

COP-15  
Holland Climate House  
Copenhagen



## Water management under Climate Change Learning to ride a tiger

Henk van Schaik

## Water management and Climate change

- Started 2001 after Third Assessment Report of IPCC
- Dialogue on Water and Climate
  - 2001 – 2005: Building awareness on climate variability and change
    - International events: WWF, WWW, IWA
    - Documentation : books and films
    - Local dialogues (Pacific, Caribbean, Africa, Netherlands, Siberia...)
  - Since 2005:
    - Grappling how to handle climate change in water management and water services

## Coping with climate change: top priority

Climate change is one of the most fundamental challenges ever to confront humanity. No issue is more fundamental to long-term global prosperity. And no issue is more essential to our survival as a species

*Summit on Climate Change for Heads of States and Governments,  
New York, 22 September, 2009*

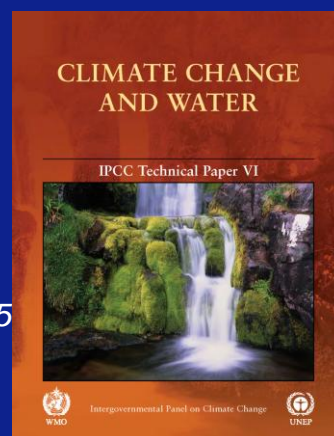
*IPCC 2007: By 2020 50 % yield loss in rain fed agric; by 2050 200 million people displaced because of climate; snow melt affecting one billion people.*

**Climate change became a top priority in less than 10 years**



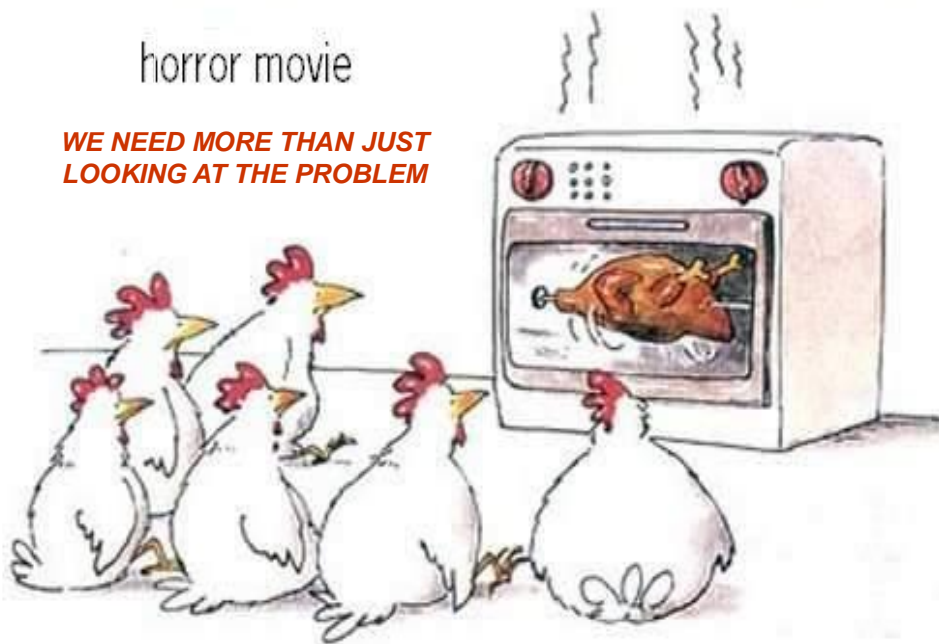
## *Facts and Forecasts*

Climate Change and Water:  
The IPCC Technical Report  
*June 2008*  
*reviewed scientific articles till end 2005*



horror movie

**WE NEED MORE THAN JUST  
LOOKING AT THE PROBLEM**



RES8552

## A New Planning Uncertainty

POLICYFORUM

CLIMATE CHANGE

### Stationarity Is Dead: Whither Water Management?

P. C. D. Milly,<sup>1\*</sup> Julia B. Betancourt,<sup>2</sup> Malin Falkenmark,<sup>3</sup> Robert M. Hirsch,<sup>4</sup> Zbigniew W. Kundzewicz,<sup>5</sup> Dennis P. Lettenmaier,<sup>6</sup> Ronald J. Stouffer<sup>6</sup>

Systems for management of water throughout the developed world have been designed and operated under the assumption of stationarity. Stationarity—the idea that natural systems fluctuate within an unchanging envelope of variability—is a foundational concept that permeates training and practice in water-resource engineering. It implies that any variable (e.g., annual streamflow or annual flood peak) has a time-invariant (or 1-year-periodic) probability density function (pdf), whose properties can be estimated from the instrument record. Under stationarity, pdf estimation errors are acknowledged, but have been assumed to be reducible by additional observations, more efficient estimators, or regional or paleohydrologic data. The pdfs, in turn, are used to evaluate and manage risks to water supplies, waterworks, and floodplains; annual global investment in water infrastructure exceeds US\$500 billion (1).



An uncertain future challenges water planners.

In view of the magnitude and ubiquity of the hydroclimatic change, apparently now

Climate change undermines a basic assumption that historically has facilitated management of water supplies, demands, and risks.

