COP15: Groundwater, climate change & adaptation

Groundwater and climate change in Africa: *The Kampala Statement*

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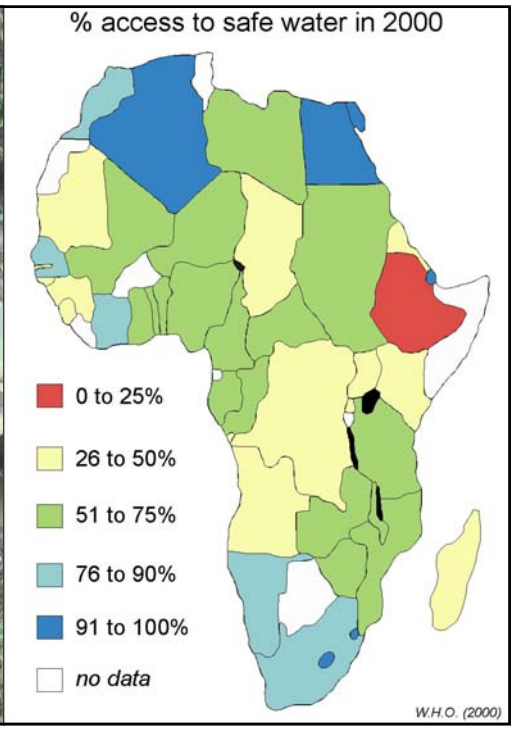
IAH Commission of Groundwater & Climate Change

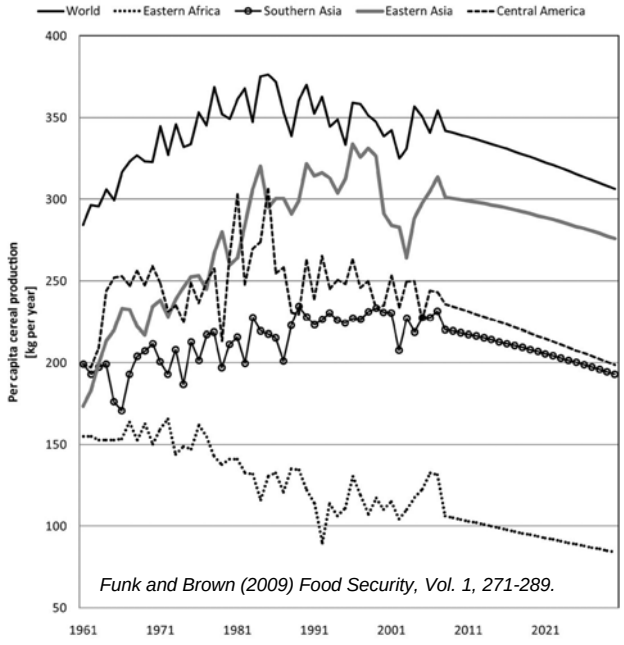
www.iah.org

UNESCO-IHP GRAPHIC programme

http://www.unesco.org/water/ihp/graphic/

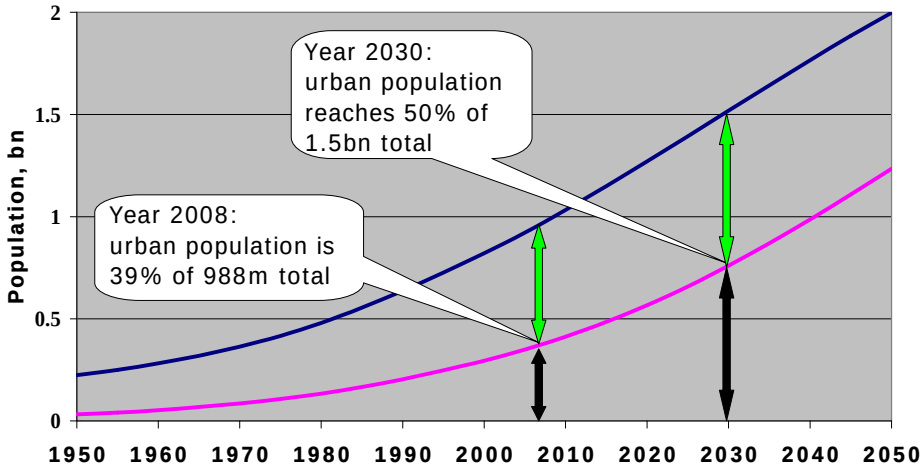


declining per capita food production in Africa



Funk and Brown (2009) Food Security, Vol. 1, 271-289.

