Presentation given at the Katoomba XV Meeting entitled

Integrated Solutions: Water, Biodiversity and Terrestrial Carbon in West Africa

October 6-10, 2009
Accra, Ghana

Hosted by:

The Katoomba Group, Forest Trends,
and the Nature Conservation Research Center

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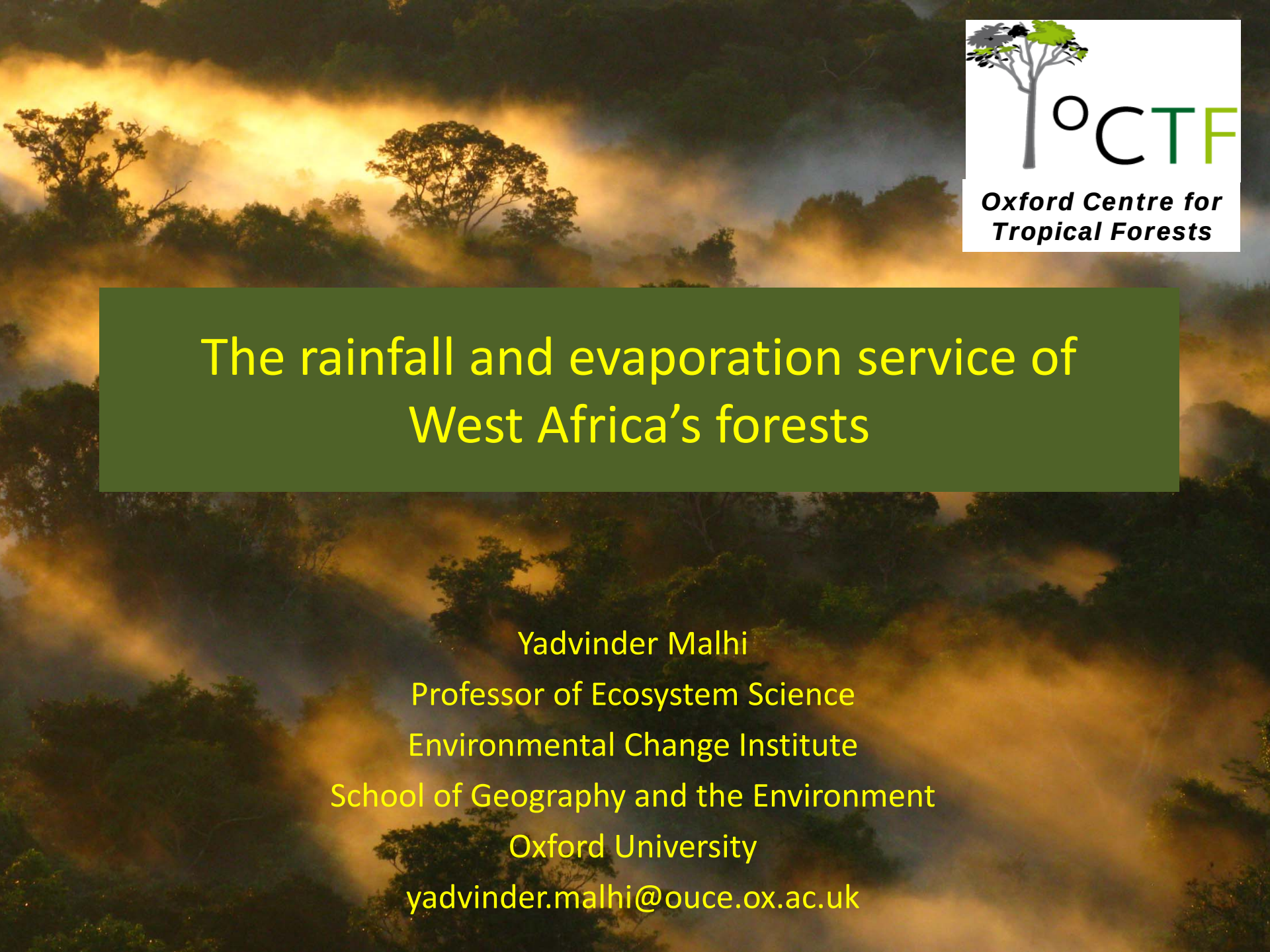

Oxford Centre for Tropical Forests

The rainfall and evaporation service of West Africa's forests

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School of Geography and the Environment
Oxford University
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Talk Outline

