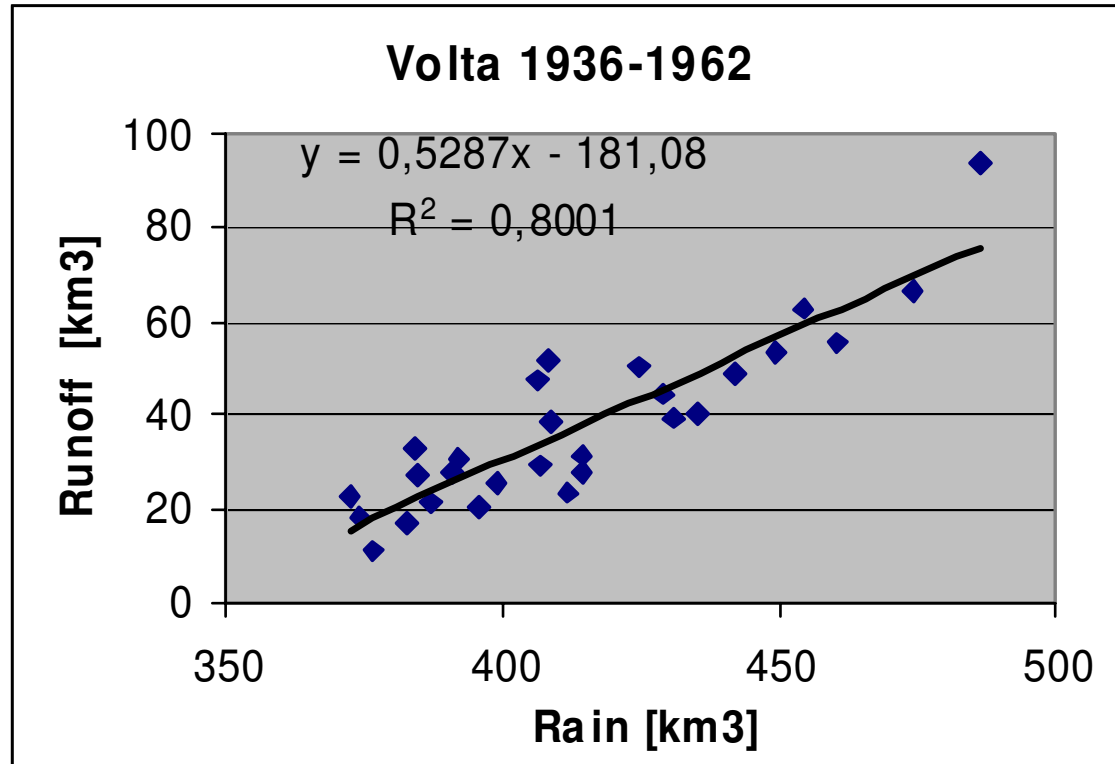


Rainfall (CV 7%) and Runoff (CV 36%)



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Volta



High sensitivity:

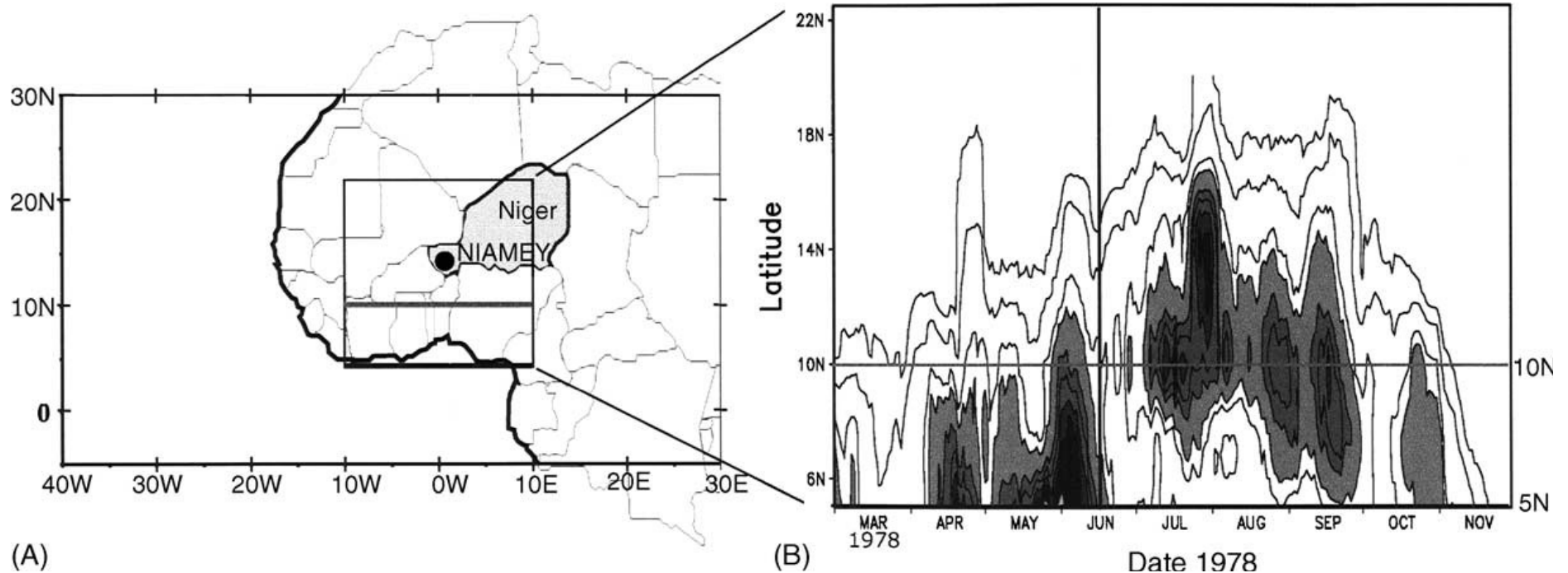
$$Q = 0.53 * (\text{Rain} - 341) \text{ [km}^3\text{]}$$