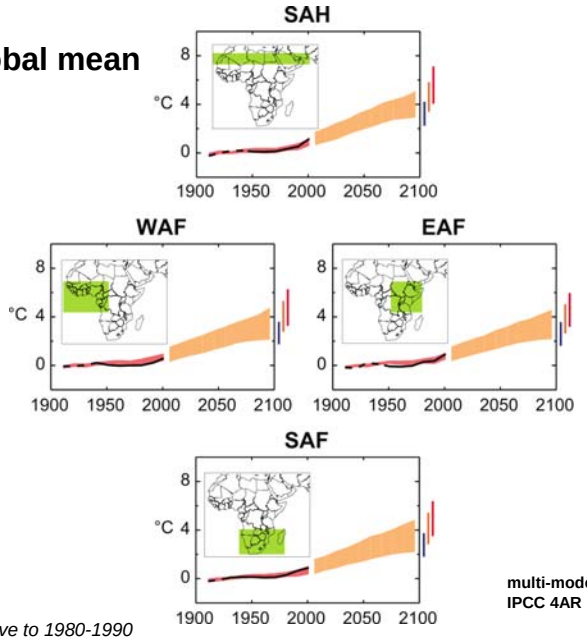
fast growing and urbanising populations



Population Division, UN DESA (2007)

projected warming in Africa of 3 to 4°C this century

1.5 X global mean



multi-model ensembles
IPCC 4AR Figure 11.1

** 2080-2099 relative to 1980-1990*

uncertain projections of rainfall

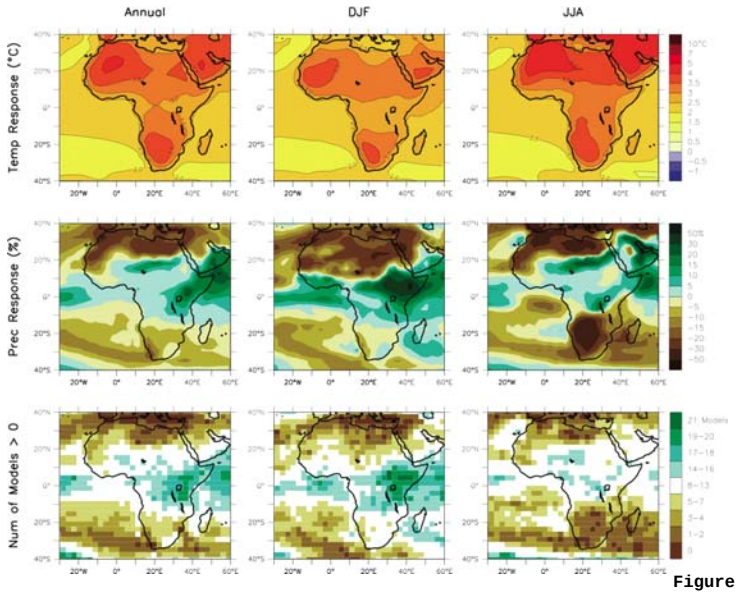


Figure 11.2

multi-model ensembles IPCC 4AR (A1B scenario)

variability in African rainfall

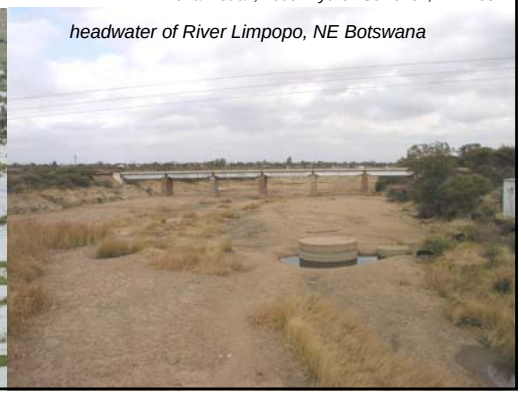
- most variable river discharge in the world

McMahon et al., 2007. J. Hydrol. 54, 727-738.