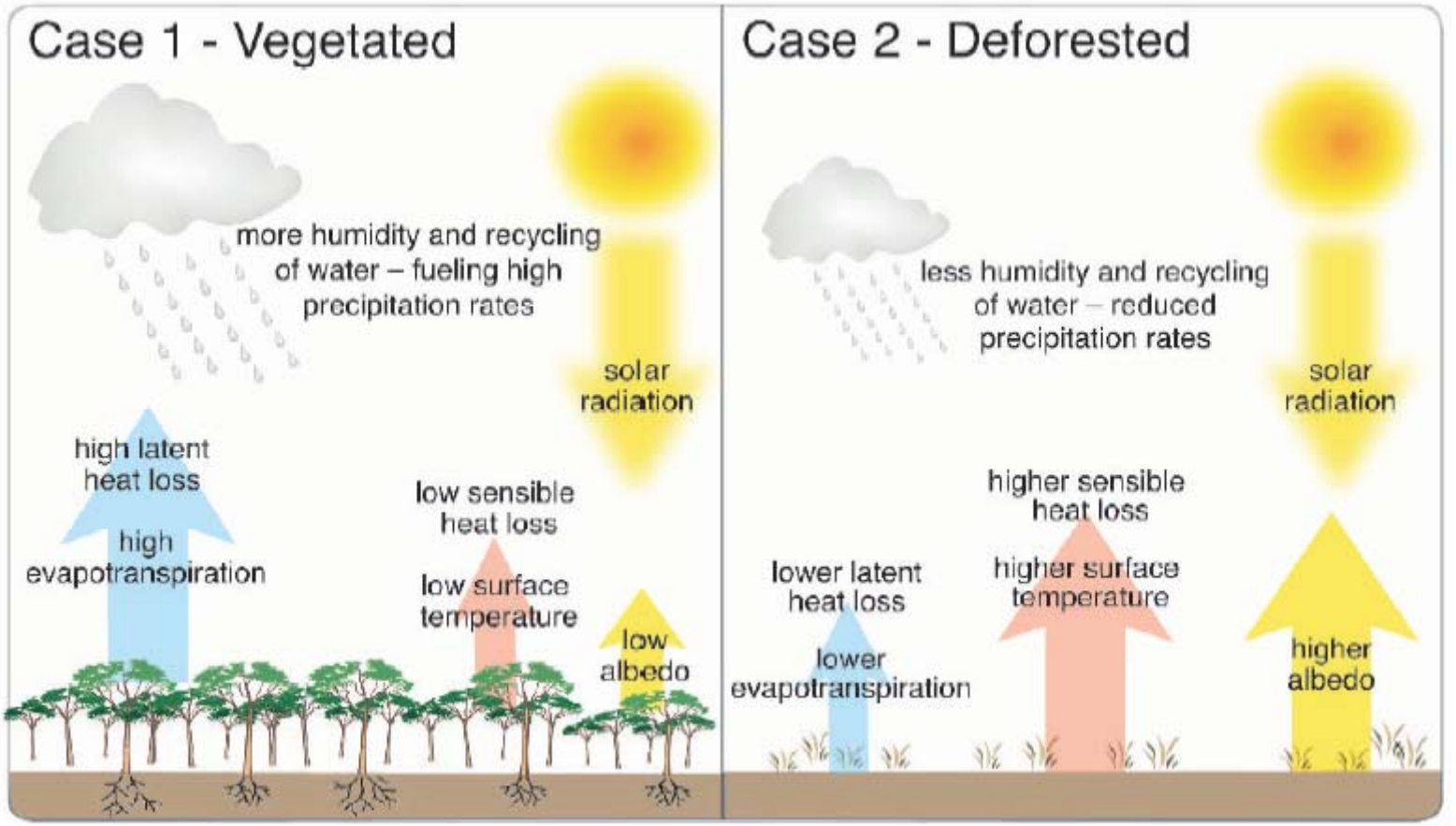
The basic principle: through what mechanisms can forest loss affect rainfall?

Is there any evidence for forest loss affecting rainfall in West Africa?

The evaporative cooling service and adaptation to climate change

What is needed to create payment mechanisms for maintenance of rainfall provisions by trees?

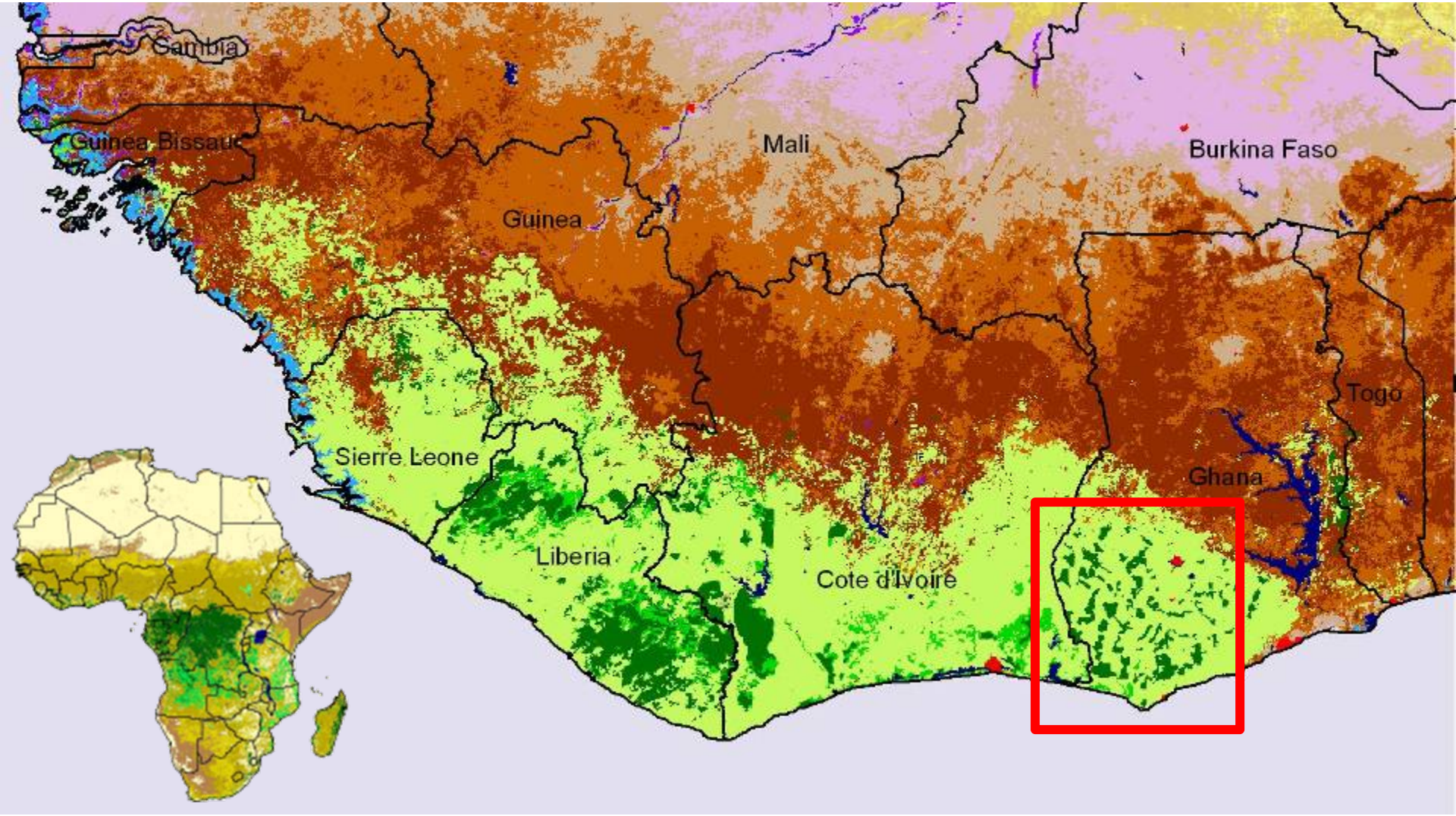
The Principles of the Rainfall and Evapotranspiration Service