$$(r = 0.89)$$



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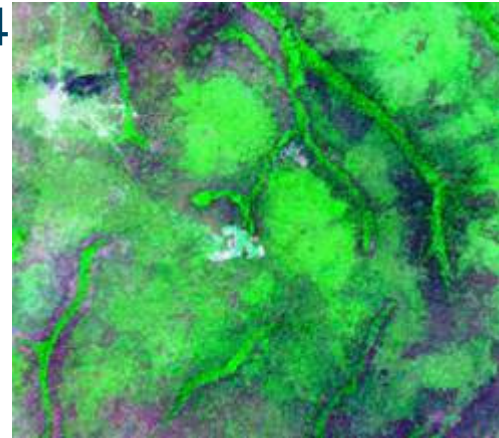
Source: Sultan et al, doi:10.1016/j.agrformet.2004.08.005



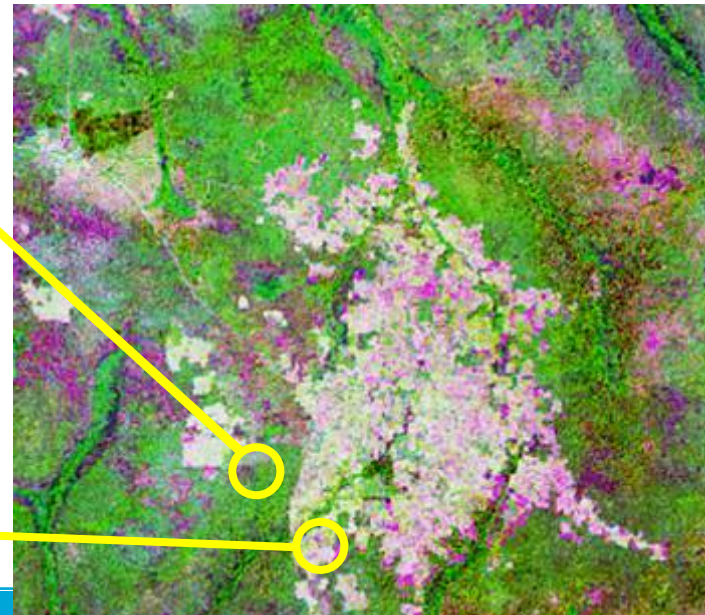
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Volta

