



Presentation from  
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# **Opportunities for Green Water Based Green Revolution in Africa**

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# Outline



Introduction

Water, Ecosystem Services and the SDGs: Nature's Infrastructure

The Water Resource Challenge

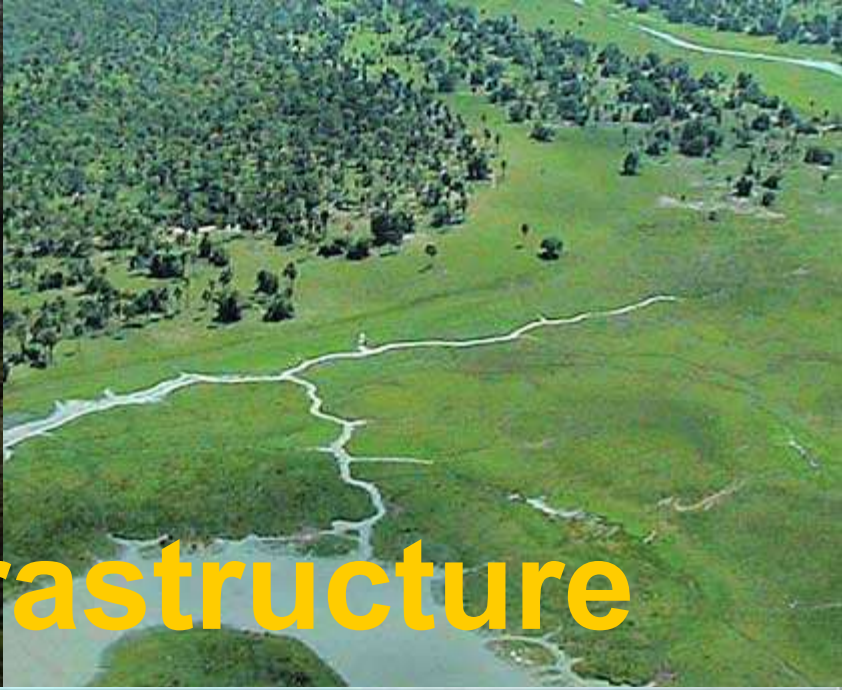
Opportunities for Water Based Green Revolution in Africa

Conclusions and Policy Implications



# **Water, Ecosystem Services, and the SDGs**





# Nature's infrastructure





# CONSTITUENTS OF WELL-BEING

## ECOSYSTEM SERVICES

### Supporting

- NUTRIENT CYCLING
- SOIL FORMATION
- PRIMARY PRODUCTION
- ...

### Provisioning

- FOOD
- FRESH WATER
- WOOD AND FIBER
- FUEL
- ...

### Regulating

- CLIMATE REGULATION
- FLOOD REGULATION
- DISEASE REGULATION
- WATER PURIFICATION
- ...

### Cultural

- AESTHETIC
- SPIRITUAL
- EDUCATIONAL
- RECREATIONAL
- ...

LIFE ON EARTH - BIODIVERSITY

### Security

- PERSONAL SAFETY
- SECURE RESOURCE ACCESS
- SECURITY FROM DISASTERS

### Basic material for good life

- ADEQUATE LIVELIHOODS
- SUFFICIENT NUTRITIOUS FOOD
- SHELTER
- ACCESS TO GOODS

### Health

- STRENGTH
- FEELING WELL
- ACCESS TO CLEAN AIR AND WATER

### Good social relations

- SOCIAL COHESION
- MUTUAL RESPECT
- ABILITY TO HELP OTHERS

### Freedom of choice and action

OPPORTUNITY TO BE ABLE TO ACHIEVE WHAT AN INDIVIDUAL VALUES DOING AND BEING

ARROW'S COLOR  
Potential for mediation by socioeconomic factors

- Low
- Medium
- High

ARROW'S WIDTH  
Intensity of linkages between ecosystem services and human well-being