(Foley *et al* 2003)


Smoke, dust and clouds
West Amazonia, Sep 14th 2004

Original and current intact forest area in West Africa

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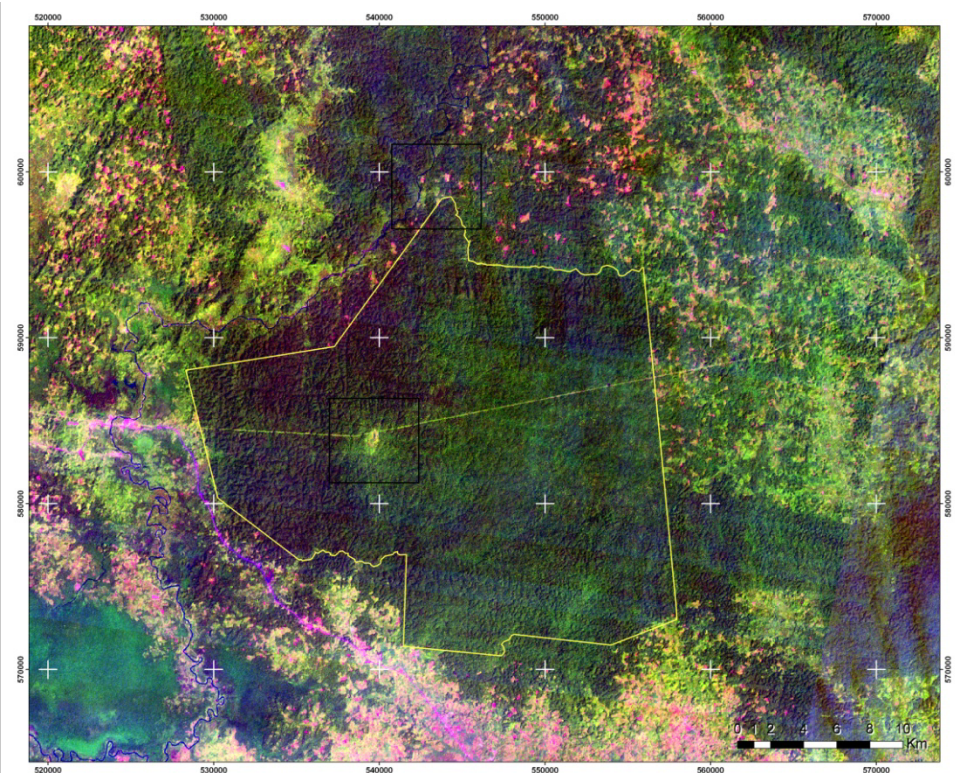
Ankasa River Conservation Area, SW Ghana

1986



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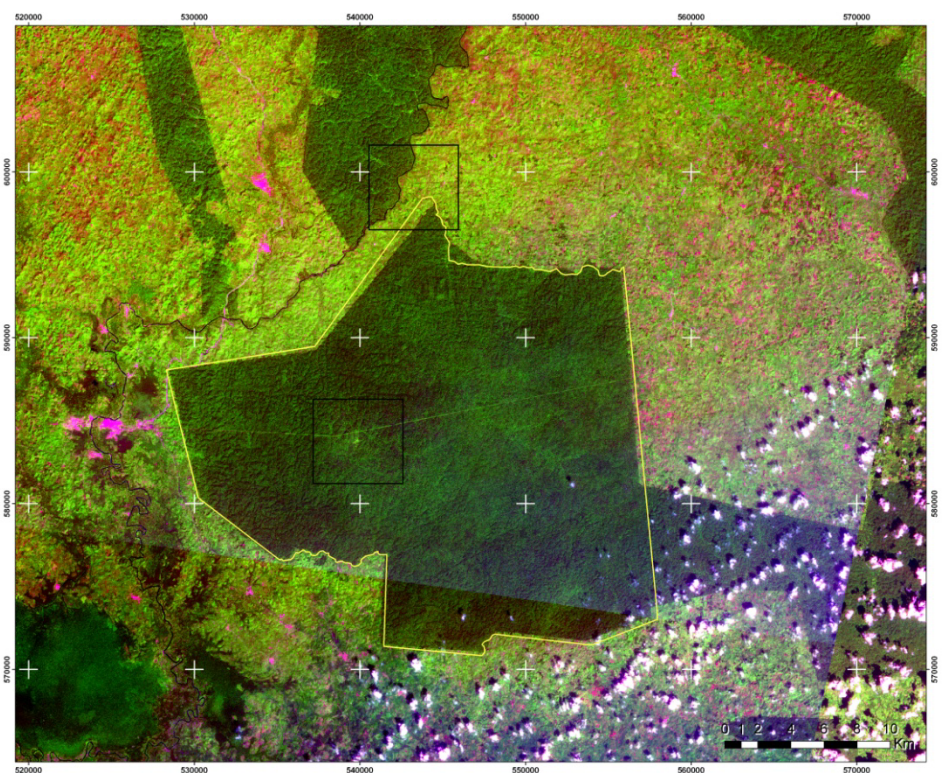


