



2018年(第27回) ブループラネット賞
受賞者記念講演会

2018 Blue Planet Prize
Commemorative Lectures

マリン・ファルケンマーク教授

講演スライド集

「水思考の転換」

ーサハラ以南のアフリカにおける飢餓軽減のために

京都講演

Prof. Malin Falkenmark

Slides for the Lecture

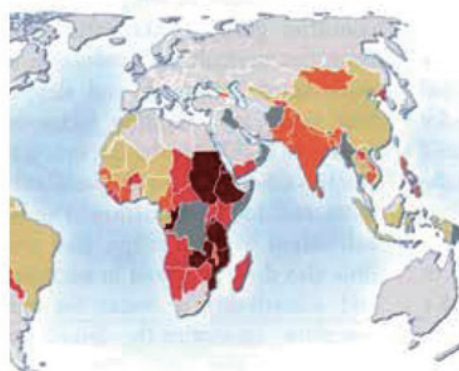
Shift in water thinking - crucial for
hunger alleviation in sub-Saharan Africa

Kyoto

Shift in water thinking - crucial for hunger alleviation in sub-Saharan Africa

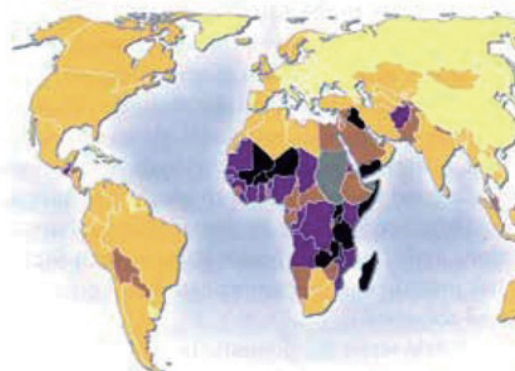
Africa suffering from major development failure

*** strong motivation for SDG 2030 agenda**



Undernourished people (% of population)
5 15 25 35 75%

UNDERNUTRITION



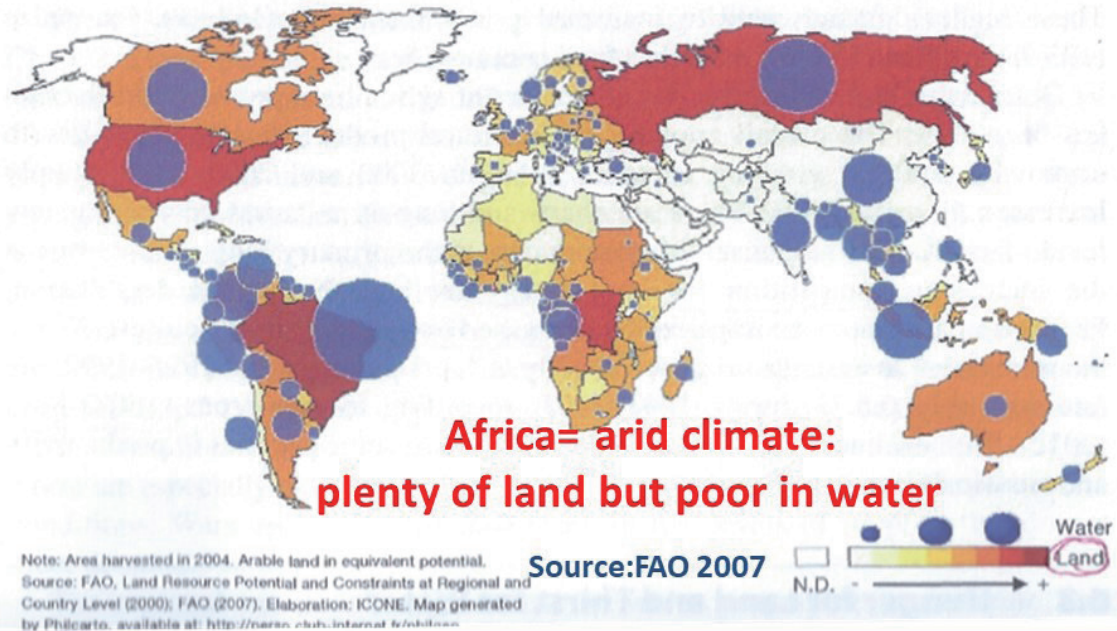
Population growth 2010-2050 (% , medium variant)