- variability to increase with global warming
  - *more frequent and intense floods & droughts*

Allen and Ingram, 2002. Nature 419, 224-230.
Trenberth et al., 2003. BAMS 84, 1205–1217.
Mileham et al., 2009. Hydrol. Sci. J. 54, 727-738.

Mutarara District, Mozambique, 22 February 2007



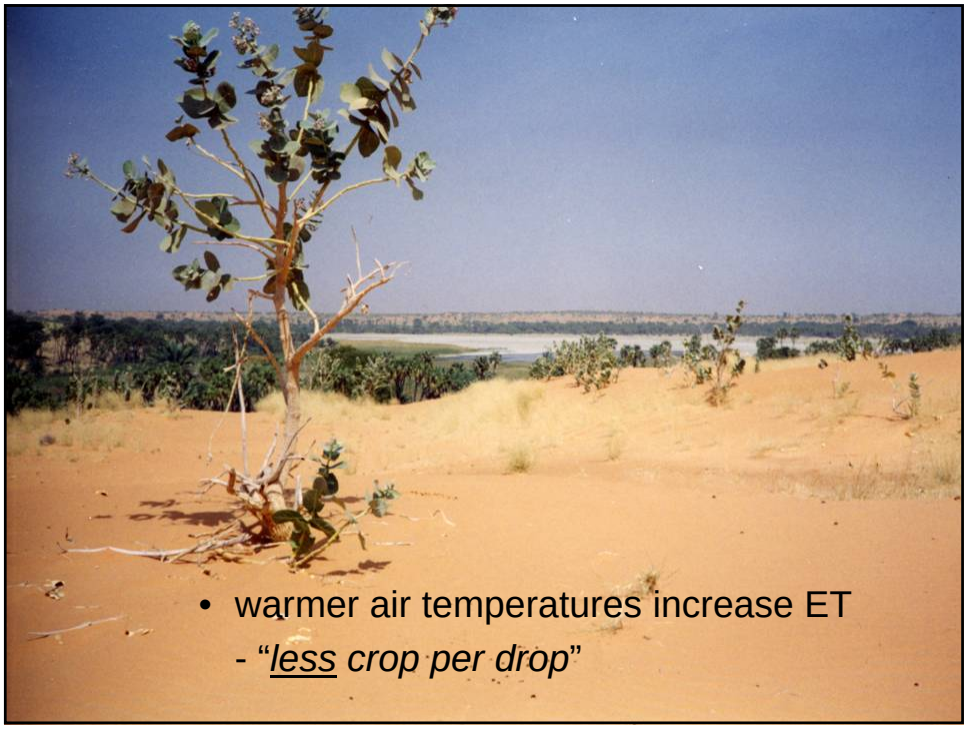
headwater of River Limpopo, NE Botswana

- more variable precipitation leads to more variable soil moisture reducing crop yields