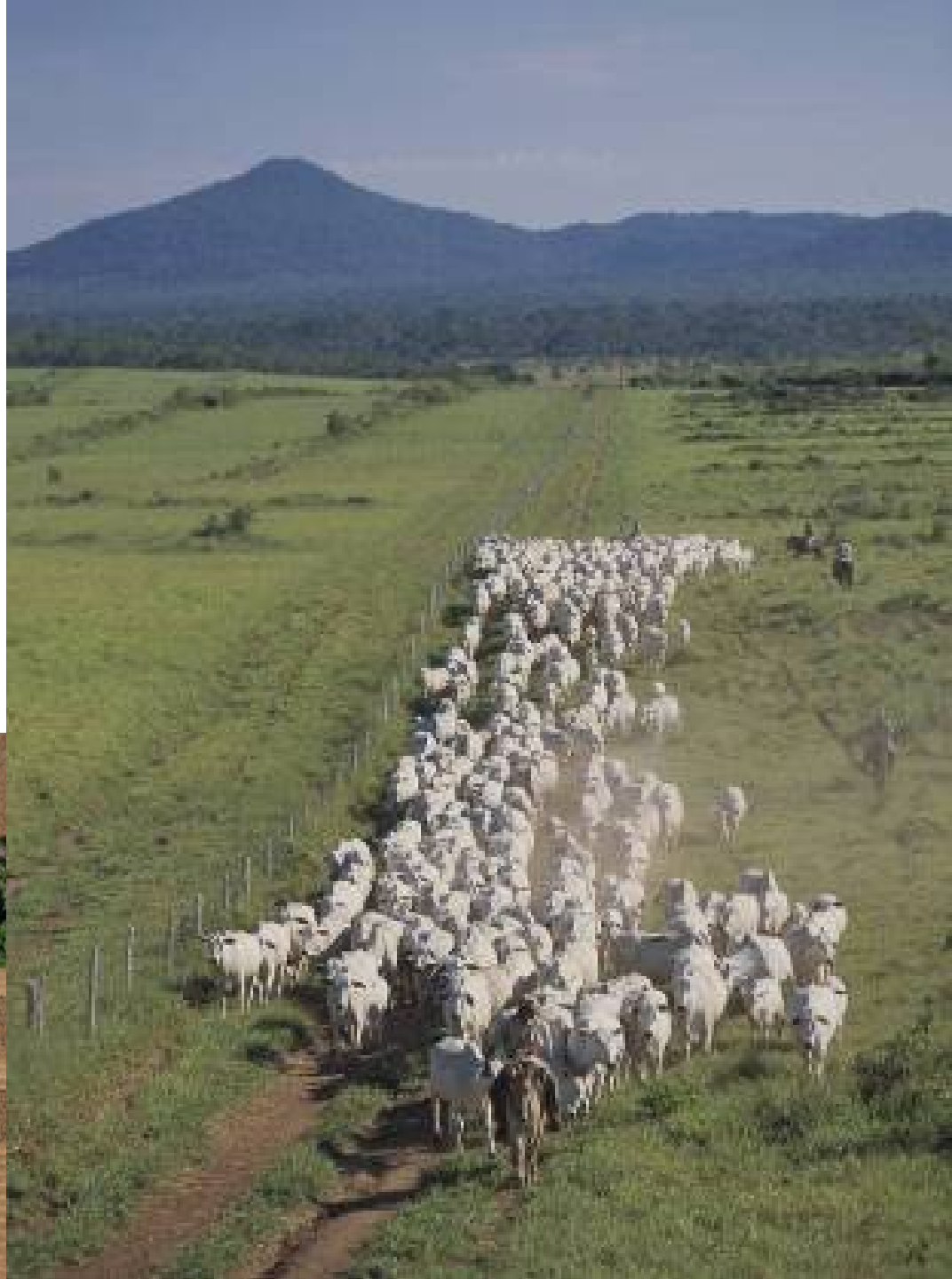
WILDLIFE DIVISION
(FORESTRY COMMISSION)

REPUBLIC OF GHANA

JRC

EUROPEAN COMMISSION

But West Africa is not like (parts of) the Brazilian Amazon...