-30 10 50 100 150

No data
POPULATION GROWTH

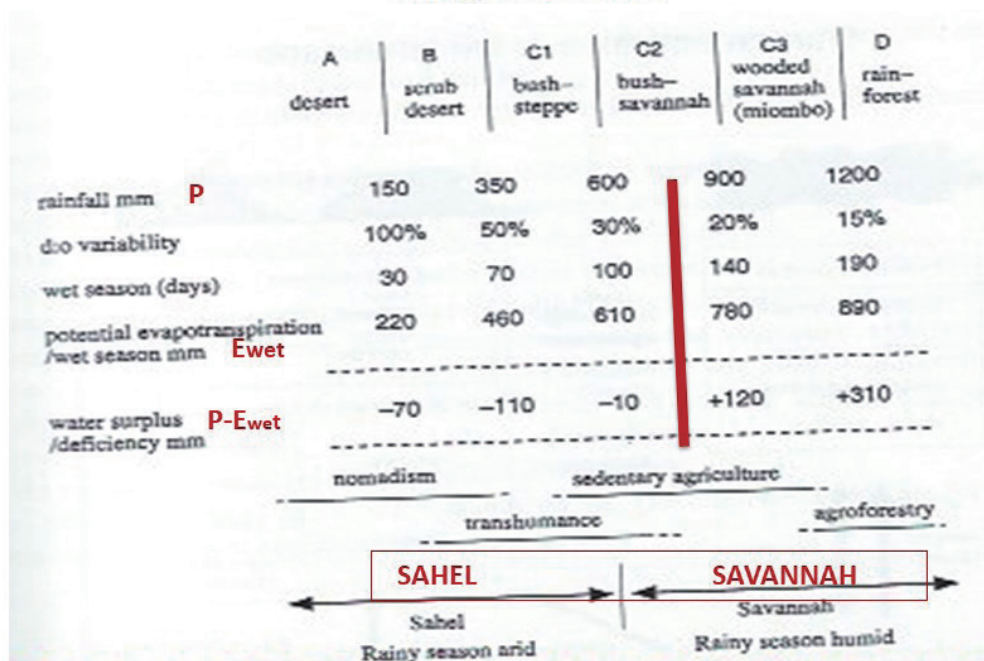
Africa is different

Available land and water for crop production



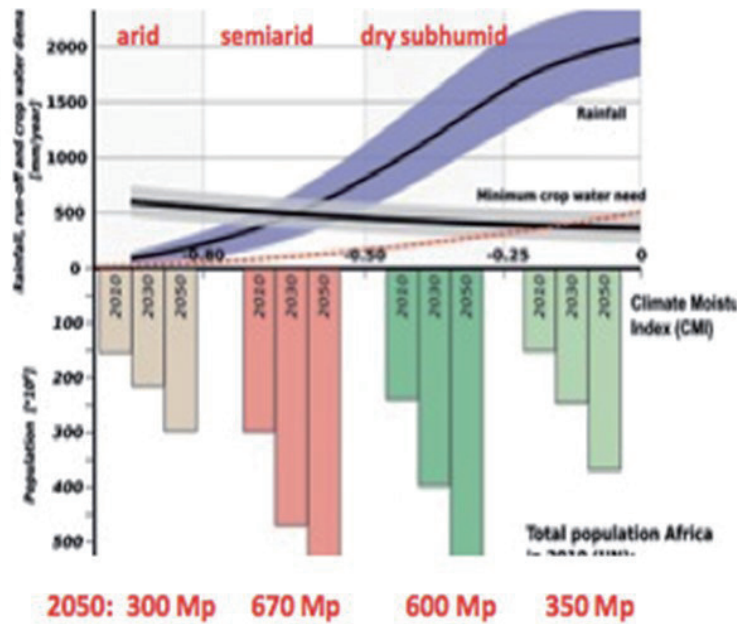
Hydroclimatic livelihood zones

Mageed 1989



Savanna water availability situation

supplementary
irrigation needed in
subsistence farming

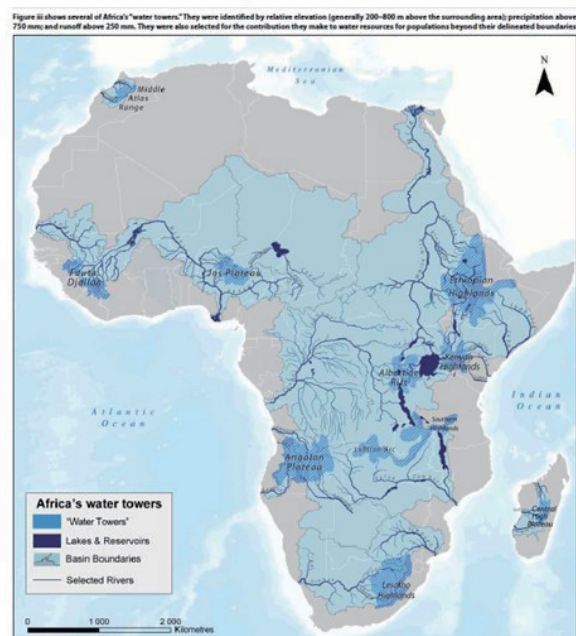


Blue water reality

water needed by humans, industry and energy

accessibility problems