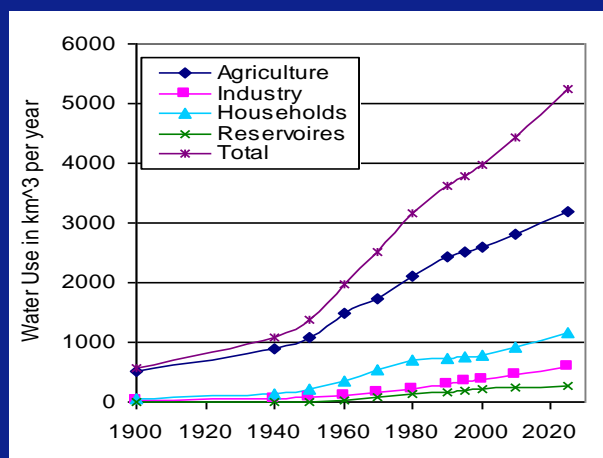
that has emerged from climate models (see figure, p. 574).

*Why now?* That anthropogenic climate change affects the water cycle (9) and water supply (10) is not a new finding. Nevertheless, sensible objections to discarding stationarity have been raised. For a time, hydroclimate had not demonstrably exited the envelope of natural variability and/or the effective range of optimally operated infrastructure (11, 12). Accounting for the substantial uncertainties of climatic parameters estimated from short records (13) effectively hedged against small climate changes. Additionally, climate projections were not considered credible (12, 14).

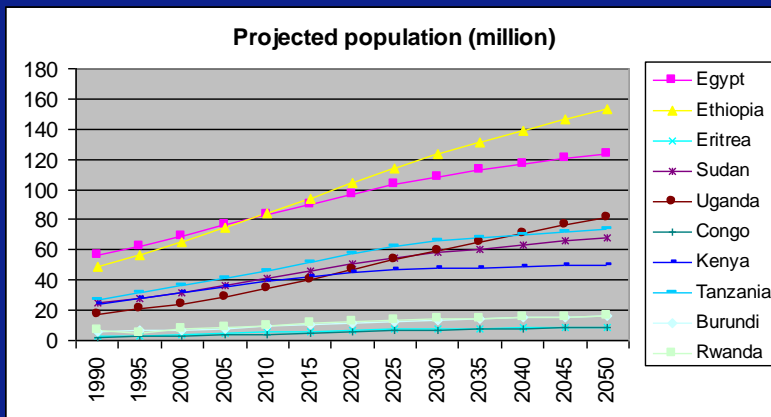
Recent developments have led us to the opinion that the time has come to move beyond the wait-and-see approach. Projections of runoff changes are bolstered by the recently demonstrated retrodictive skill of climate models. The global pattern of observed annual streamflow trends is unlikely to have



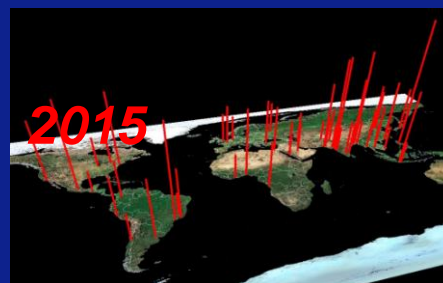
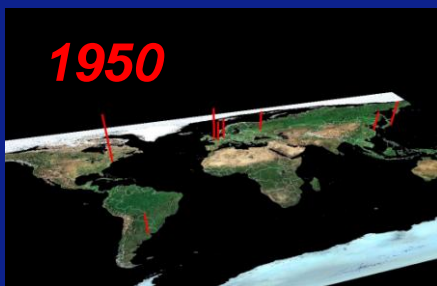
Meeting growing global water demands



# Population projection Nile countries



## World Cities exceeding 5 million residents



Analysis by Munich Re  
Data:  
U.N. Population Division





High-level event

### **Water and Climate – From Dialogue to Action**

Wednesday 16 December 2009

9.30 a.m. – 11.00 a.m.

Holland Climate House, Hall C7, Bella Center, UN Climate Change  
Conference, Copenhagen

**«Opportunity knocks. It is up to you to open the door.»**  
— UN Secretary-General Ban Ki-moon

Water is the primary medium through which climate change will manifest itself on livelihoods, economies and ecosystems. In recent years a global dialogue among water professionals and politicians has resulted in a set of guiding principles laid down in statements from Nairobi, Stockholm, UN Water and Cairo. These messages are foremost in guiding the water community, but have also been forwarded to the climate community assembled at the COP-15.

These principles are:

- 1 Mainstreaming adaptation within the broader development context
- 2 Strengthening governance of water resources management and improving integration of land and water management
- 3 Improving and sharing knowledge and information on climate, water and adaptation measures
- 4 Building long-term resilience through stronger institutions and water infrastructures, including well-functioning ecosystems
- 5 Investing in cost-effective adaptive water management and technology transfer
- 6 Releasing additional funds through increased national and international budgetary allocations and innovative funding mechanisms for adaptation

The side event will present and discuss the principles, including follow-up actions on climate information, planning, building with nature and capacity development.