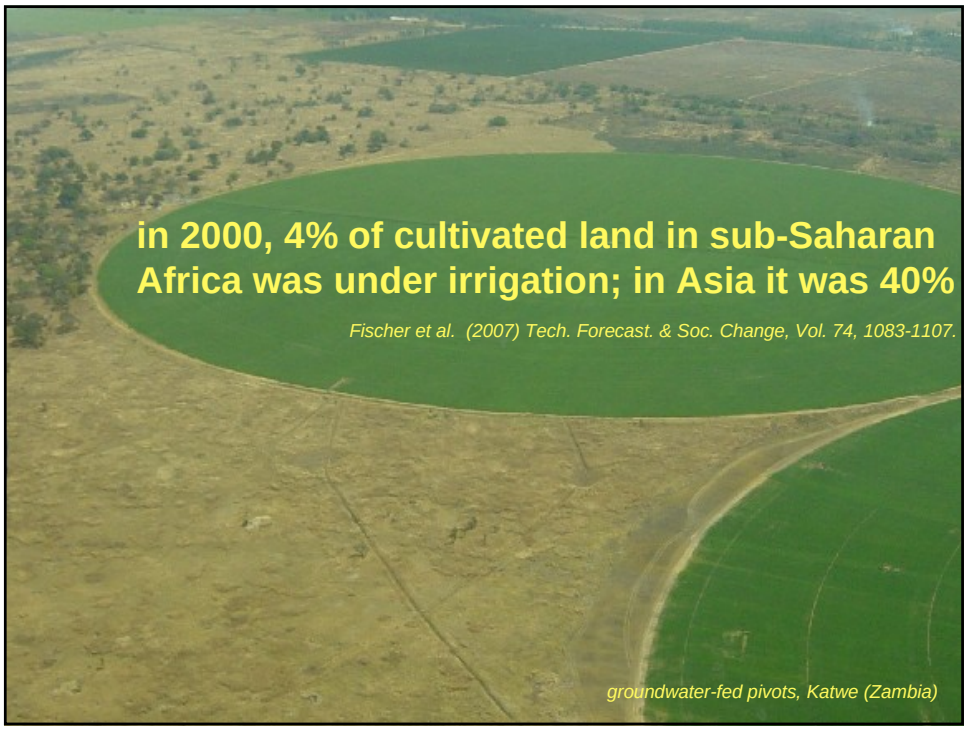
Challinor et al. 2006. "Avoiding Dangerous Climate Change", pp. 187-194.

- climate change threatens food security as >95% of all food grown in sub-Saharan Africa is rainfall-fed

matoke and tea plantations, Bushenyi (Uganda)



- warmer air temperatures increase ET
  - "*<u>less</u> crop per drop*"

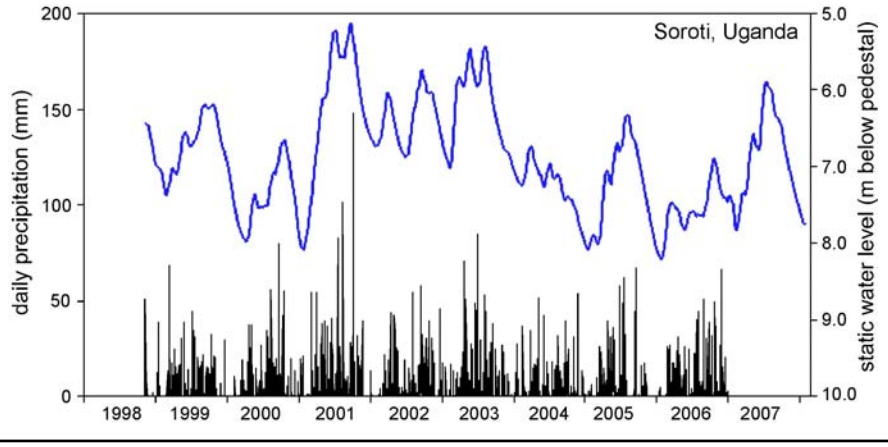


climate change and groundwater recharge

UCL

projected increases in rainfall intensity favour groundwater recharge (Uganda, Nigeria)

Taylor & Howard, 1996. J. Hydrol. 180, 31-53.
Eilers et al., 2007. Geoderma. 140, 119-131.
Mileham et al., 2008. J. Hydrol. 359, 46-58.
Owor et al., 2009. Environ. Res. Lett., Vol. 4.

