Water Security and IWRM – International Best Practices

Yellow River Ecological Corridor (YREC)
Inaugural Session

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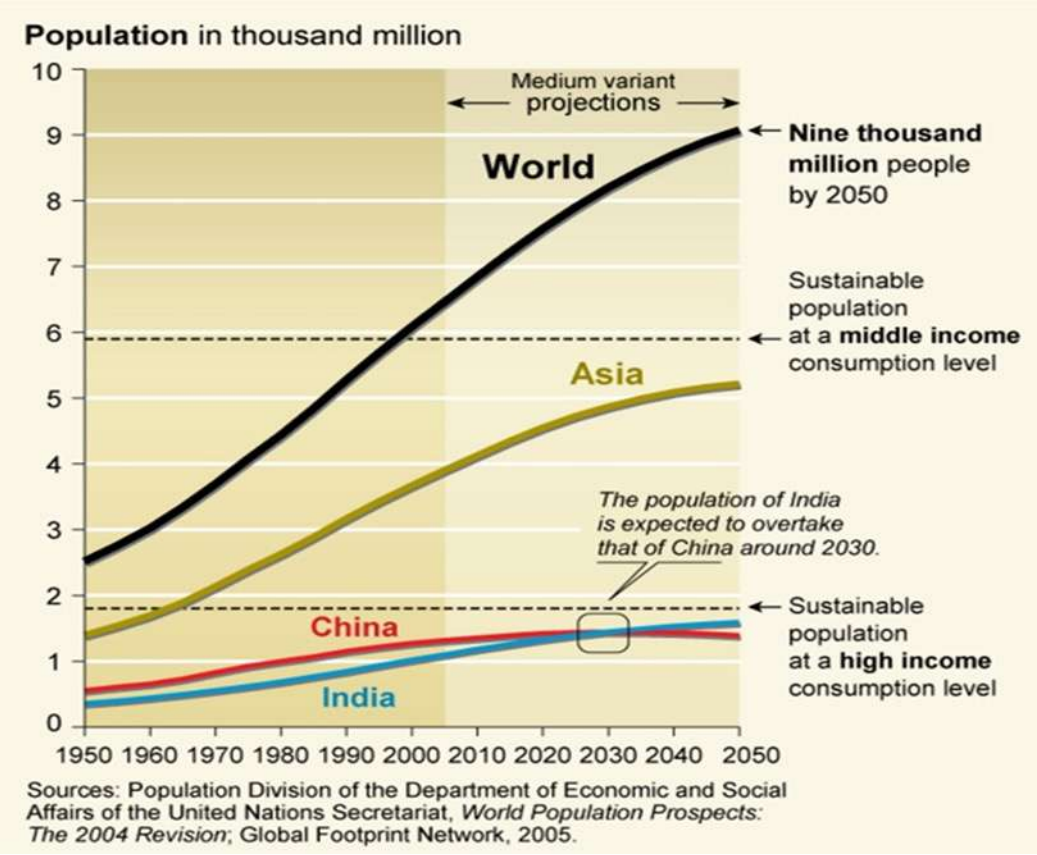
Eelco van Beek

Consultant ADB

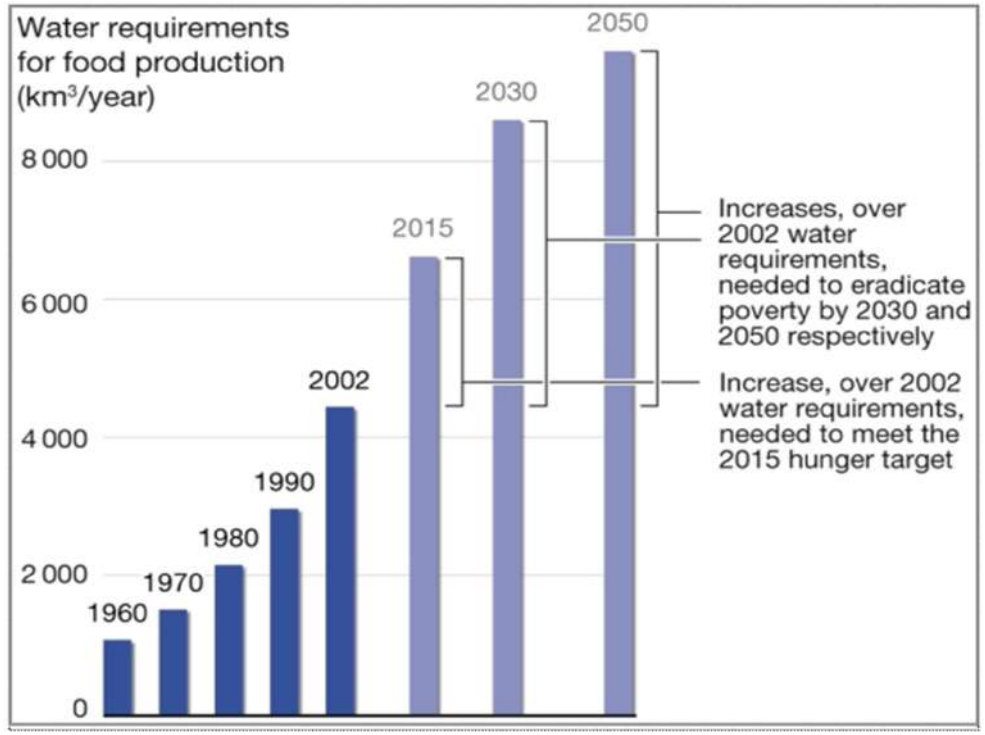
1. Water Security challenges – drivers for change

- Energy, Food, Water Demands
  - increasing
- Supplies
  - more variable and extreme
- Water
  - more contaminated
- Environment, Ecosystems
  - more concern
- Future uncertainties
  - increasing
- Why
  - climate? **PEOPLE** ?



A more populous world

A hungrier world 1960 - 2050



Demand for more dams





Demand for less dams

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But also: a more prosperous world – change in lifestyles

- As people become wealthier their diets change
- They consume more meat and dairy products
- They take more energy and water to produce than vegetable diets
- Prosperous people use more energy to maintain their lifestyle

Each 150 g. hamburger requires 2400 liters of water.