- Weak
- Medium
- Strong

Ecosystem services are essential for promoting decoupling

## **Water-related services:**

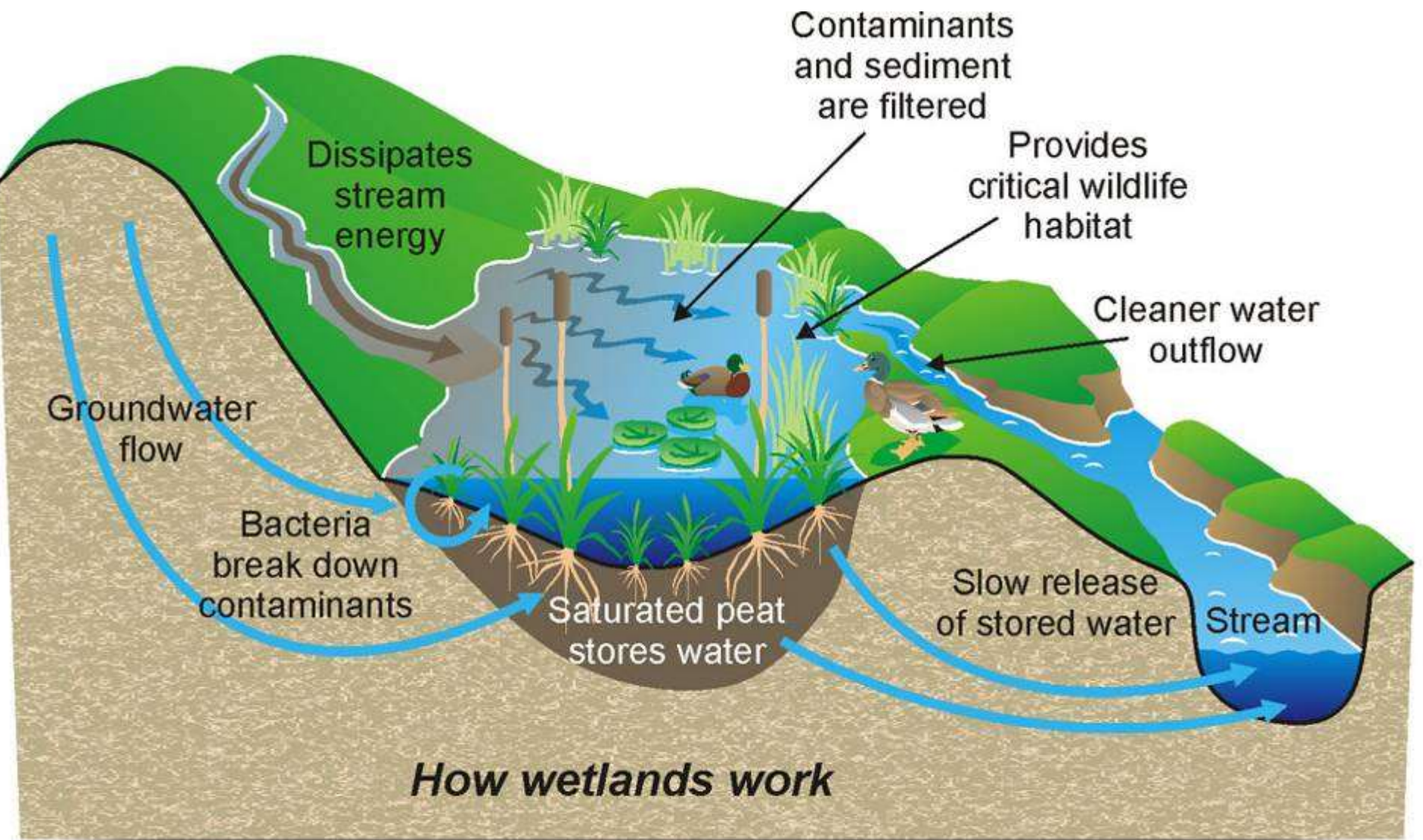
- **Provision of fresh water for drinking, agriculture, electricity generation, etc.**
- **Regulation of floods and extreme weather events**
- **Purification of wastes**
- **Delivery of nutrient-rich sediments to flood plains**