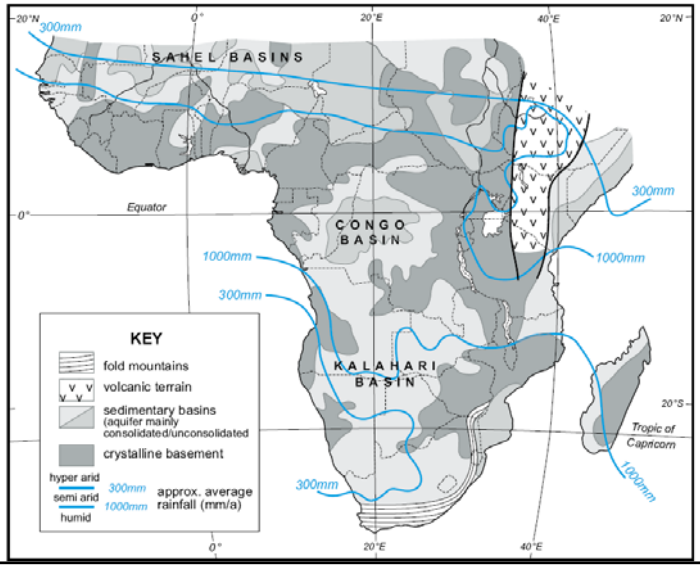



• renewable groundwater resources in sub-Saharan Africa are ~2X China and ~4X India
FAO (2003) AquaStat
• enormous potential of groundwater to improve access to safe water at low cost…
urban spring
Kampała (Uganda)


and to improve food security and expand food production through groundwater-fed irrigation
maize plantation irrigated by a groundwater-fed pivot
Katwe (Zambia)

groundwater resources in Africa

- considerable uncertainty in groundwater resources and the sustainability of more intensive groundwater development

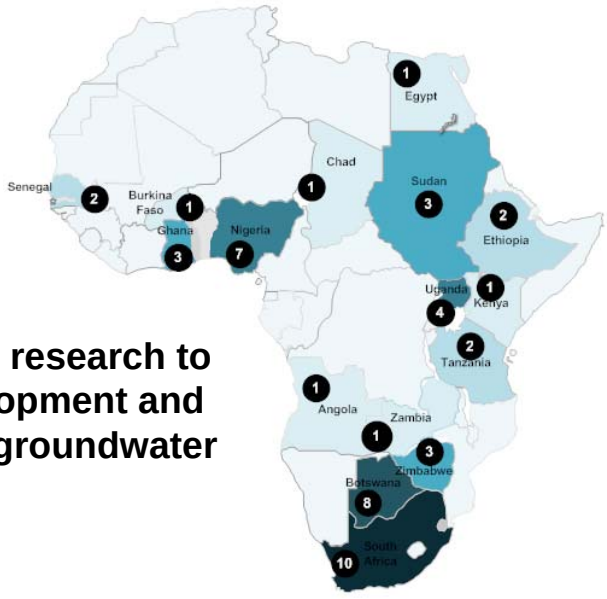


- need to invest in training

- need to invest in monitoring & assessment

groundwater research

quantitative studies of groundwater recharge in Africa



- **need to invest in research to inform the development and management of groundwater**

Summary:

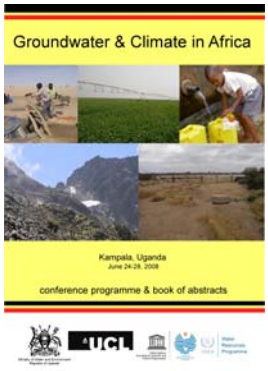
1. great potential for groundwater to enable communities in sub-Saharan Africa to adapt to projected changes in freshwater availability brought about by climate change and demographic change (at low cost)

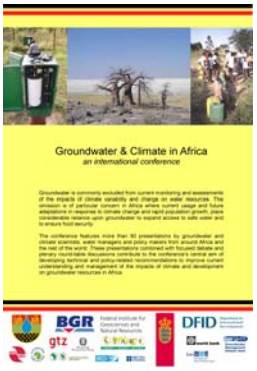
2. urgent need for the development of *learning alliances* and investment in people and infrastructure to overcome current barriers to the sustainable use of groundwater

groundwater-fed pivots, Katwe (Zambia)

Groundwater & Climate in Africa conference

24 to 28 June 2008, www.gwclim.org





- representatives from 23 countries in Africa (37 in total)
- 96 presentations published in *IAHS Red Book Vol. 334 & special issue of Hydrological Sciences Journal Vol. 54(4)*
- policy outcomes summarised in "*The Kampala Statement*"