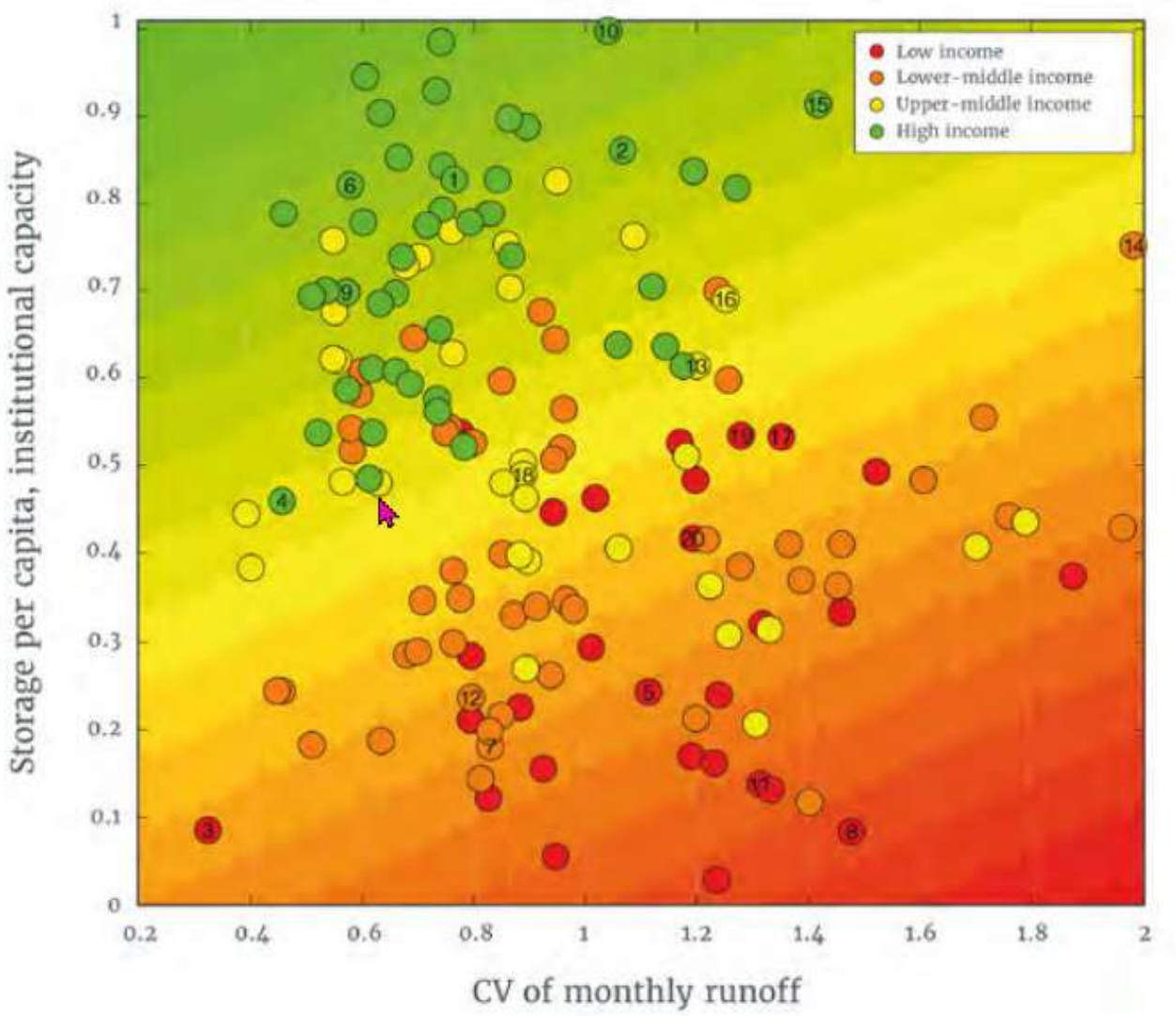
How can we as water managers cope with these changes?

2. Living in harmony with our environment

- People depend on water-related services that the environment provides us
  - drinking water, growing crops, transportation, etc
- That's why people live close to water systems
  - along rivers, coastal areas, delta's, etc
  - old civilizations: Mesopotamia, Indus, Nile, Yellow River, etc
- Population growth caused that we exceeded the carrying capacity of the natural system
  - shortages, pollution, and
  - we started to live in areas where we should not live: e.g. the floodplains
- We tried to cope with the situation by engineering the environment

Can we manage / control our natural system?

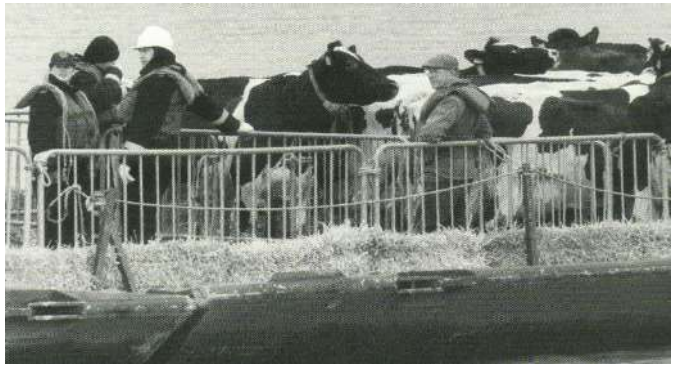
- Of course, we have to
  - Correlation between infrastructural development and welfare
  - Dikes, reservoirs, pumps, etc
- Old moto of water engineers
  - “Fighting against water” (the Netherlands)
  - “Harnessing the river” (PRC)
- But, till what level?
  - and at what costs?



Source: OECD/GWP (2015), Securing Water, Sustaining Growth

Case the Netherlands - flooding

Near-flooding 1995

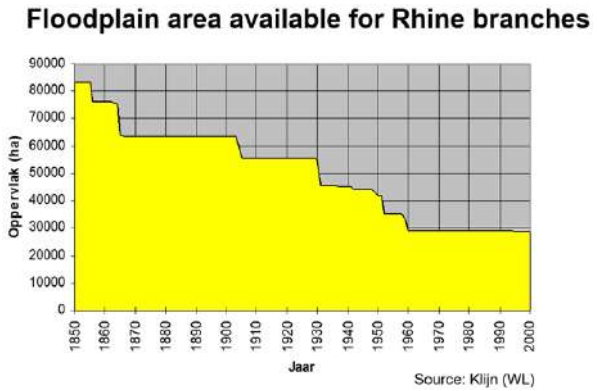


So what to do? Higher dikes?

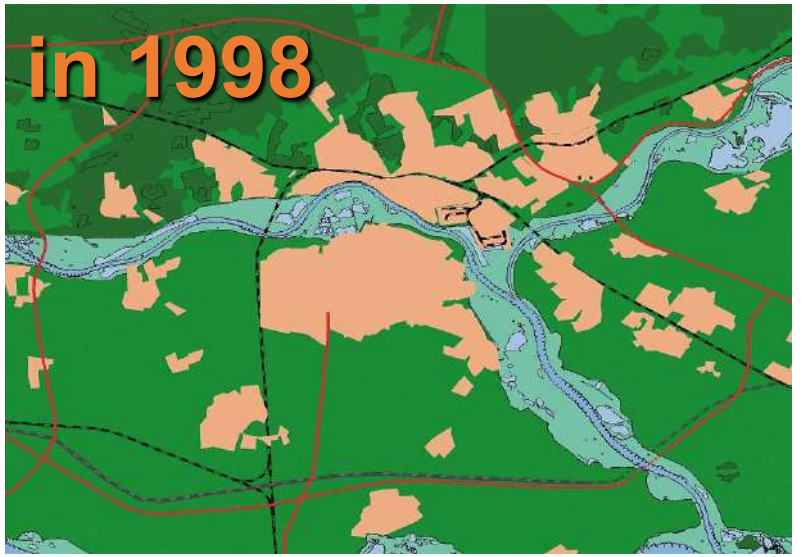
How safe are we behind these high dikes?