- large rivers
 - water towers/river corridors
- smaller rivers:
 - often seasonal/ephemeral



Sub-Saharan food production

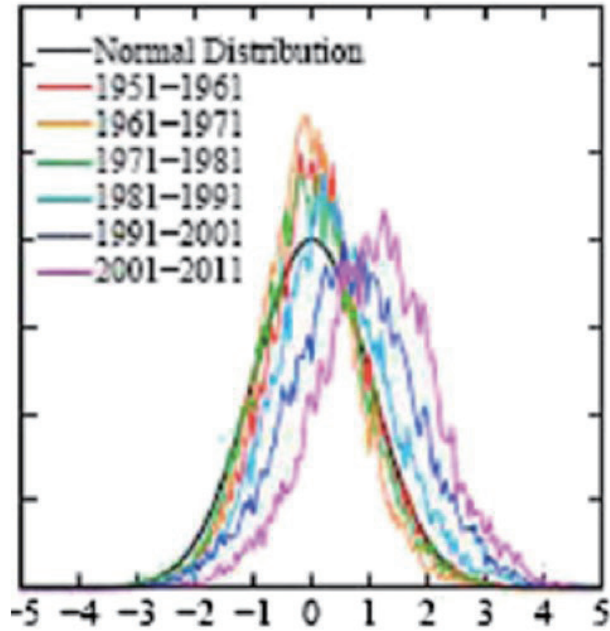
90 % of agriculture is rainfed

- **current characteristics**
 - only limited irrigation
 - mainly subsistence agriculture
 - drought proneness - interannual droughts
 - » - frequent dryspells
 - low crop yields

Droughts increasing in severity

A. interannual droughts area

(source Hansen)