1984

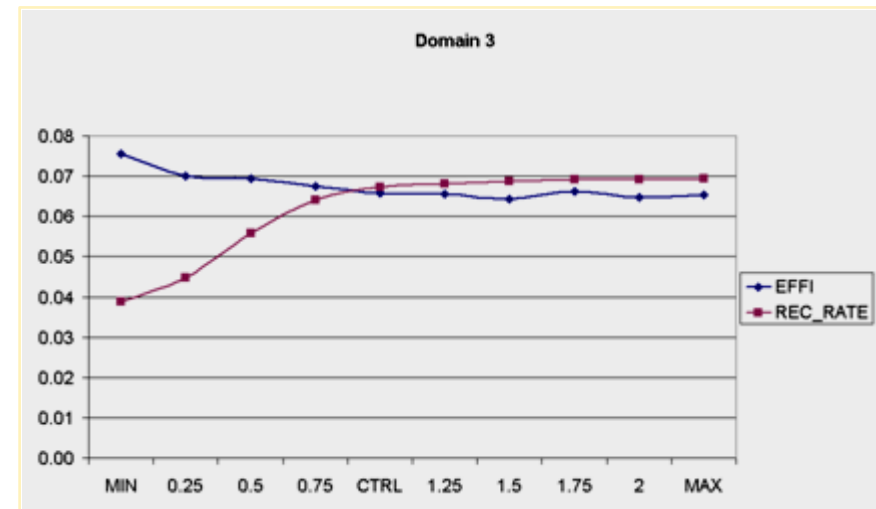
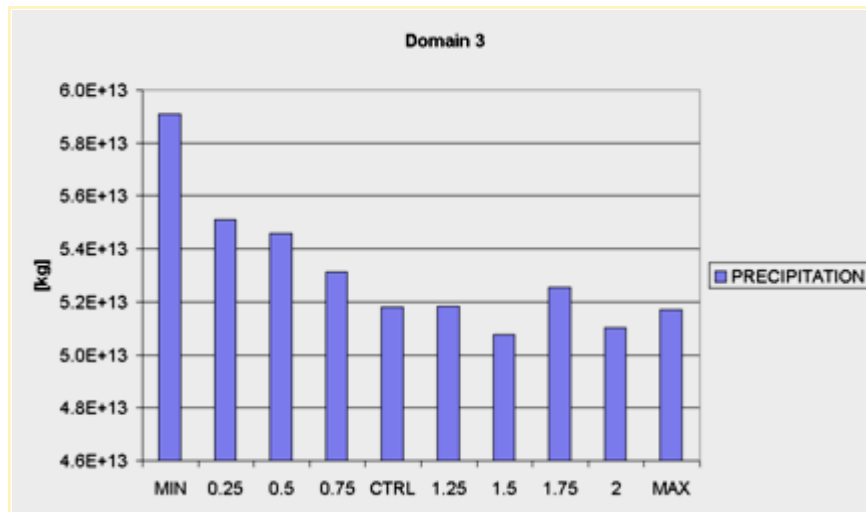


1999



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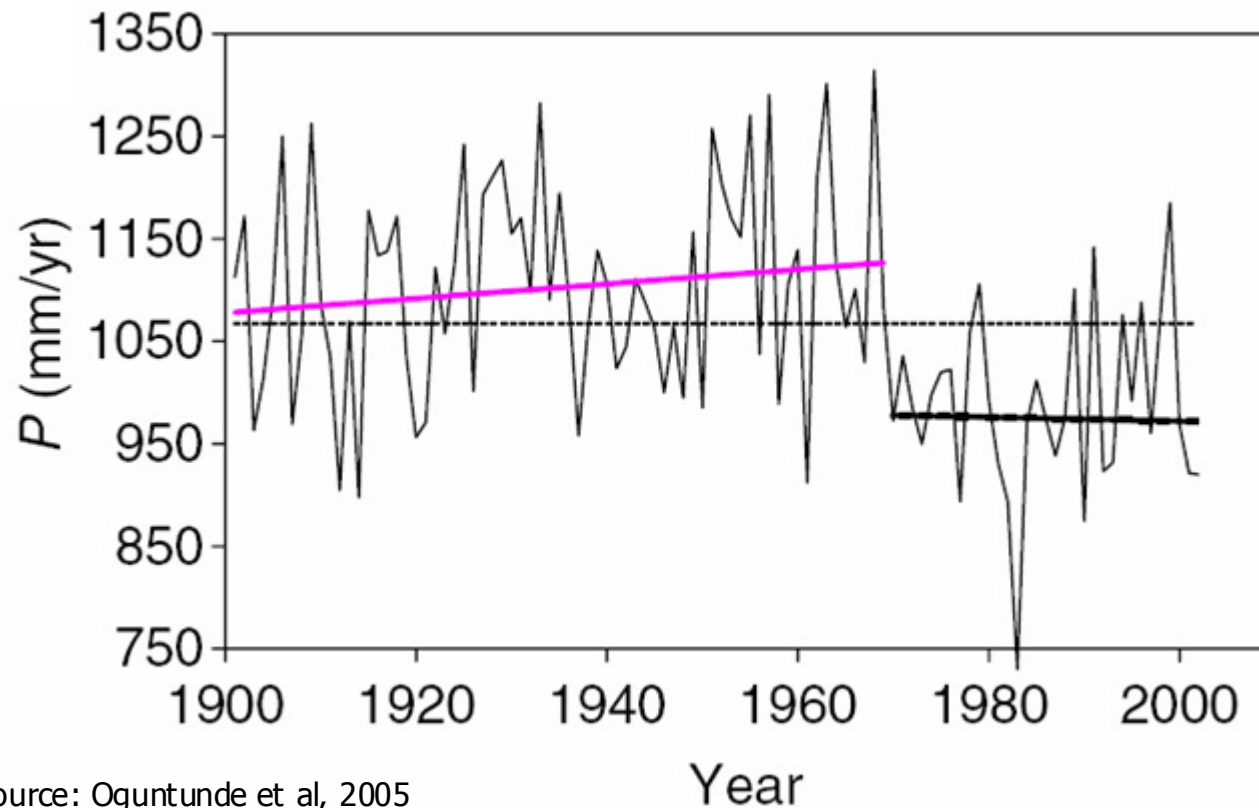