Causes, learning from our mistakes and solutions

- A major cause of increased flood risk is that we reduced the flood plain area
  - less storage results in higher water levels
- Main solution: give water again its space to accommodate the variability of our climate
  - Room-for-the River project
- Same causes and solutions in urban areas
  - e.g. Sponge Cities (PRC)

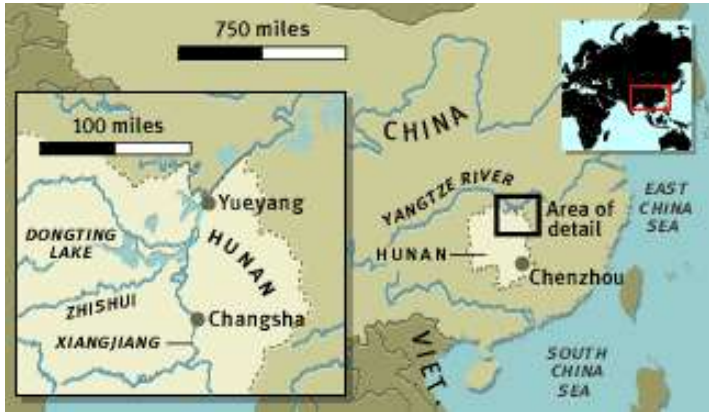


(Flood plain) Area around Arnhem in the Netherlands



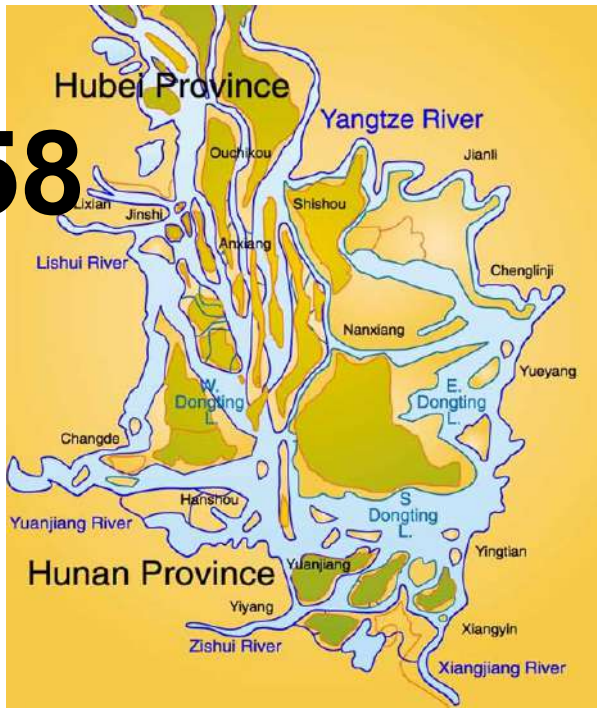
Dongting Lake

- Major flood in August 2002
- Main cause: reduction of lake area
- Same results: less storage means higher water levels if flood strikes



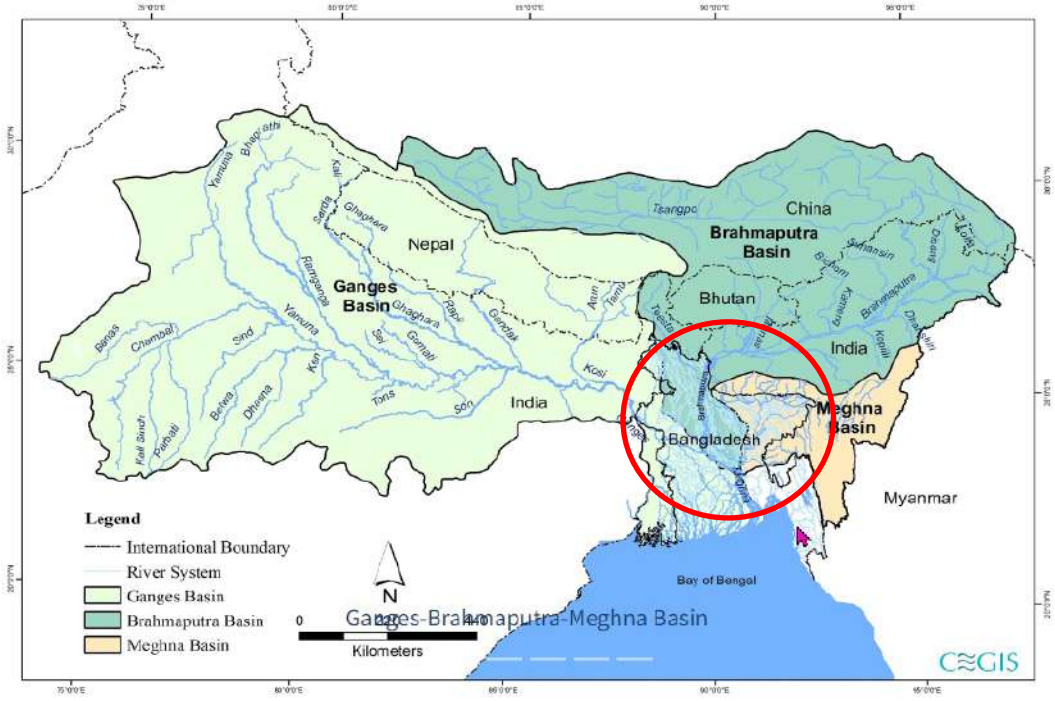
1825

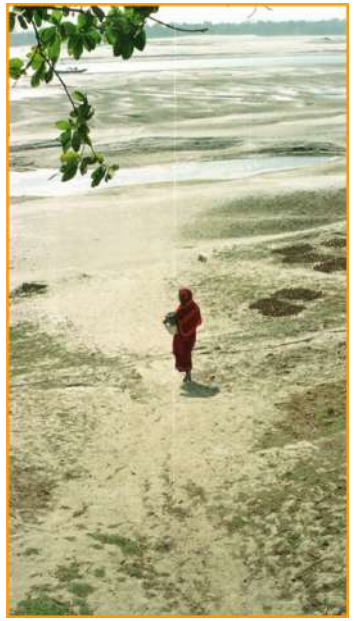
1958



Case Bangladesh

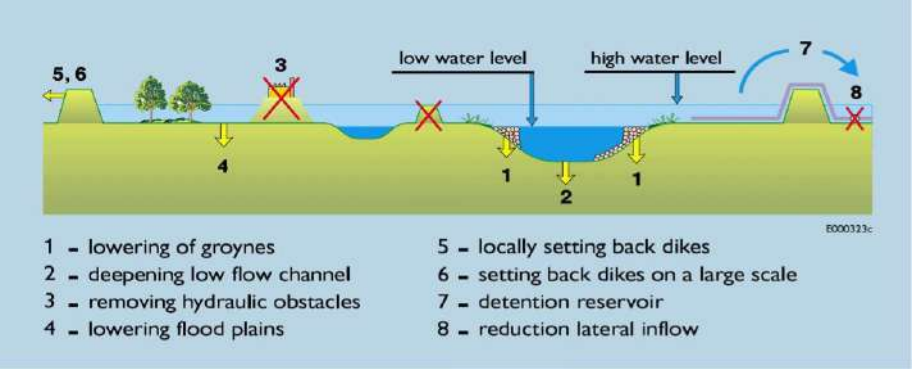
- Strong focus of WRM on flood management
  - in combination with bank erosion (river morphology)
- Long-term challenge is drought
  - climate change, upstream developments, groundwater use, salinity intrusion
- No-flow conditions in the Gorai river
- Comparable with the zero-flow condition in the 90th in the Yellow River