**These are worth US\$7 trillion per year**



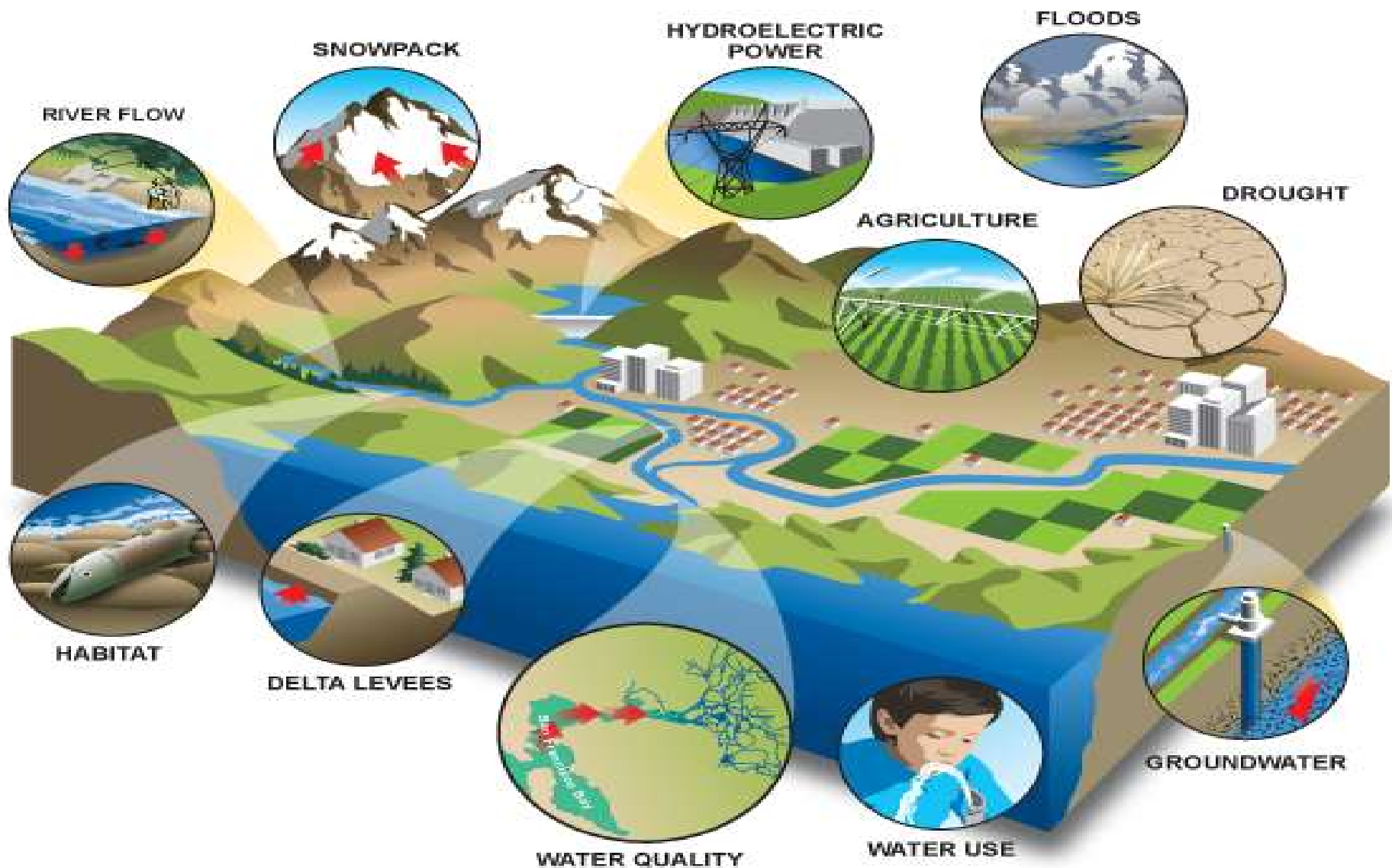


# Wetlands sequester about 37% of the terrestrial carbon pool



*How wetlands work*





**The benefits to people from water-related ecosystem services can best be assessed at the landscape scale**

# Water is central to achieving all Sustainable Development Goals (SDGs)



# Water access is central to gender empowerment, education of girls, and human well being, especially in Africa







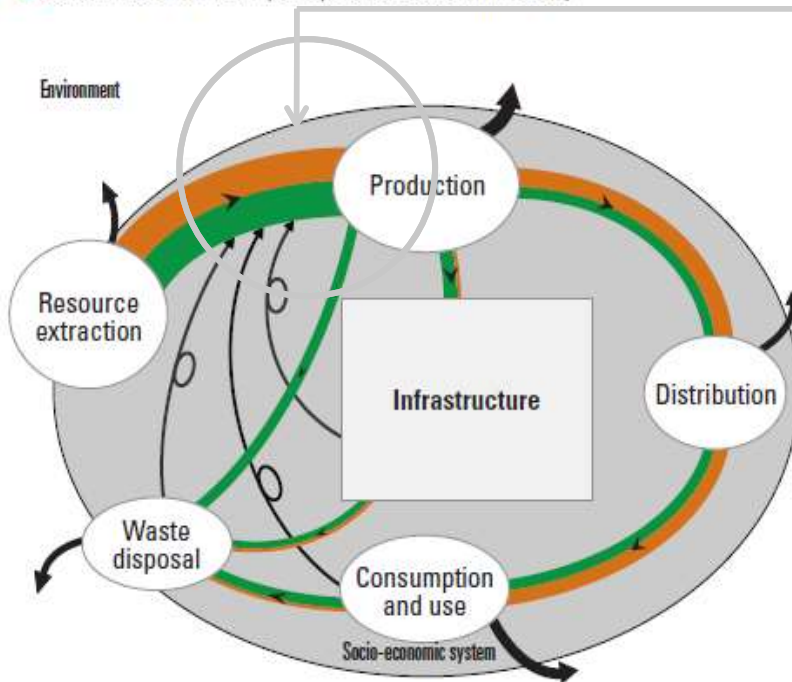