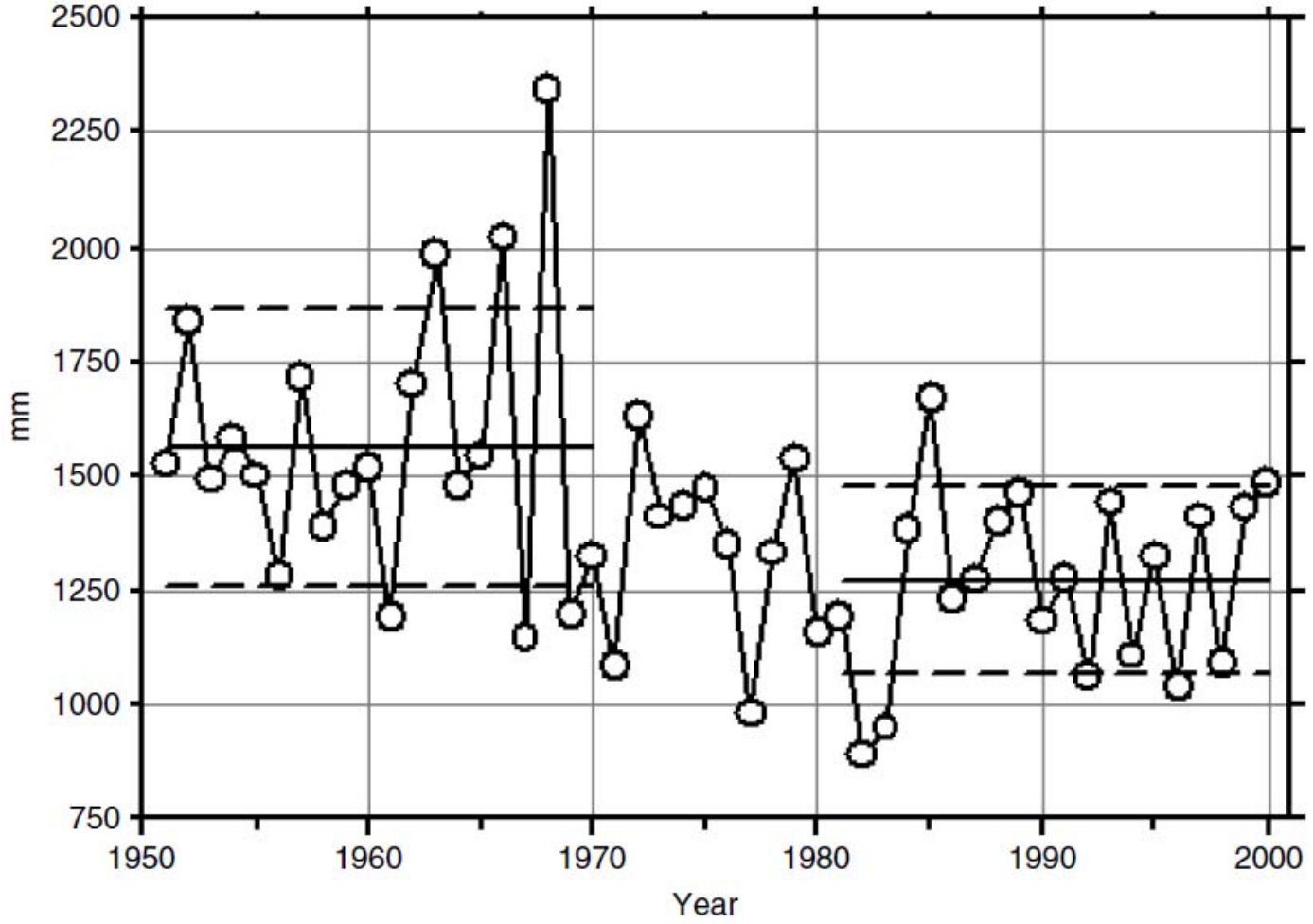
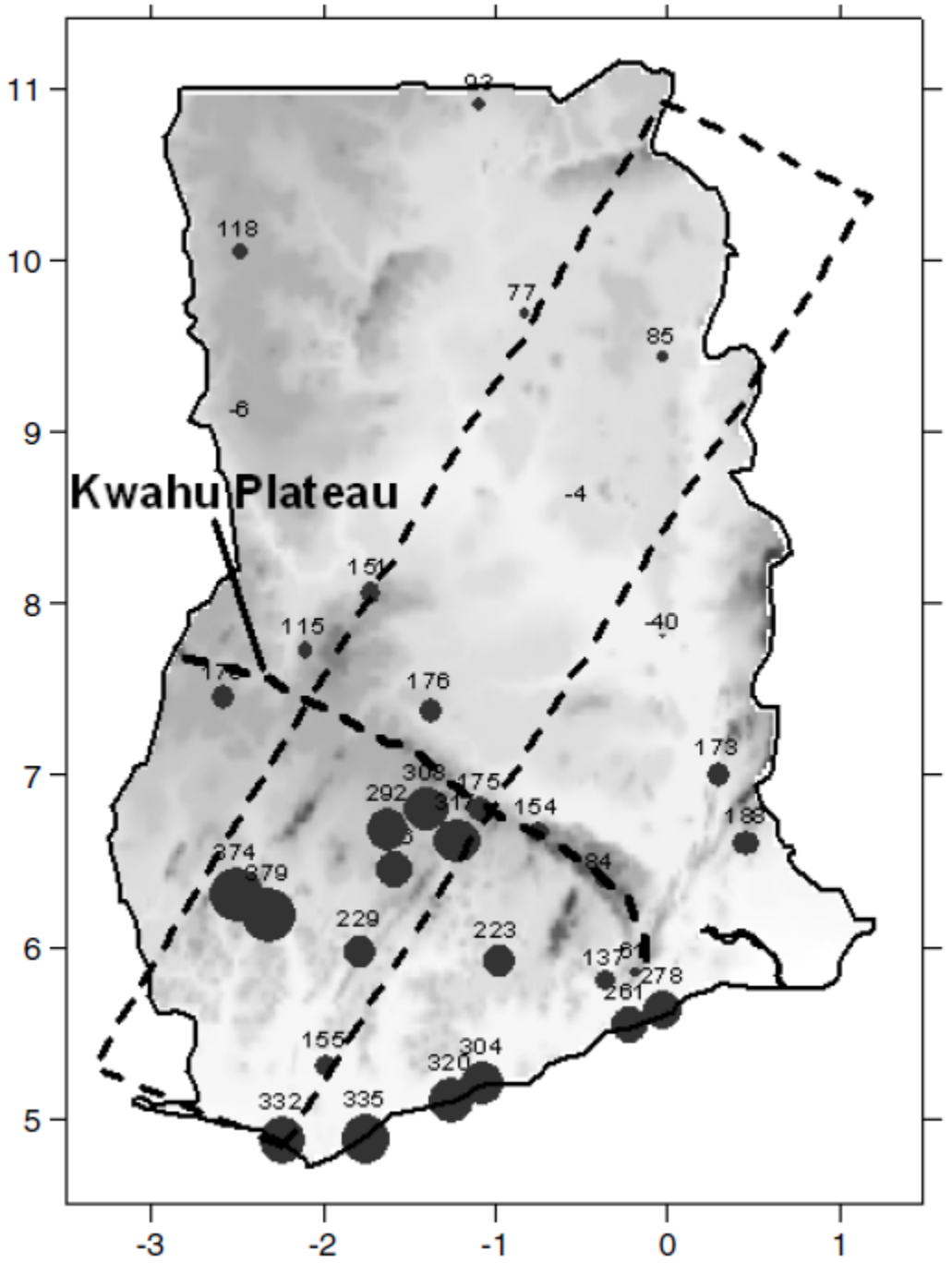