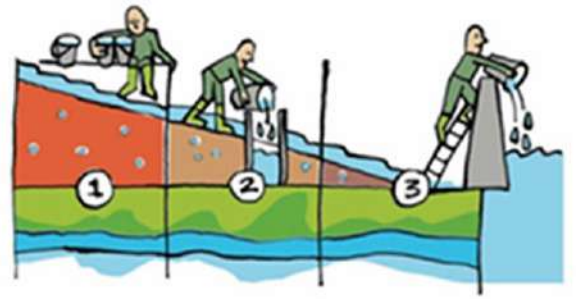




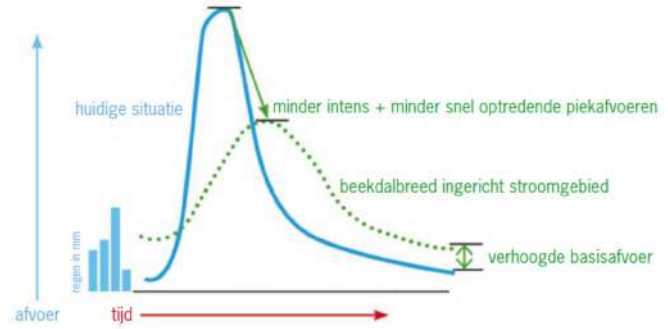
Lessons learned and ‘novel’ approaches

- First we have to acknowledge that we made mistakes
  - in deciding where we live and carry out our economic activities
  - and that we made mistakes in the past in how we carried out our water management
- Main instrument: spatial planning
  - deciding what we do where – in harmony with the water system
    - adaptive water management
  - give the water system back the space its needs
  - in combination with grey and green infrastructure
- Example: Room for the River projects
  - giving space (floodplains) back to the river
  - not new in China: Lao-Tse “allow nature to take its own course, respect to nature” – basically: “controlling by not controlling”
- Example: Decrease droughts by better flood management
  - old approach was to get rid of the water (the flood) as fast as possible
  - much better: try to keep the water: retention and storage, e.g. using groundwater – also requires space
- In both examples Nature Based Solutions play a major role



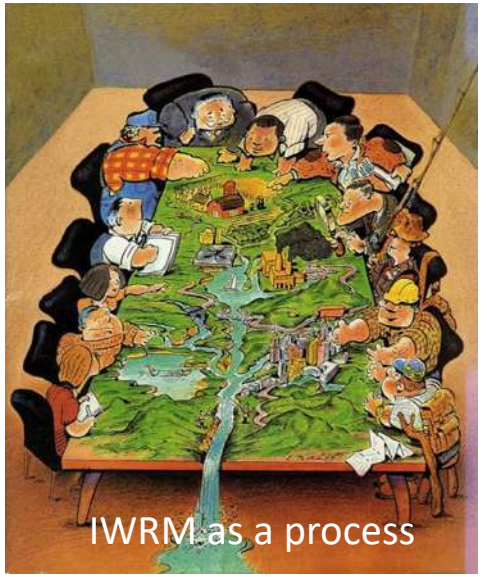


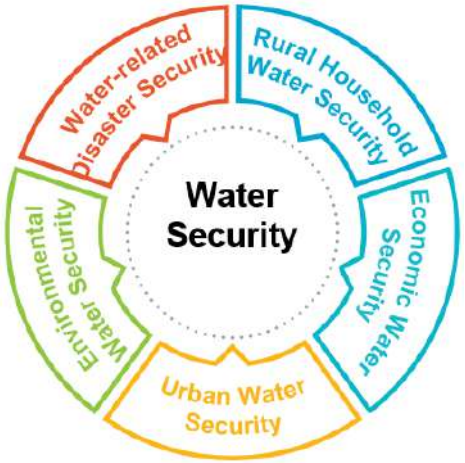
Three-step approach on drainage: retention, storage and drainage

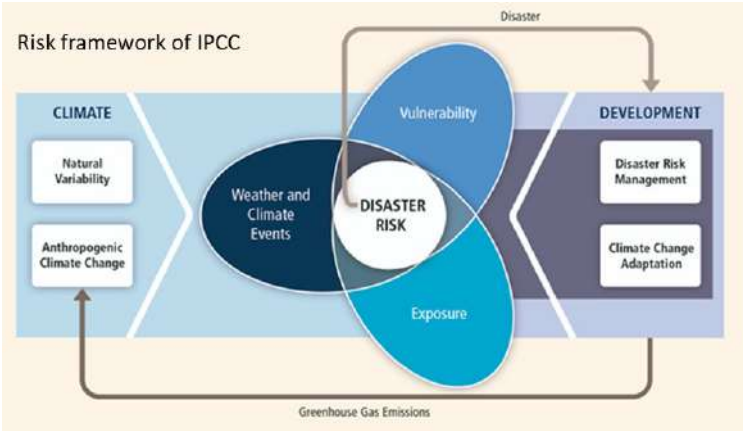


3. Required paradigm shift

- 30 years ago already – introducing IWRM
  - surface water – ground water – quantity - quality
  - multi-sector
  - bottom-up
- 10 years ago – introducing Water Security concept
  - from the process of IWRM to the desired outcome
  - Asian Water Development Outlook (AWDO)
- Eco-systems approach
  - Nature-based solutions
- Since Sendai: risk approach
  - thinking in probabilities


IWRM as a process





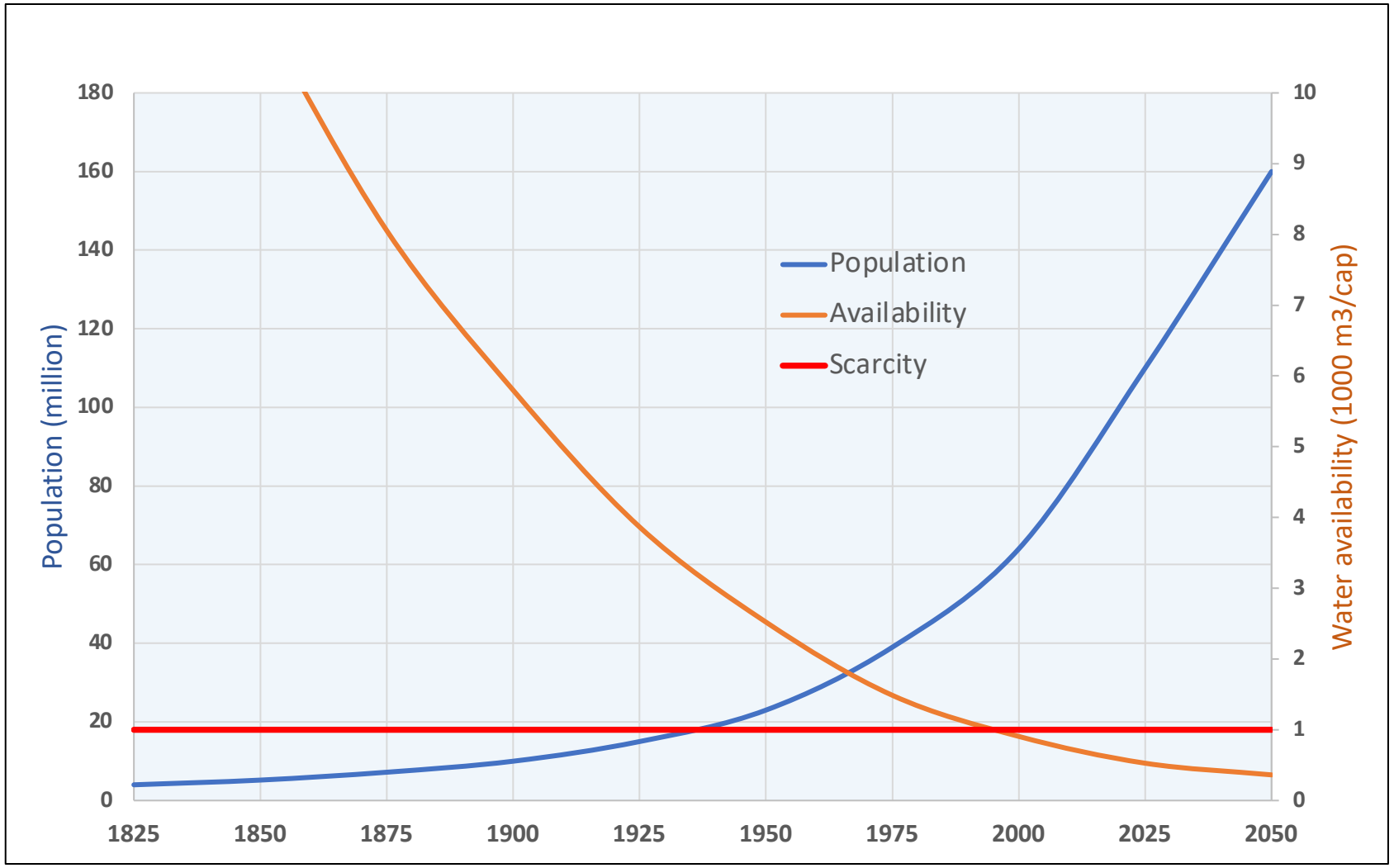
Egypt

Egypt =

- Delta
- Valley
- Some oases

- Only 7% of total area is inhabited
- Hardly any rainfall
- Fully dependent on Nile discharge (+ storage in Lake Nasser)

Water availability per capita in Egypt



Population grows:
-from 4 million in 1825
-to 160 million in 2050

Water availability stays the same: 58 BCM

Water availability per capita decreases:
-from 15,000 m^3/cap in 1825
-to 360 m^3/cap in 2050

Water scarcity starts at 1000 m^3/cap
-already reached in 1990

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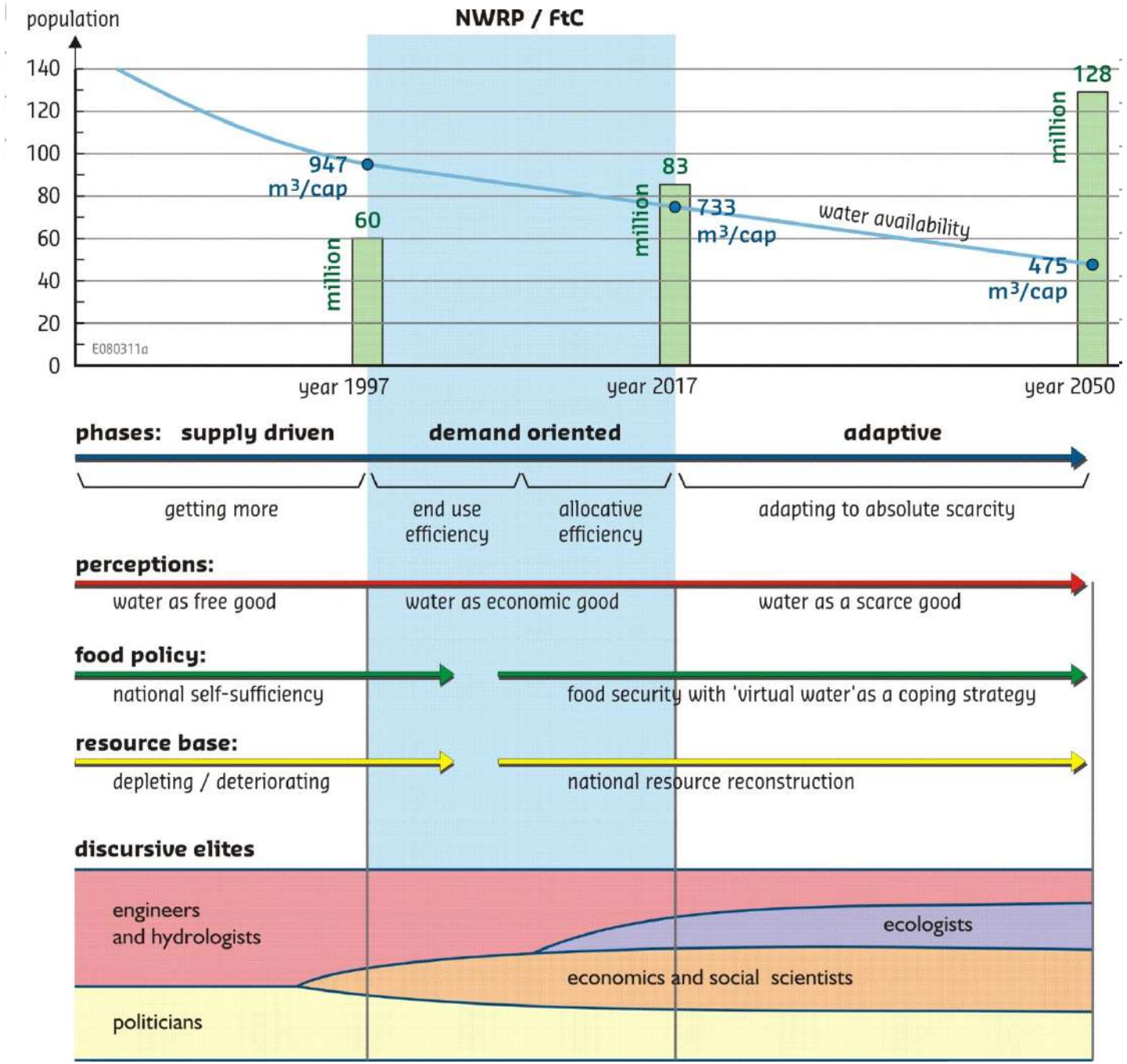
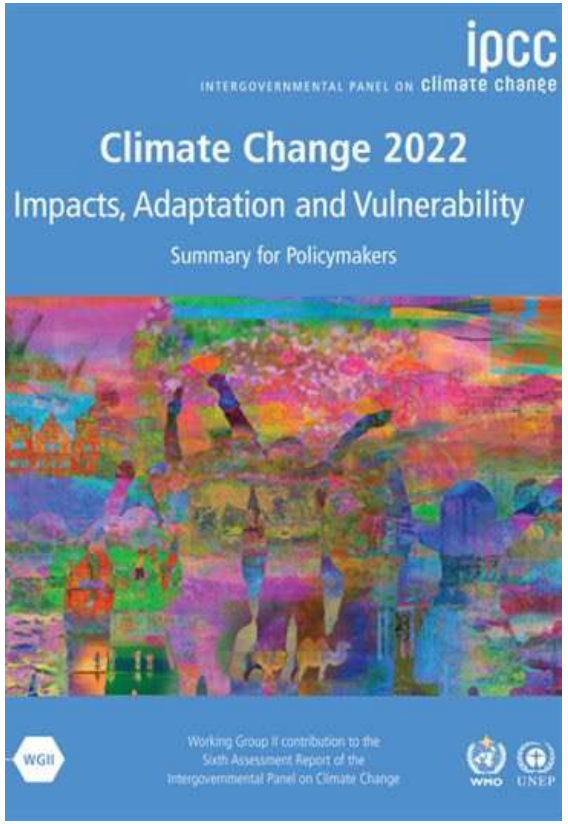
Changing perspectives in water-management in Egypt