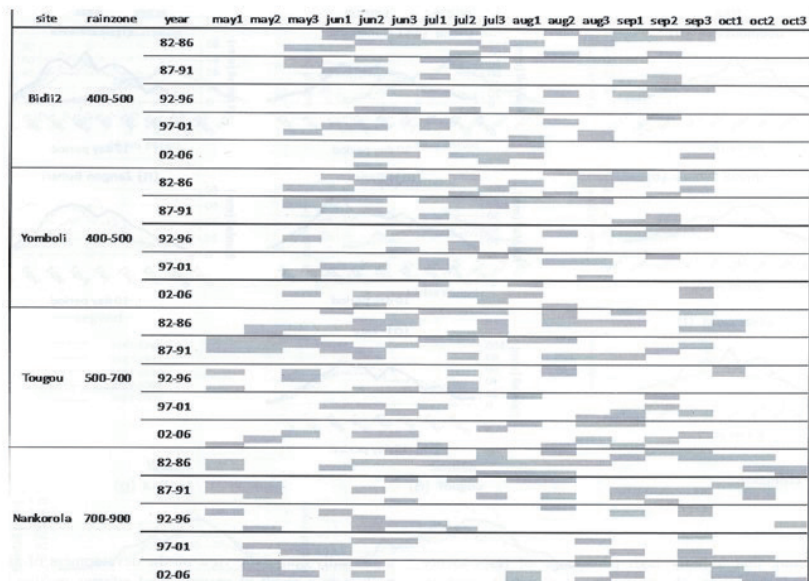


B. intra-annual droughts / dryspells

Growing season weeks

Sudan-Sahel region: annual dryspells

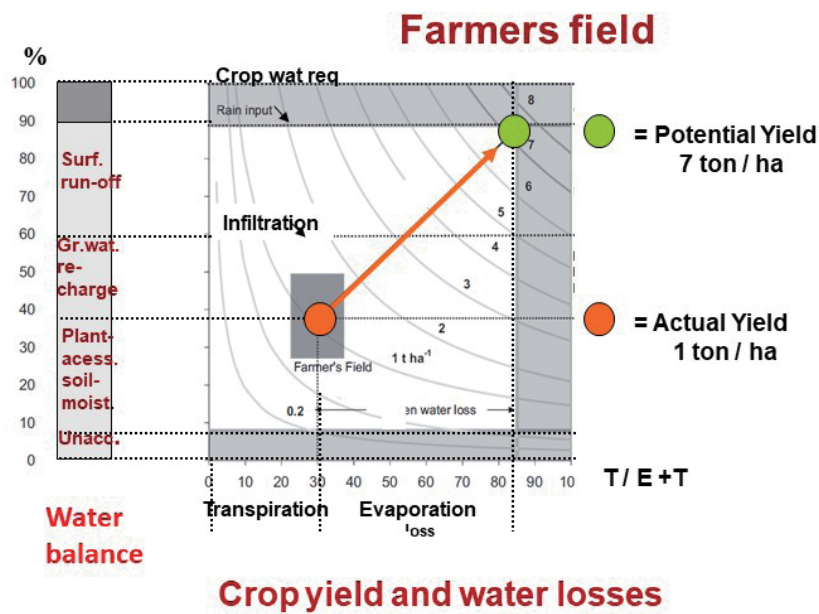
- four stations:
400 → 900 mm rain
- 1982-2006
- annual dryspells
- =grey