Source: Van de Giesen et al, 2000



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Climate change

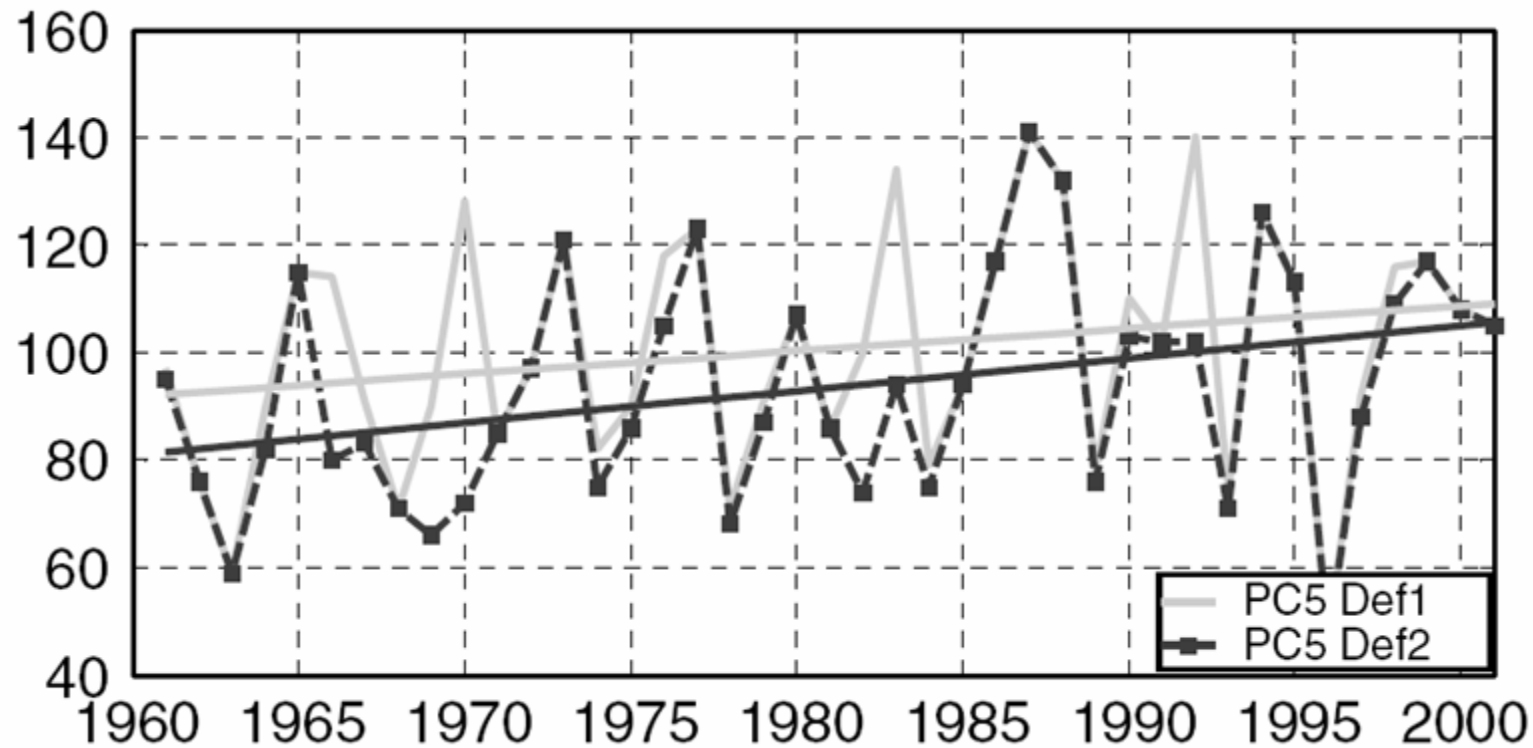


Source: Oguntunde et al, 2005



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Climate change – On-set

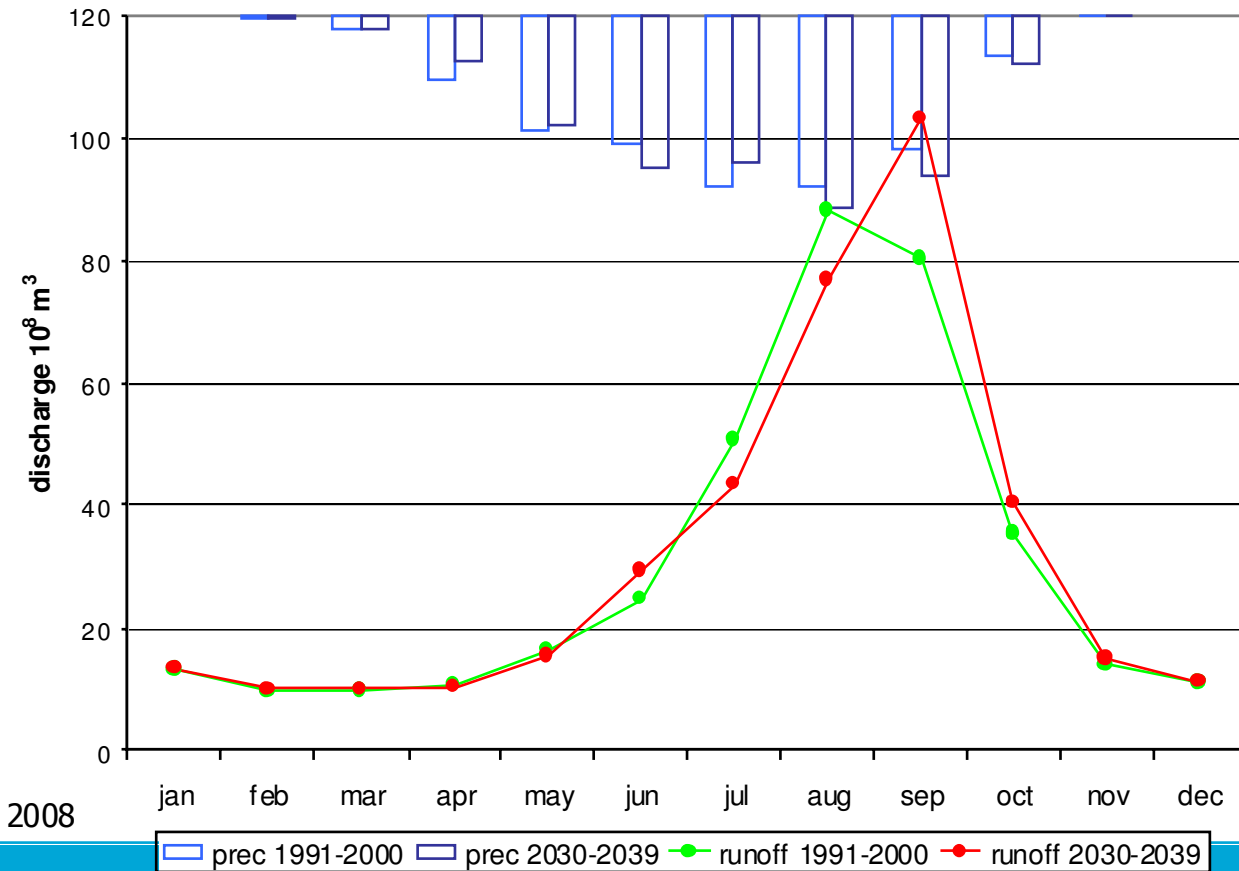


Source: Laux et al, 2008



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Climate change – On-set