modified after: Turton



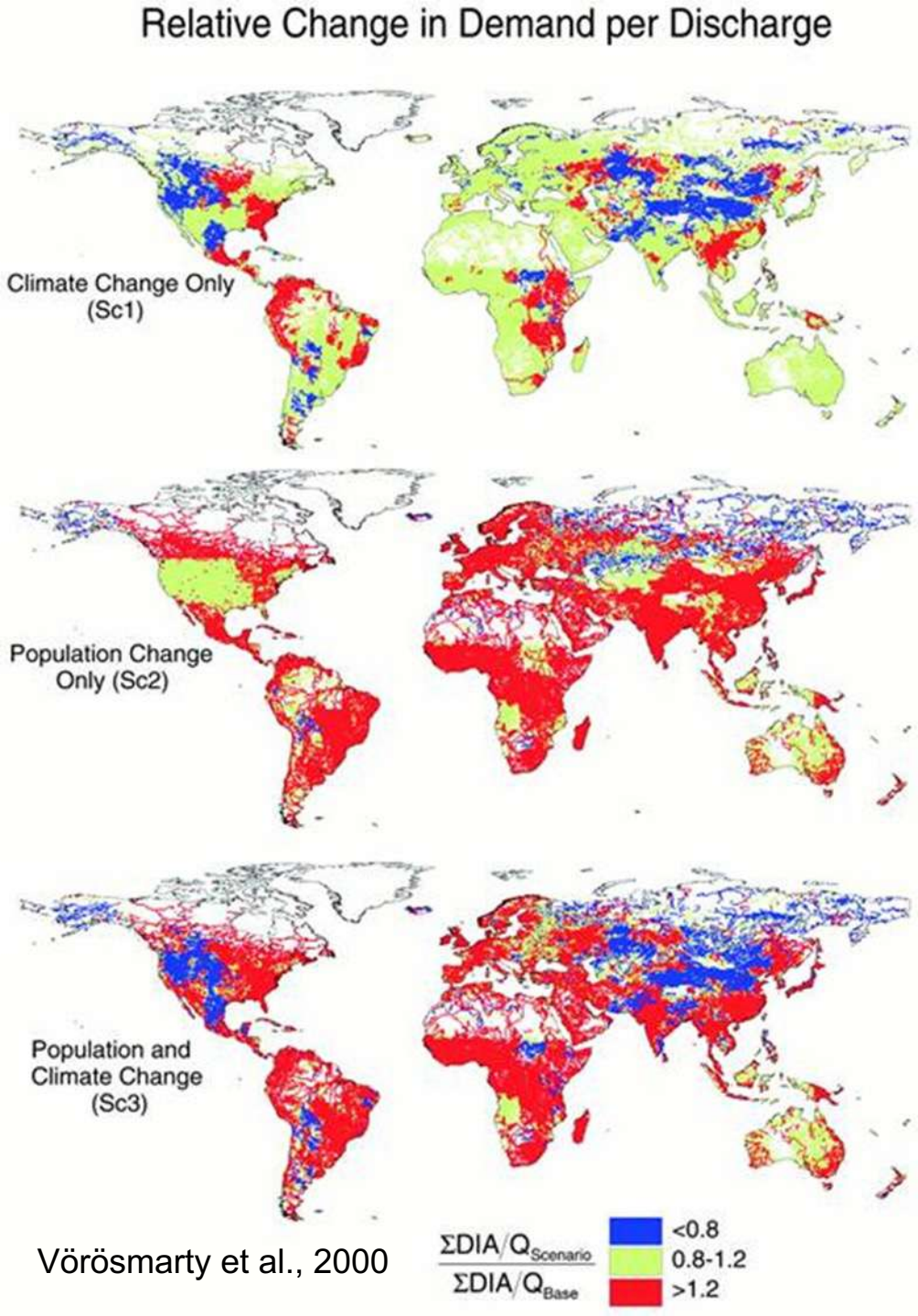
4. Why is this urgent? Climate Change?

- We have to deal with socio-economic and demographic developments
  - increased demand, pollution, etc.
- We have to correct our mistakes in the past
  - give space back to the water system so it is able to cope with its dynamics
  - and accept that there are limits in technical solutions
- We realized that human welfare depends on a healthy ecosystem
  - and that water (quantity, quality, dynamics) is an important element for this
- We have to prepare ourselves for Climate Change
  - while acknowledging that Climate Change is not the main cause for many of our water problems



Climate, main reason for our problems?

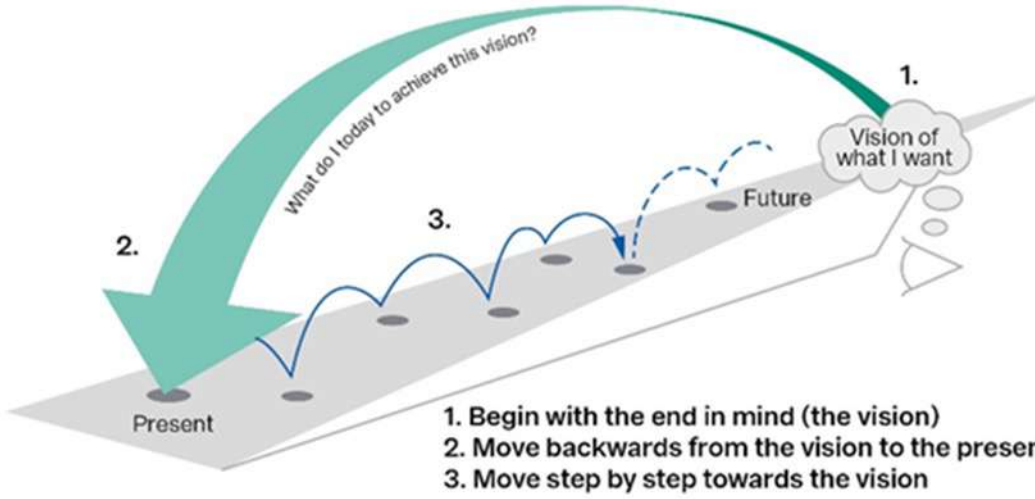
- First: make a distinction between climate variability and climate change
- Climate variability (CV): **YES**
- Climate change (CC): Only for (minor) part
  - we should prepare ourselves for a future under climate change
  - but don't blame climate change for our present problems
- But climate change is easy:
  - to be blamed – no water manager or politician is directly offended
  - and there is a lot of money available and political support