- o can be overcome by rainwater harvesting

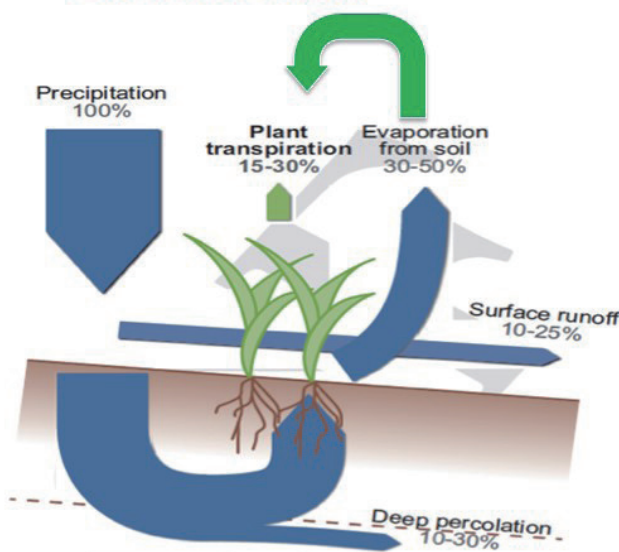
Source: Mertz et al 2012

Result: very low crop yields



Make better use of the rain

- **reduce losses**



1. vapour shift

helping roots take up more of the water in the root zone

2. supplementary irrigation

protect roots from drought damage by WATER HARVESTING

Core agricultural measures

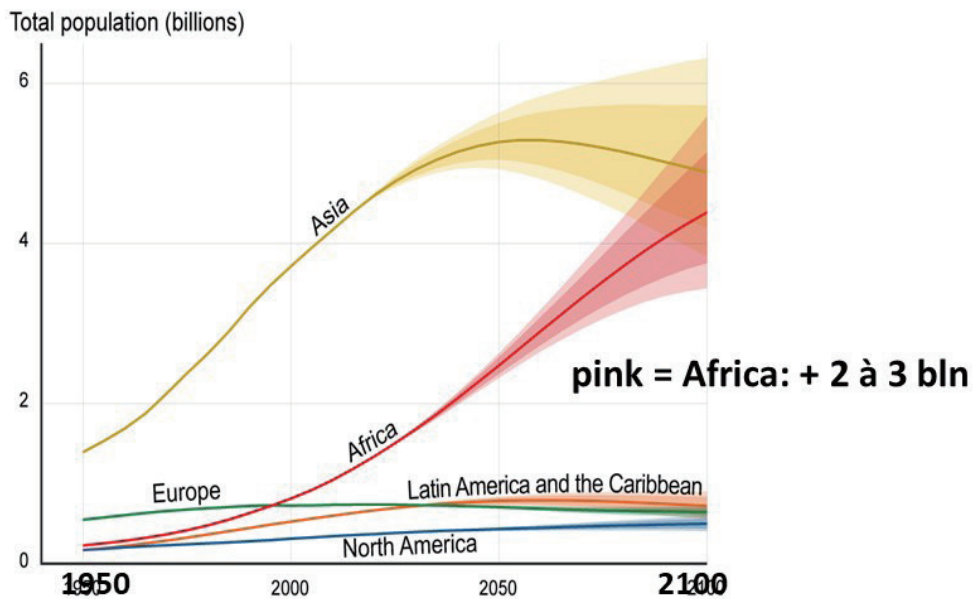
- **soil conservation**
 - make sure that the rain enters the soil
- **nutrients**
 - soils are poor in nutrients
- **make best possible use of the rain**
 - rainwater harvesting in small dams

Longterm challenges

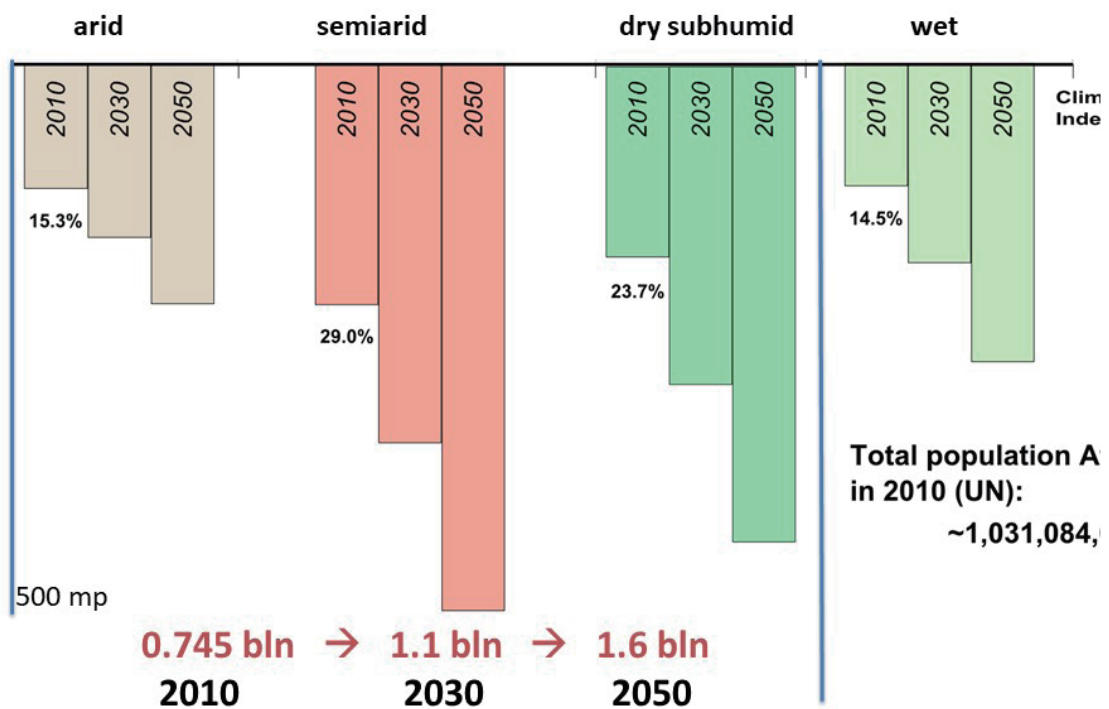
- Let us now turn towards the green water aspects, focusing on the core resource in dryland, in other words the dry climate regions agriculture where much of the rain evaporates before reaching any river.