# The Water Resource Challenge

# The Inconvenient Truth



- Recycling flows
- Emissions (mainly CO<sub>2</sub>)
- Flows of energy carriers (biomass and fossil fuels)
- Other material flows (ores, construction minerals)

'Hidden' resources flows are large and cause significant environmental impacts...

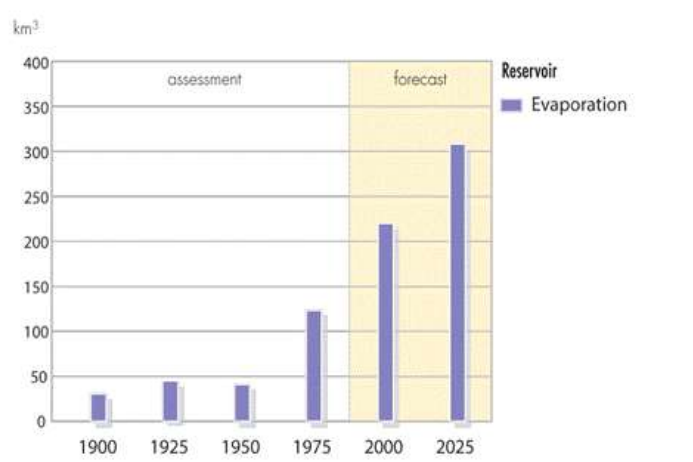
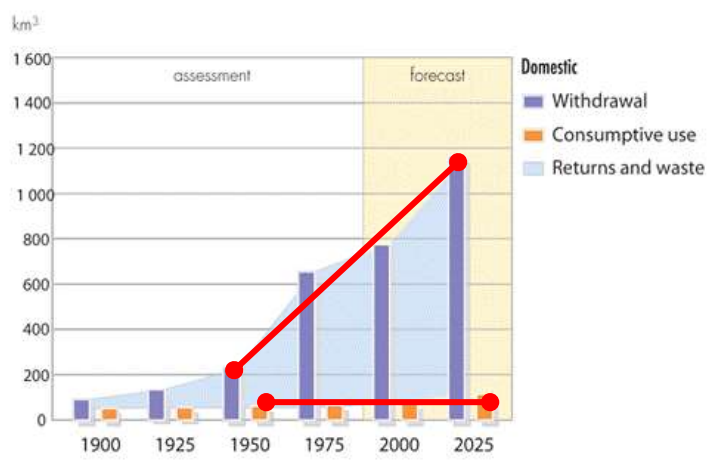
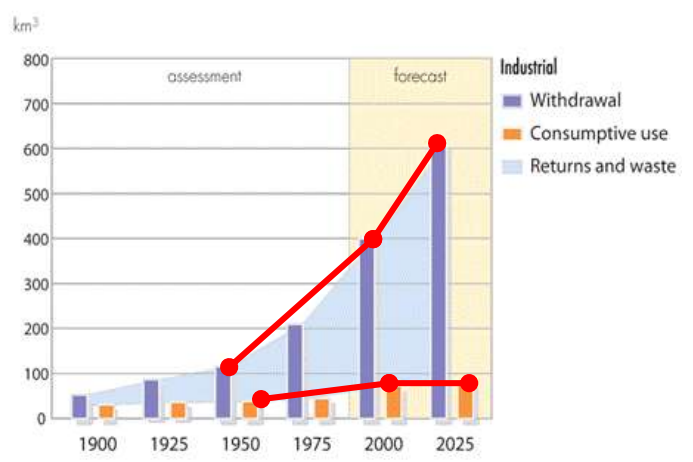
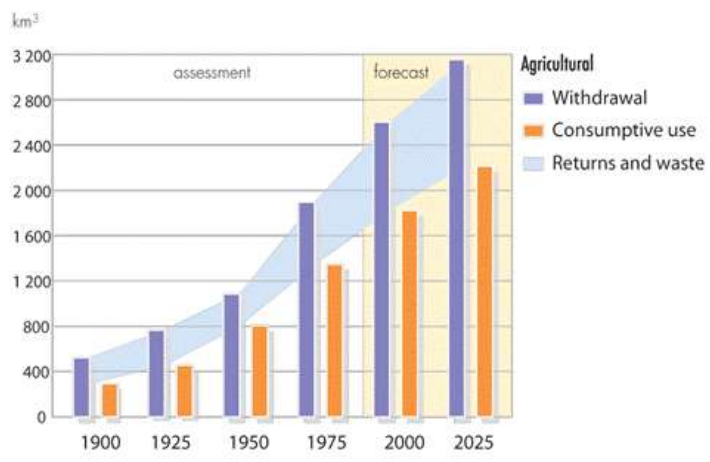


...and the receiving environments for emissions are smaller than some might think.

Fischer-Kowalski, 2011



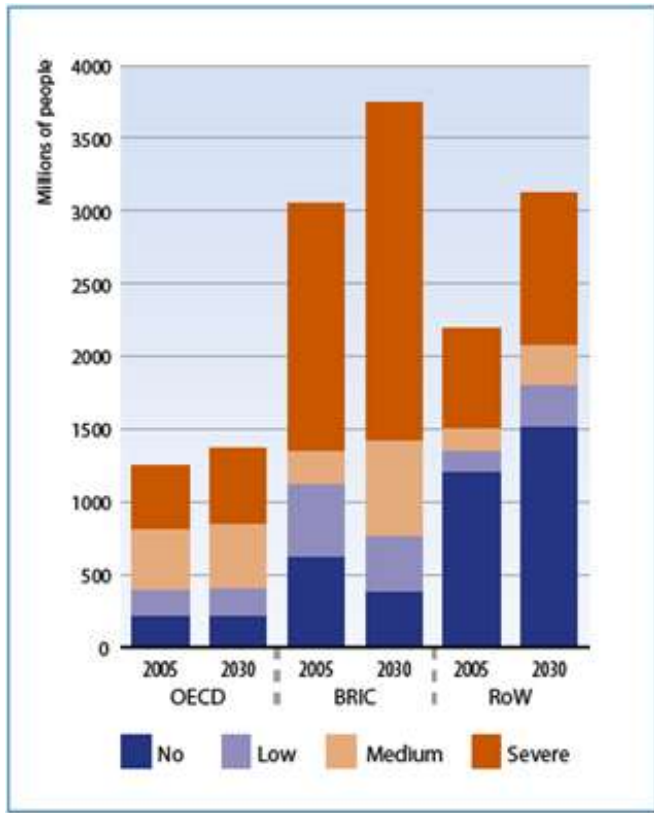
# Water Withdrawal far Exceeds Water Consumption in all Sectors



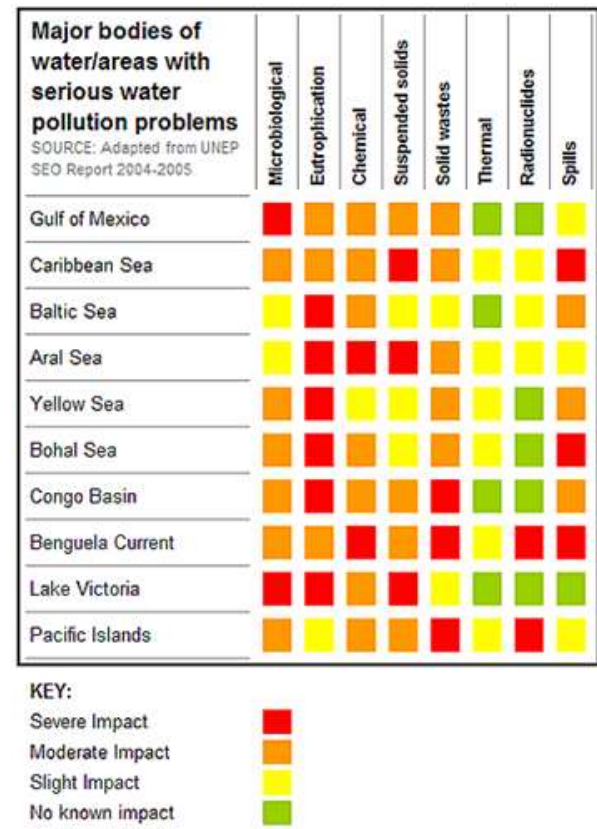




# Major water bodies are now polluted and about two third of world population will live in areas of water stress by 2025



Number of People in Water Stressed Areas



Pollution of Major Water Bodies

# Water Scarcity Could Limit the Achievement of the SDGs, especially in Africa



By 2030, the world could face a 40% shortfall in water supply if no changes are made in how water is managed.