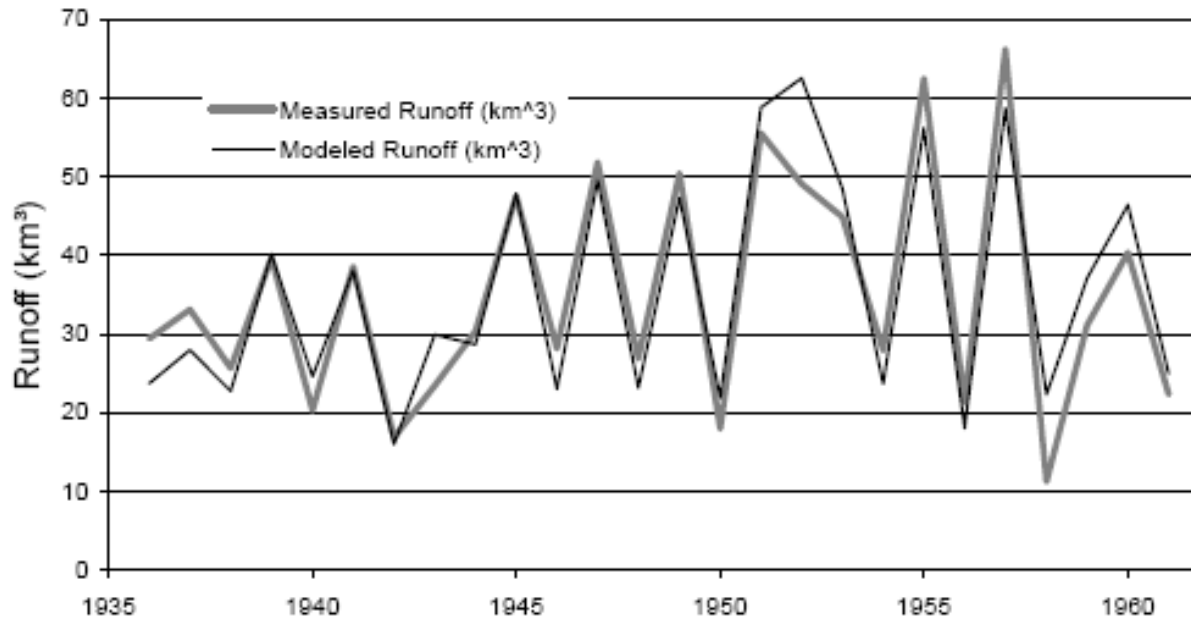


Source: Jung & Kunstman, 2008



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Adaptation



Source: Andreini et al., 2000

Thornthwaite-Mather

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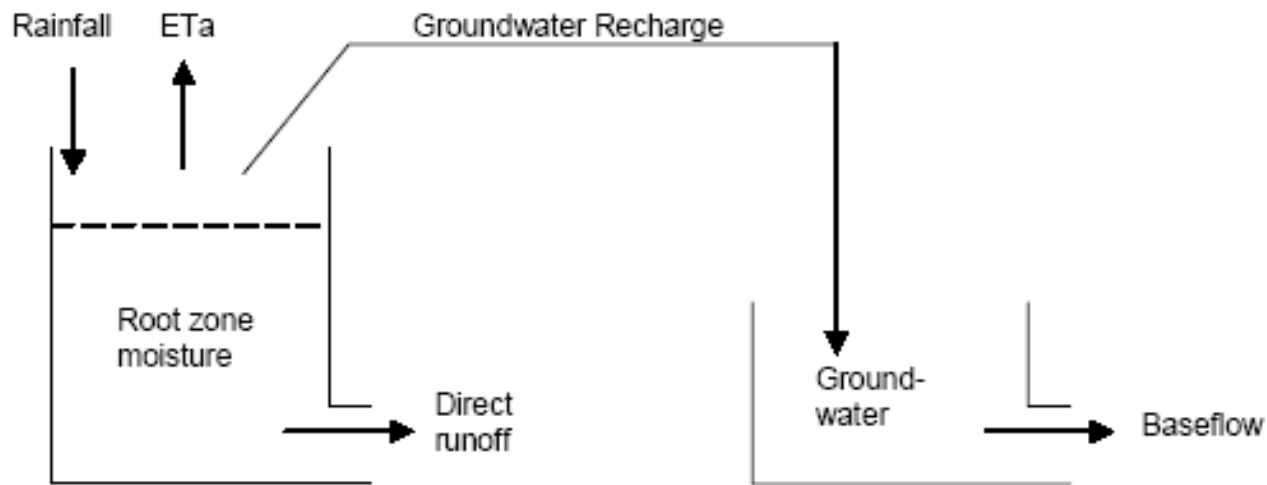
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Adaptation