Essential challenge

dramatic population growth in Africa

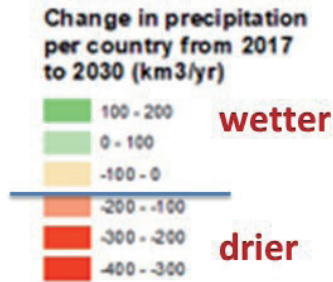


Population growth

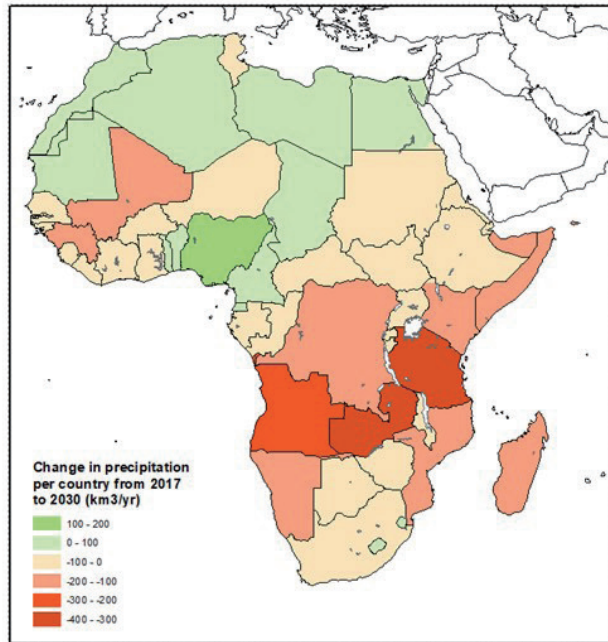


Climate change

* change 2017-2030



(Source:SRC 2018)



Water poor countries

will have to import food

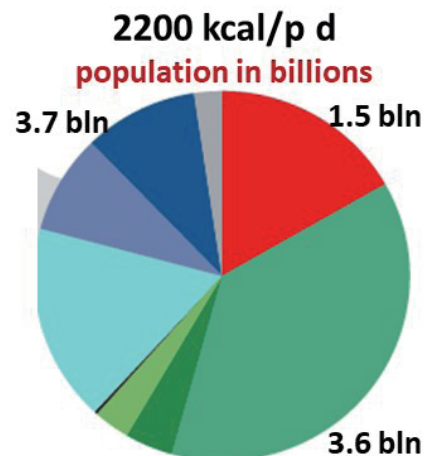
Great expectations on water surplus countries

blue: water surplus allows food export

green: water deficiency necessitates food import

Assumed population 9.2 bln

2050 AD



Green water perspective

- **highly vulnerable crop production**
 - currently large water losses
 - food import dependence developing
 - Green Water Revolution urgent
 - **Sustainable Development Goal 2**
 - hunger alleviation reached by 2030
 - water scarcity challenge not understood
- SDG water blindness!!!!**

SHIFT IN THINKING ESSENTIAL!!!!

Three issues colliding

- **dry climate**
 - low runoff generation-great rain variability-climate change
- **extreme population growth**
 - 4-folding this century (1000 Mp→4000 Mp)
- **increasing water demands**
 - rising income, industrialisation, generation of foreign currency

Longterm challenges

- **food security**
 - Green Water Revolution
 - increasing export dependence
 - foreign currency for import
- **industrial development = urgent**
 - rapidly rising blue water requirements
- **land/water integration = essential**
 - blue water for humans, industry, energy
 - green water for food
- **national water planning**

Conclusions

- **Africa's main water resource**
 - RAIN
- **potential water policy**
 - blue water for cities/industry/energy
 - green water for food production

->Shift in thinking essential

Thank you!

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship