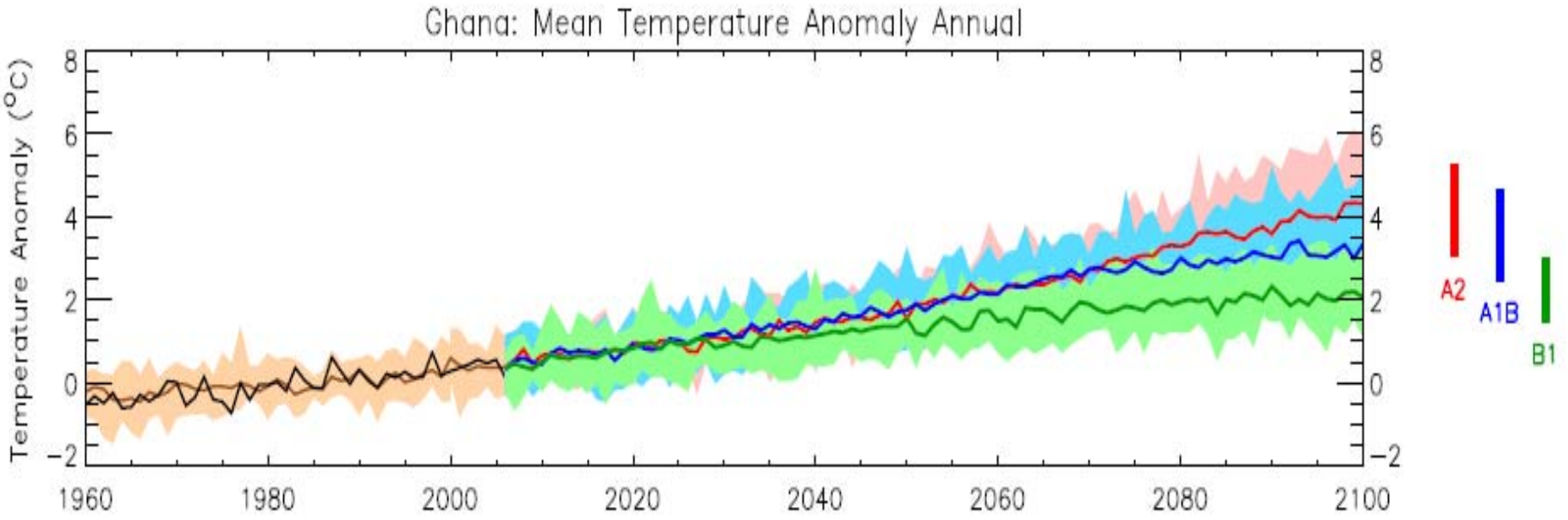
Figure 2. Annual rainfall fluctuations in Kumasi, 1951–2000. The solid lines represent the 20-year means and the dotted lines show the +/– 1 standard deviations.

Owusu and Waylen, *Trends in spatio-temporal variability in annual rainfall in Ghana (1951-2000)*, Weather, 2009