Source: Friesen et al., 2005

Thornthwaite-Mather

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Adaptation

**More concentrated rain =>
more groundwater,
more river flow**



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Adaptation - reservoirs



Tono



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Adaptation - reservoirs



Village level



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Adaptation - reservoirs

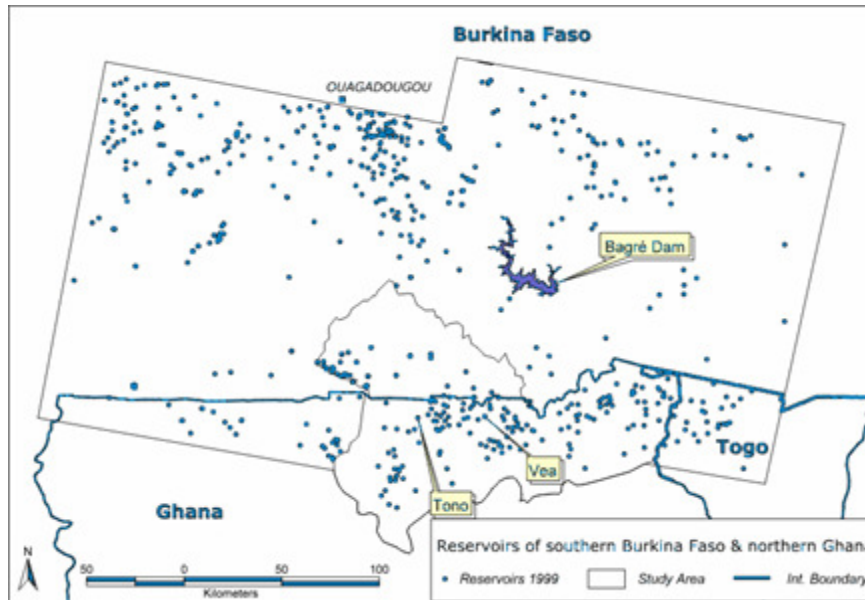


Village level



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Adaptation - reservoirs



	Burkina Faso		Ghana	
	Number	Area (ha)	Number	Area (ha)
1984	186	2638	116	1469
1999	547	24091	163	2922