Vörösmarty et al., 2000

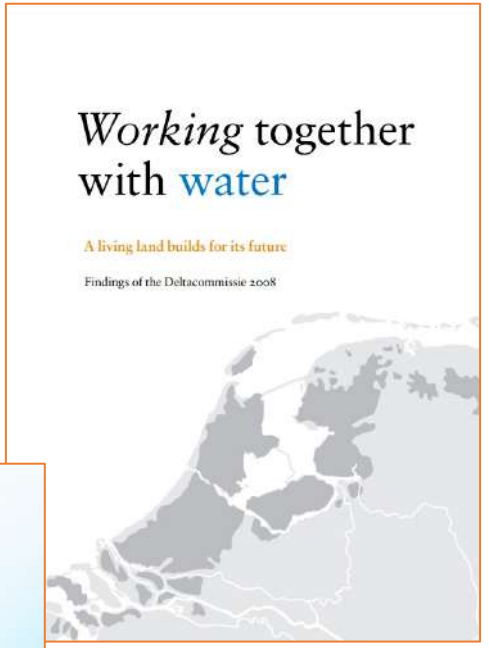
5. Need for a long-term and integrated approach

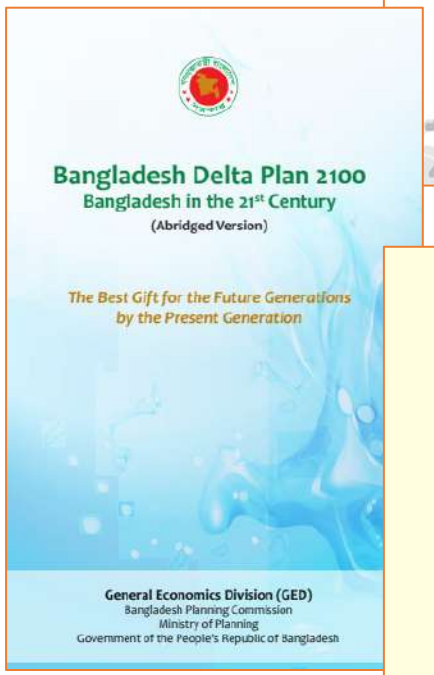
- IWRM aims to solve present and possible future problems
  - to be expected due to climate change, socio-economic developments, etc.
- But we do not know these developments, they are uncertain
  - for climate change we develop/assume scenarios, e.g. the IPCC scenarios for CO_2 emissions
  - making a distinction in changes in averages and in changes of extremes (floods and droughts)
  - and for these extremes follow a risk approach
- Climate change is a long-term process
  - requires a vision on how to deal with at a larger
  - then step back to the present to take action nov
  - and follow an adaptive planning approach



Long-term vision and integrated approach (cont.)

- Netherlands / EU
  - Long-term, major role for spatial planning, ecology, etc
  - Governance improved by Delta law and guarantee for finance
  - EU's Water Framework Directives plays a major role
- Bangladesh
  - Faces all challenges: growth, climate change (intensity, sea level), upstream developments
  - Long-term vision in Bangladesh Delta Plan 2100
  - Includes major governance and institutional development
- Yellow River
  - Basin Strategic Plan to provide vision
    - ecological protection and high-quality development
  - Yellow River law providing clear guidance on governance





6. Towards water security for all – the challenges

- Integrated long-term vision
  - preparing for the future (2100) – following an adaptive approach
  - with special attention to spatial planning of activities (what, where, etc.)
  - Water Management should not be left to water engineers
- Integrated approach, requiring vertical and horizontal cooperation
  - PRC's Yellow River Law
  - EU's Framework Directive
- Balancing between economic development and ecological health
  - Achieving ecological health of the water system can support economic development (food, energy)
  - PRC's Ecological Civilization Policy – Ecological Redline Policy
  - Outline Plan for Ecological Protection and High-quality Development of the YRB
- Taking into account all dimensions of Water Security
  - requires policy coordination at the highest level

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Quantifying Water Security

Asia Water Development Outlook (AWDO)

Water Security across five Key Dimensions (KDs)