The total demand gap for agricultural products in 2030 is expected to grow by around 60% to meet the demands arising from growing population and higher incomes.

Precipitation, which is part of “green water”, accounts for about 80% of agricultural water use, and rain-fed agriculture systems account for 60% of the world’s food production

Yet, only some 30% of rainfall is used as productive green water flow, with about 50% being lost as evaporation, resulting in very low crop yields.

# Africa stands out as the most vulnerable of the Water Scarce World Regions, and the demand gap is expected to reach 283% by 2030



Region	Projected Change from 2005
China	61%
India	58%
SSA	283%
Rest of Asia	54%
North America	43%
Europe	50%
South America	95%
Oceania	109%

Increase in Annual Water Demand, 2005 – 2030 (Source: 2030 Water Working Group)



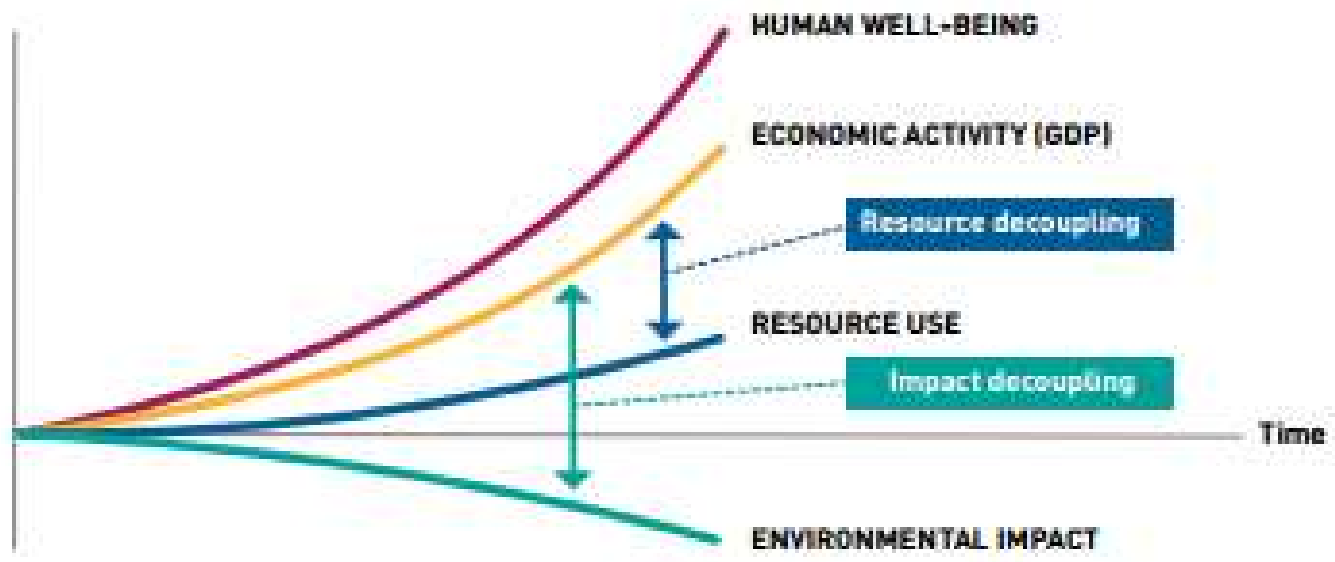


# The Convenient Truth



# Water decoupling is not rocket science

**Figure 1.1**  
The two aspects of "decoupling"



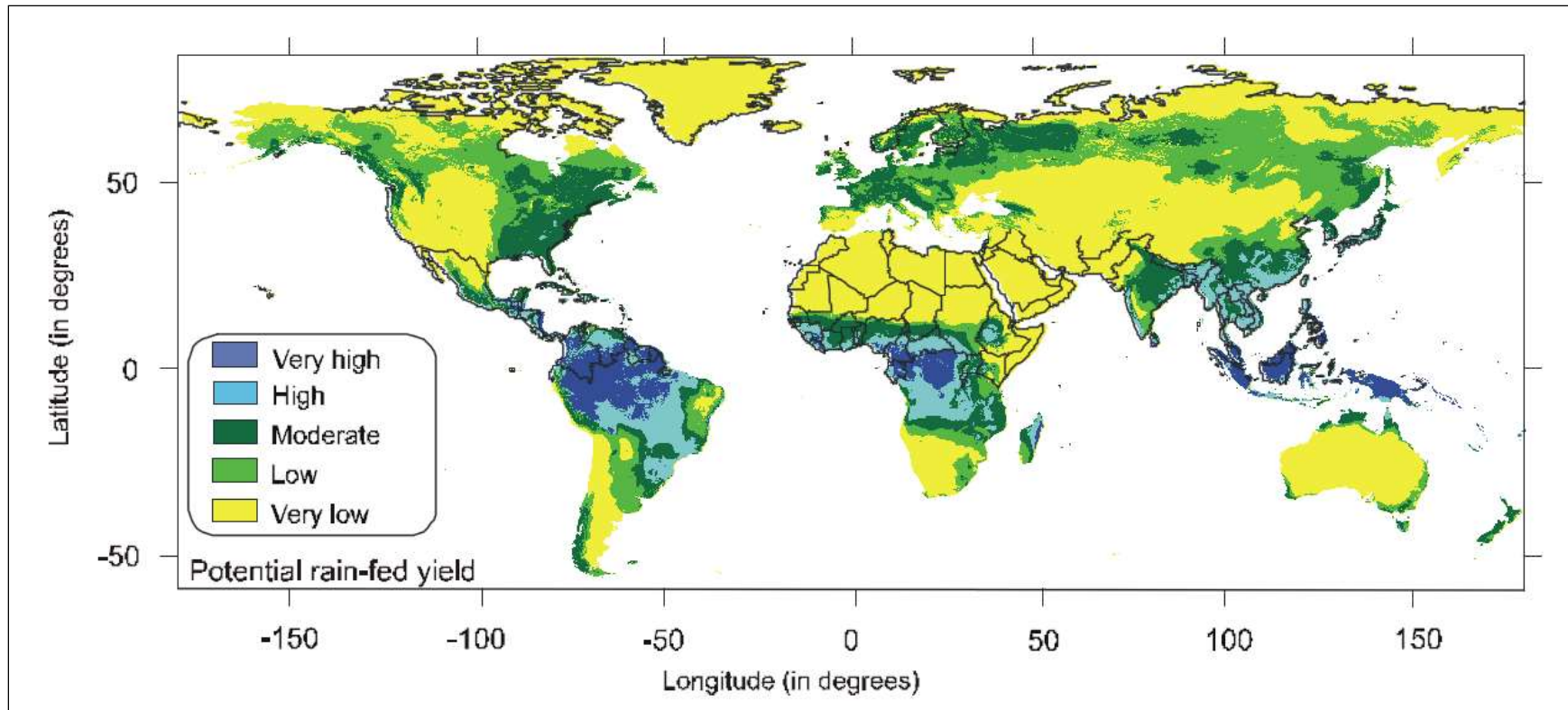
Source: UNEP (2011a)



## Water Decoupling is not Rocket Science

- Harnessing existing water productivity opportunities could more than offset 60 percent of the anticipated growth in demand for water by 2030
- The agriculture sector accounts for 70% of water use worldwide.
- Irrigation plays an important role in food production; irrigated crop yields are estimated to be on average 2.7 times rain-fed crop yields

# In most parts of Africa, significant opportunities remain for increasing productivity in rain-fed agriculture



In arid and semi-arid tropics, up to 50% of rainwater falling on crop fields is lost as non-productive evaporation