Source: Liebe et al., 2005



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Adaptation - reservoirs



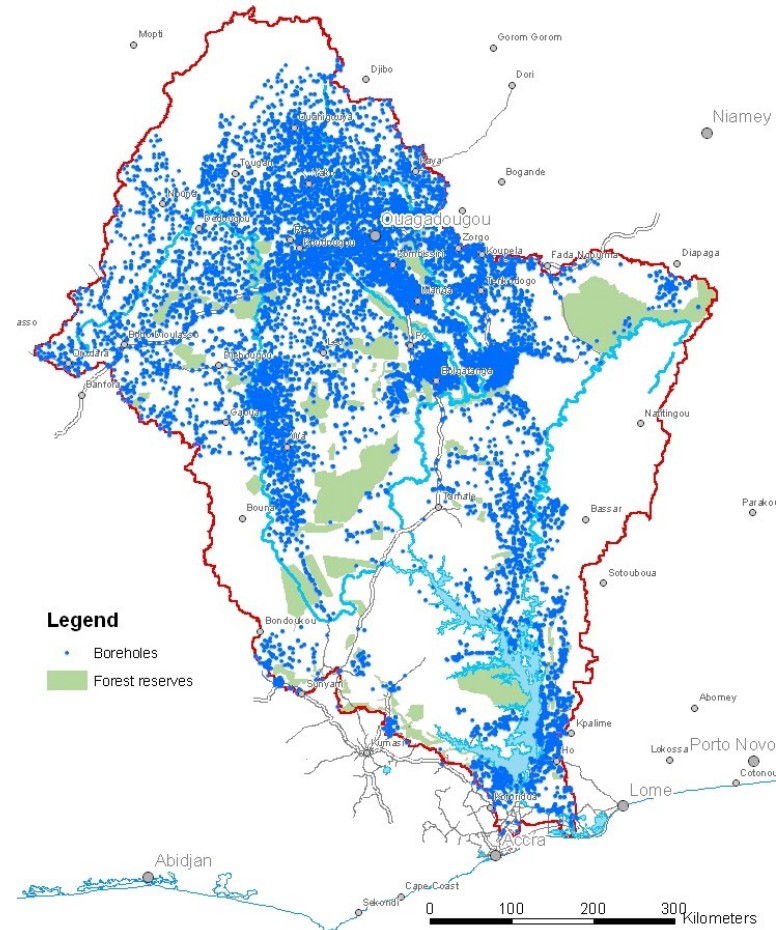
SMALL RESERVOIRS PROJECT
VOLTA • LIMPOPO • SAO FRANCISCO

www.smallreservoirs.org



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Adaptation - groundwater



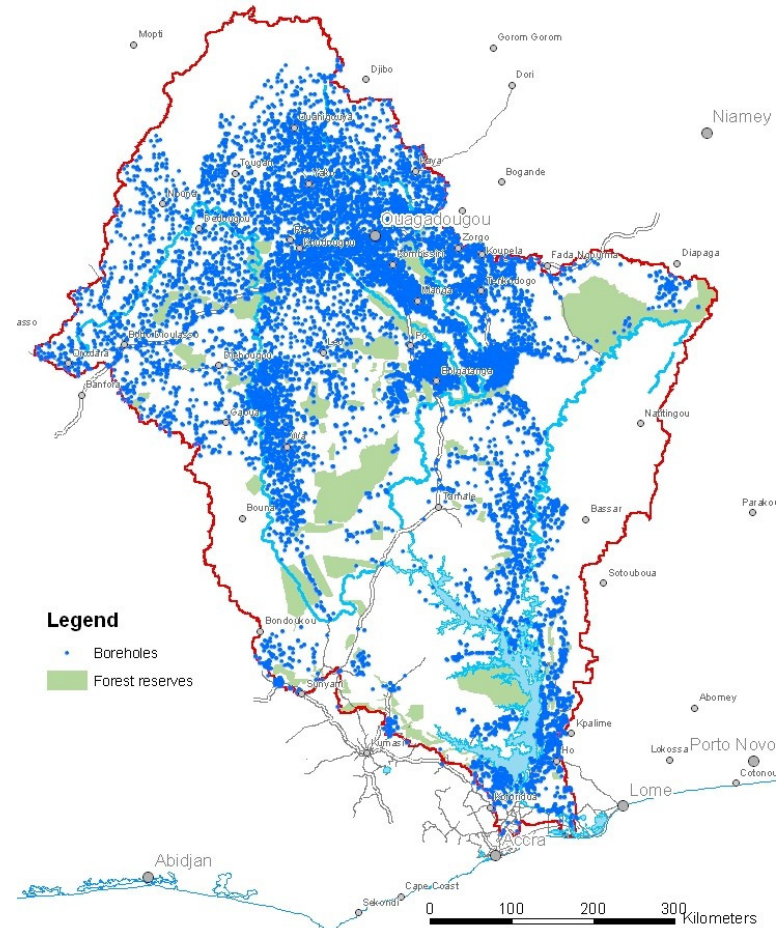
Source: Martin & Van de Giesen, 2005



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Adaptation - groundwater

< 5%!



Source: Martin & Van de Giesen, 2005



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Adaptation - groundwater



Source: Van den Berg, 2008

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Adaptation - groundwater