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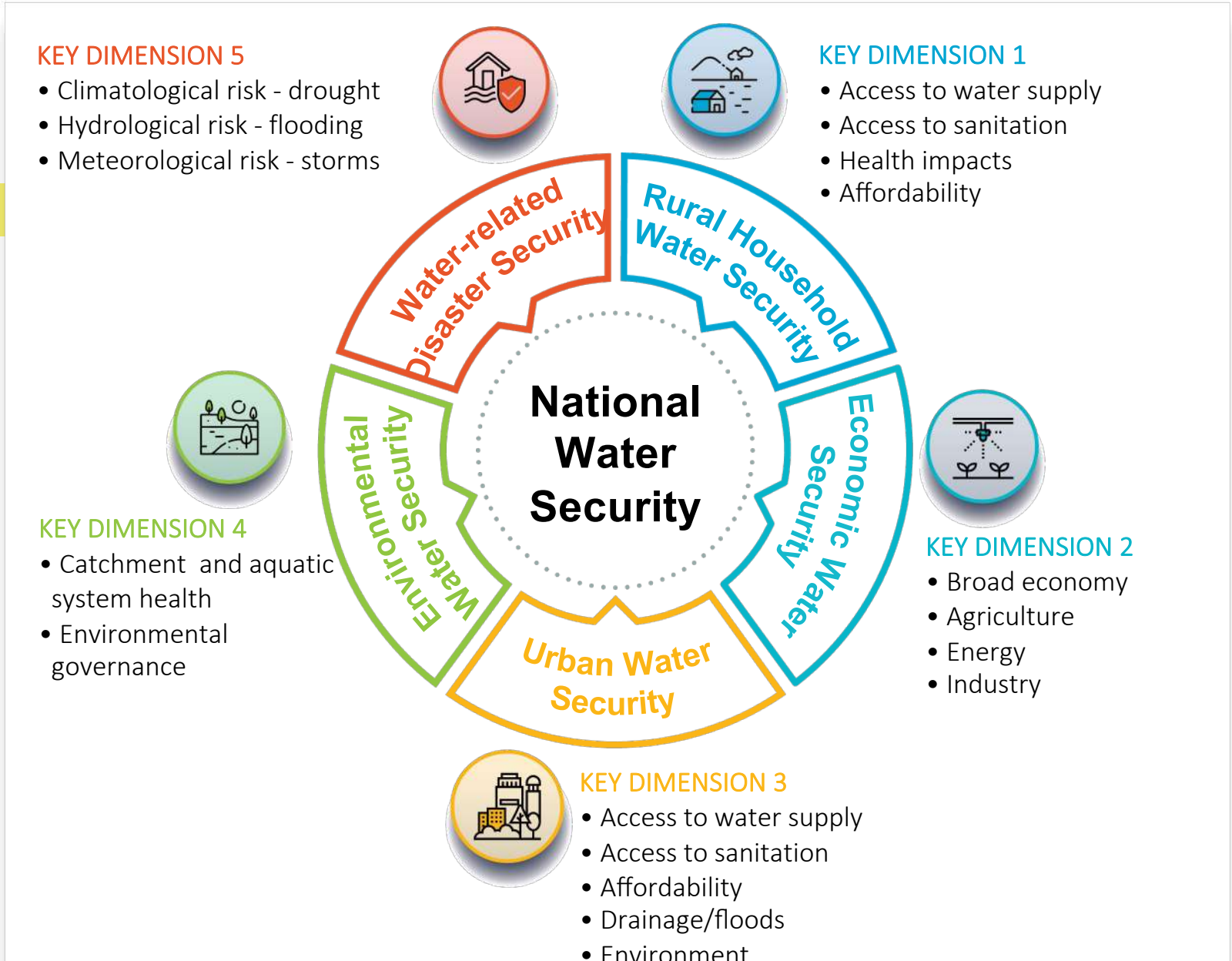
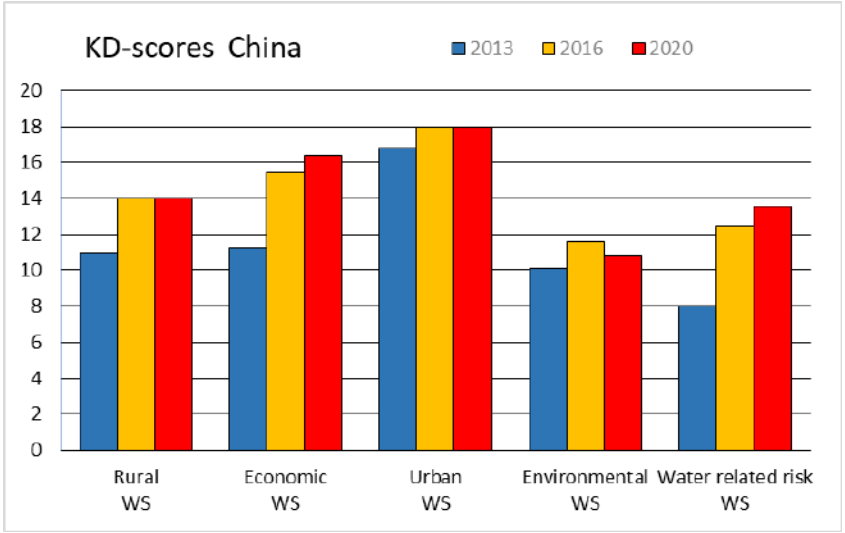
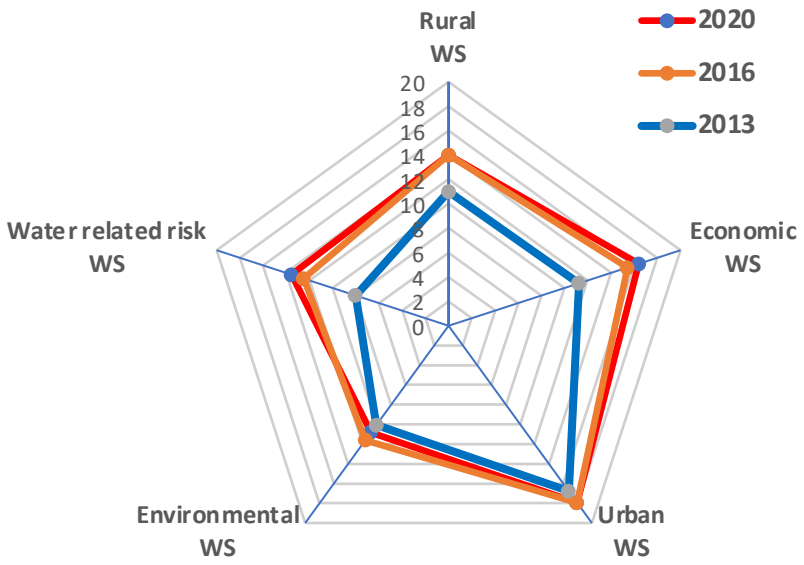
Key Dimensions of National Water Security



Water Security in PRC – according to AWDO

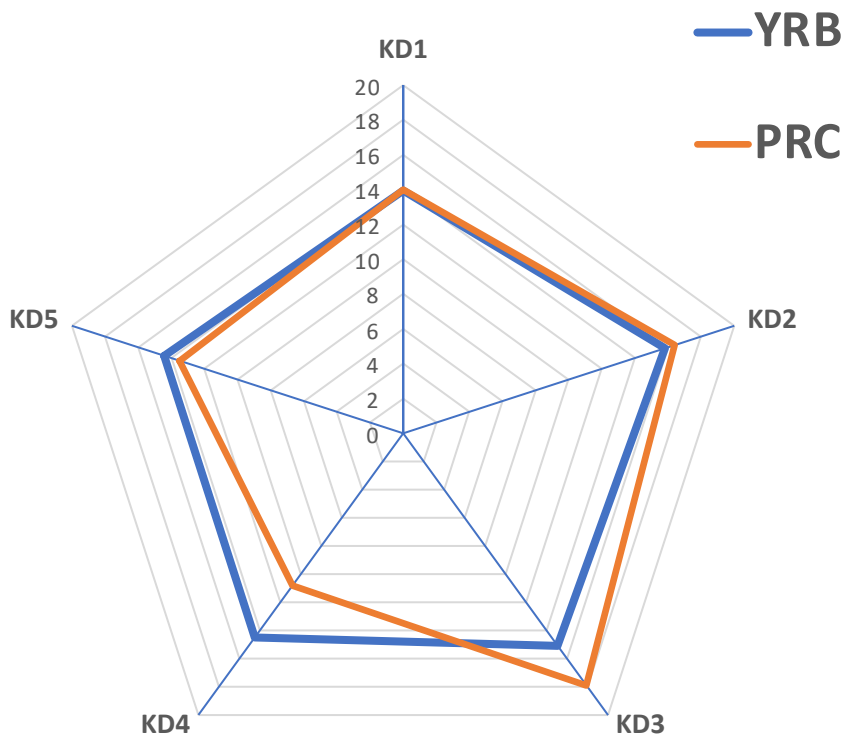
- AWDO scores of KDs on scale 1 to 20
- PRC shows clear progress
  - 2013 – 2016 – 2020
- Main progress between 2013 and 2016
- Challenges remain, in particular
  - Environmental Water Security
  - Water-related risk Security
- AWDO is mainly a communication tool
  - showing where additional action is needed





WS Assessment PRC and YR

- The 5 Key Dimensions (KDs) of the assessments of PRC and YR
  - KD1 – Water Supply Security
  - KD2 – Economic Water Security
  - KD3 – Ecological Water Security
  - KD4 – Environmental Water Security
  - KD5 – Resilience against water-related disasters
- Each KD is scored at a scale of 1 (bad) to 20 (excellent)
- Results PRC
  - showing an even picture over the 5 KDs
- Results YRB
  - compared to PRC as a whole, performs better in KD3 (ecological WS), but worse in KD4 (environmental WS)



7. Take home messages

- From fighting against water to living with water
  - Grey solutions remain important but in combination with green solutions
- Spatial planning is a major instrument in water management
  - General planning agencies to get a bigger role in water management
  - Convince planners of the importance of water in planning decisions
- Combine flood- and drought management
  - storing water during floods will help to reduce drought risk
- Climate change to be taken into account, but don't blame climate change for all our problems
  - by just blaming climate change we ignore the other reasons and we will not learn from our mistakes
- Long-term vision needed to cope with climate change
  - based on that long-term vision – follow an adaptive approach

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Our big challenge: how to achieve Water Security, involving everybody and with all uncertainties and unknowns involved in WRM

Thanks