# **Innovative Approaches for Decoupling**

# Agricultural Sector

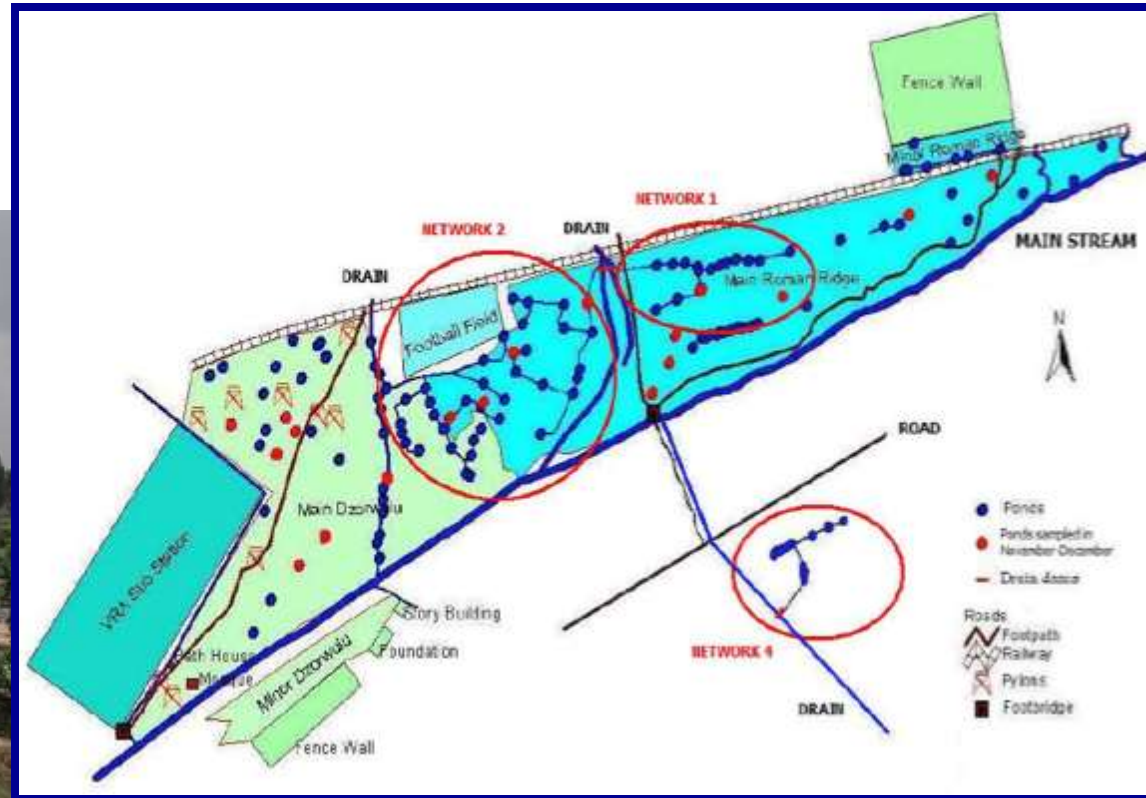


- Efficient rain water management
- Efficient irrigation delivery systems
- Deficit irrigation
- Irrigation scheduling
- Drainage infrastructure
- Agricultural land management
- Hydroponics
- Crop varieties with reduced transpiration requirement
- Waste water re-use

Simple and cost effective technologies can make a huge difference.



In China and Africa, several examples of shallow ponds are extensively used to store wastewater and pipe water for irrigation of the agricultural land





# Natural Water purification - Eco-hydrology



ecological  
treatment



green roofs



pervious  
pavement



infiltration  
trench



stormwater  
harvesting



retention  
pond





## Conclusions (1)

- Water is central to all Sustainable Development Goals (SDGs) as well as the achievement of the Paris Climate Agreement.
- The global water resource challenges are multifaceted and will be exacerbated by many factors especially population growth and climate change.
- Africa stands out as the most vulnerable of the water scarce world regions, and the demand gap is expected to reach 283% by 2030.
- Water scarcity could limit the achievement of all the SDGs if we do not change the way we manage water, especially in Africa.
- While irrigation remain a viable technology to bridge the water gap in agriculture, precipitation, which is part of “green water”, accounts for about 80% of agricultural water use, and rain-fed agriculture systems account for 60% of the world’s food production.



## Conclusions (2)

- Yet, only some 30% of rainfall is used as productive green water flow, with about 50% being lost as evaporation, resulting in very low crop yields.
- Green water based green innovation is possible, especially in Africa.
- The technologies and innovations that improve rainwater-use efficiency in agricultural production are available and can be easily deployed to achieve green water based green revolution, especially in Africa. These technologies, especially rain water harvesting, micro-dams, terracing, and flood diversion approaches, are both cost-effective and environmentally sustainable.
- But strategic actions are required to foster the mindset and policy changes required to implement them. Green water harvesting presents significant opportunities, especially in Africa.

# Enabling Strategies and Policies



- Institutional mind-set reform needed
- Appropriate policy environment to incentivise innovation: Fiscal policy measures (corporate water reporting and accounting, water pricing, pollution taxes, and realignment of subsidies)
- Systems level approaches, including structural transformations in the economy; conjunctive management of surface water and groundwater
- Institutional and social engineering measures: education, public awareness & participatory approaches, capacity strengthening programs.
- Invest in sustainable technologies for decoupling in the water sector
- Regulation - The 4-R principles