Adapting to climate change in Africa

Adaptation - groundwater



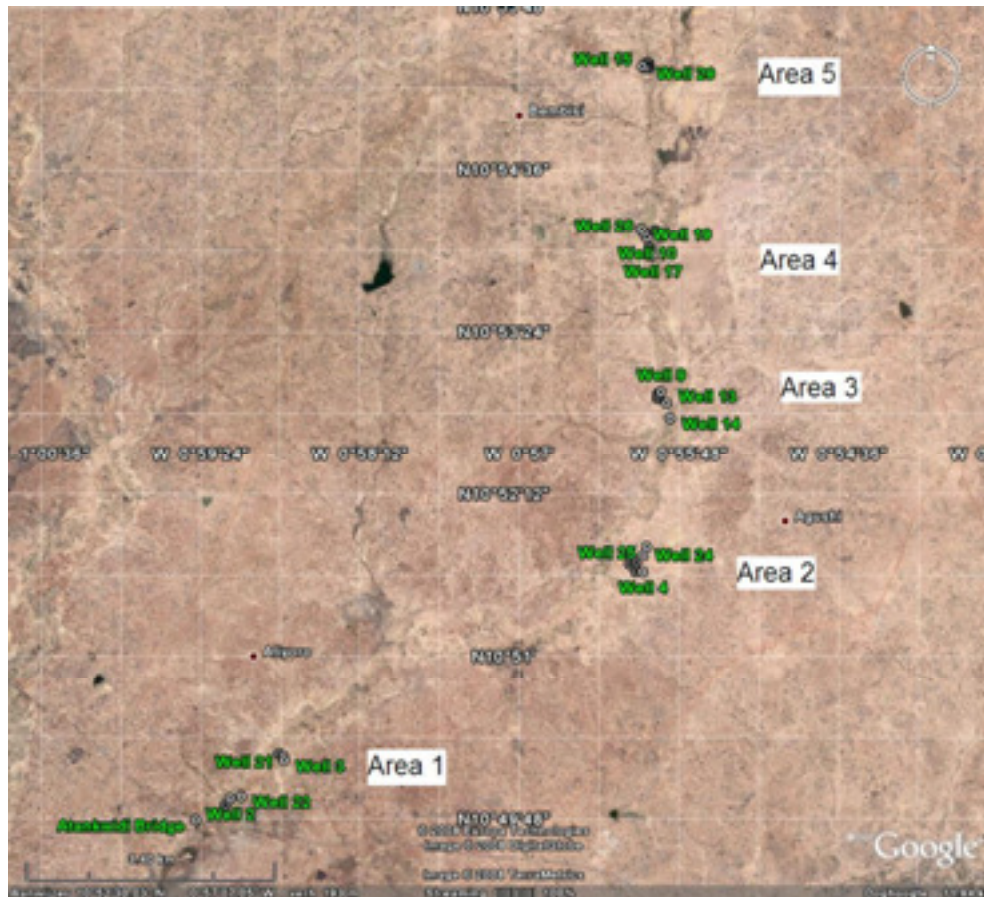
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Adaptation - groundwater



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Adaptation - groundwater



CPWF #65
Shallow
Groundwater
Irrigation



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Conclusions

- **Most likely: More concentrated rain**
- **More river flow => reservoirs (small)**
- **More groundwater => capacity?**



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Thank you for your attention!

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