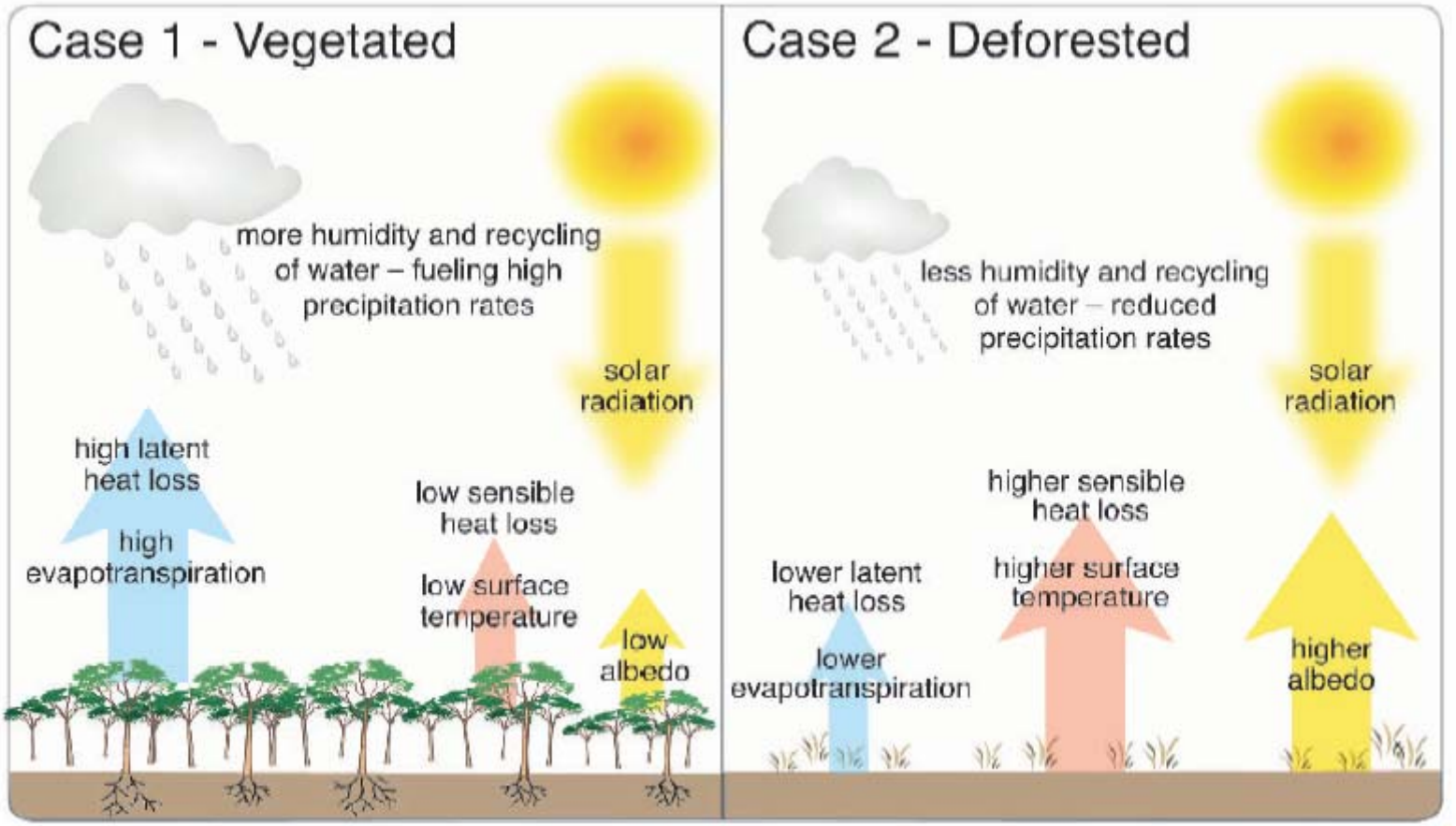
In Ghana, rainfall has declined most strongly in the forest zone over the period 1950-2000



Global climate change: observed and projected trends in Ghana

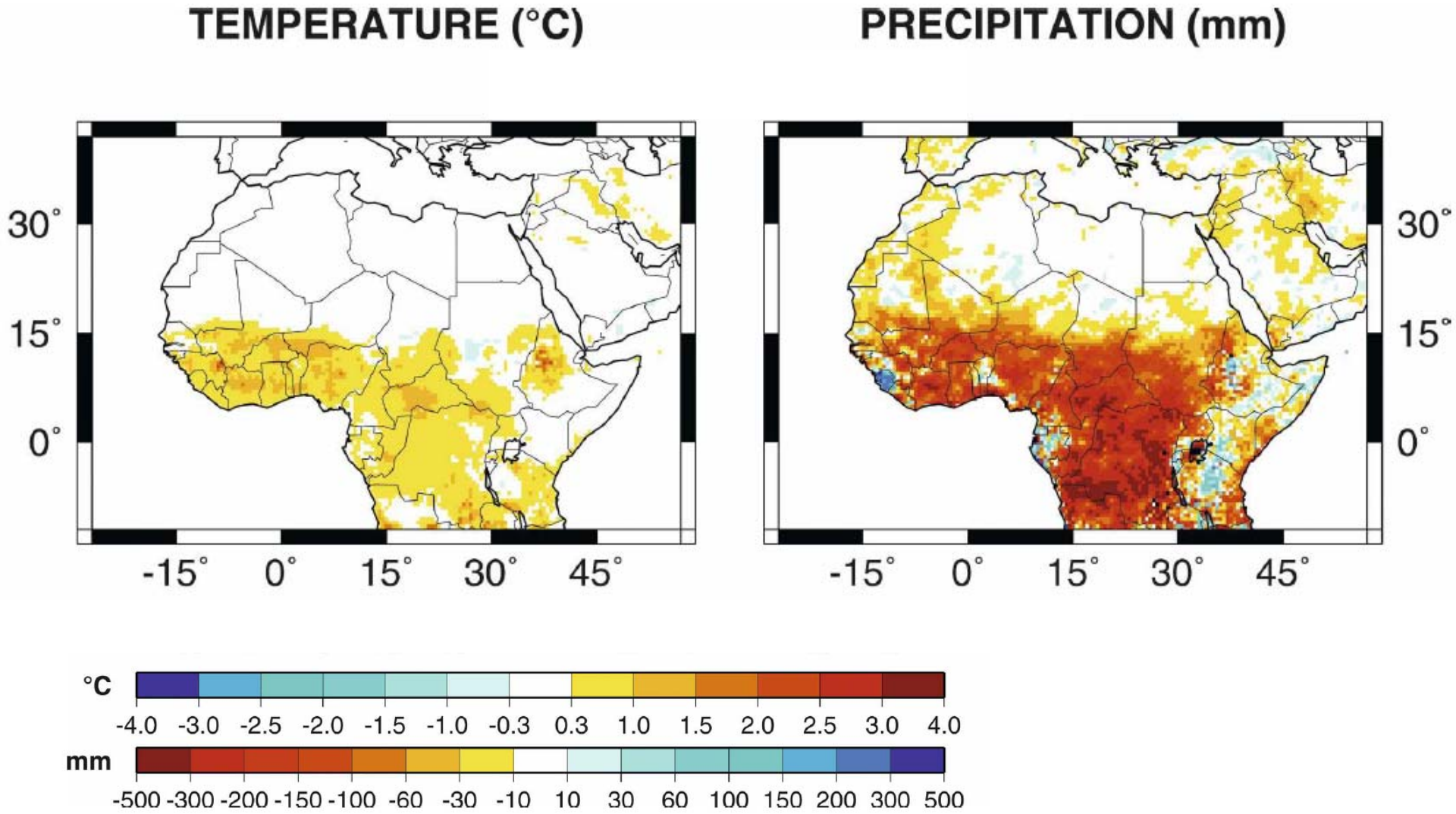


McSweeney and New, Oxford University
http://country-profiles.geog.ox.ac.uk



(Foley *et al* 2003)

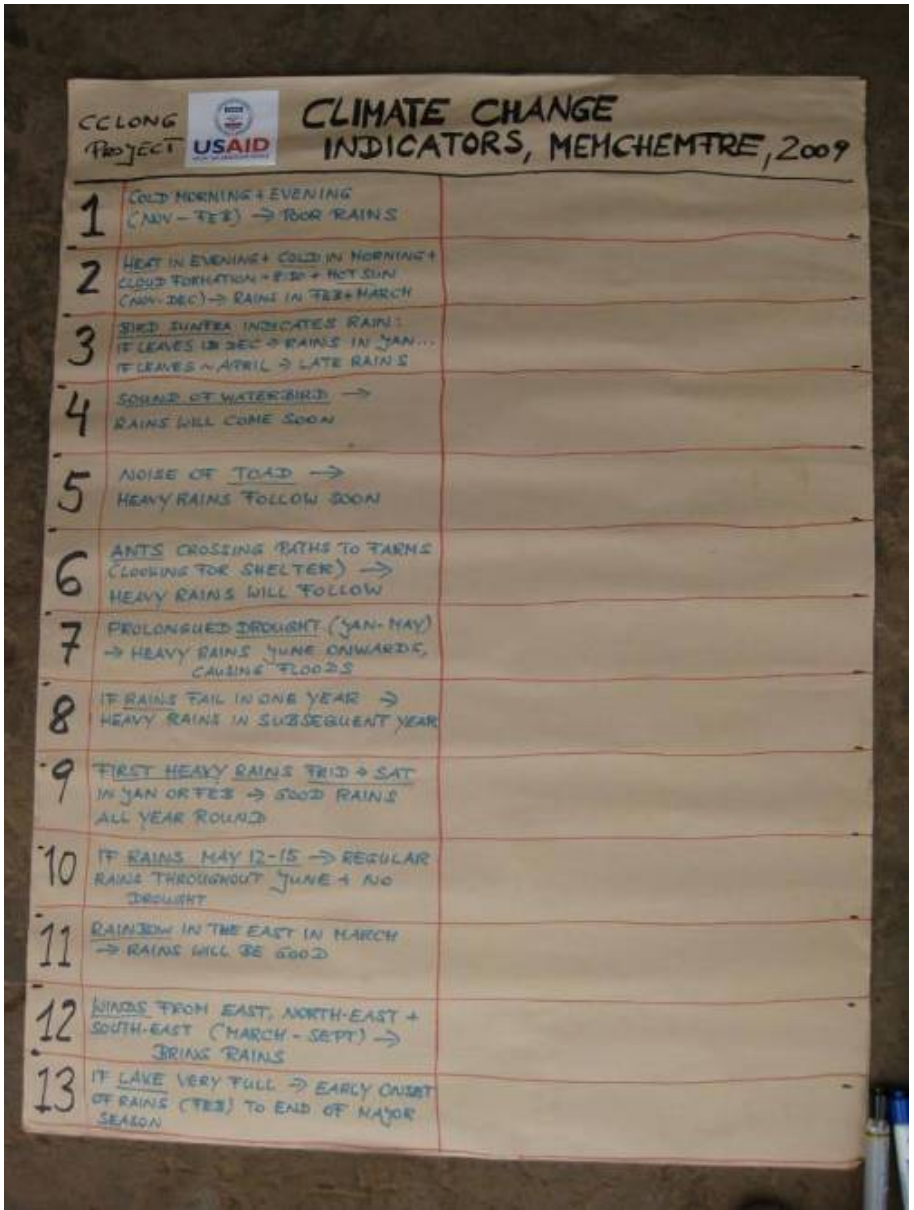
Simulations of the effects of wide-scale African deforestation alone on temperature and rainfall



Paeth *et al.* 2008, Regional Climate Change in Tropical and Northern Africa due to Greenhouse Forcing and Land Use Changes, *Journal of Climate*

Understanding and quantifying the economic costs of climate change, using extreme events in the recent past

Petra Tschakert
Penn State University,
Visiting Scientist, Environmental Change Institute



Priorities

Improve the field data

Focussed scientific studies looking at evapotranspiration, cloud formation and rainfall generation.

Apply the latest generation of high resolution meteorological models

Social and economic science

Quantify the economic value of the rainfall service.

Establish pilot projects

Even if our understanding is not yet complete, we probably know enough to initiate projects.

Think ahead

Prepare for a West Africa that is on course to be 6^{o} C warmer by 2100, and plan what role functional forests and tree cover can play in adaption to climate change.