



The Importance of Water Management in a Changing Global Waterscape

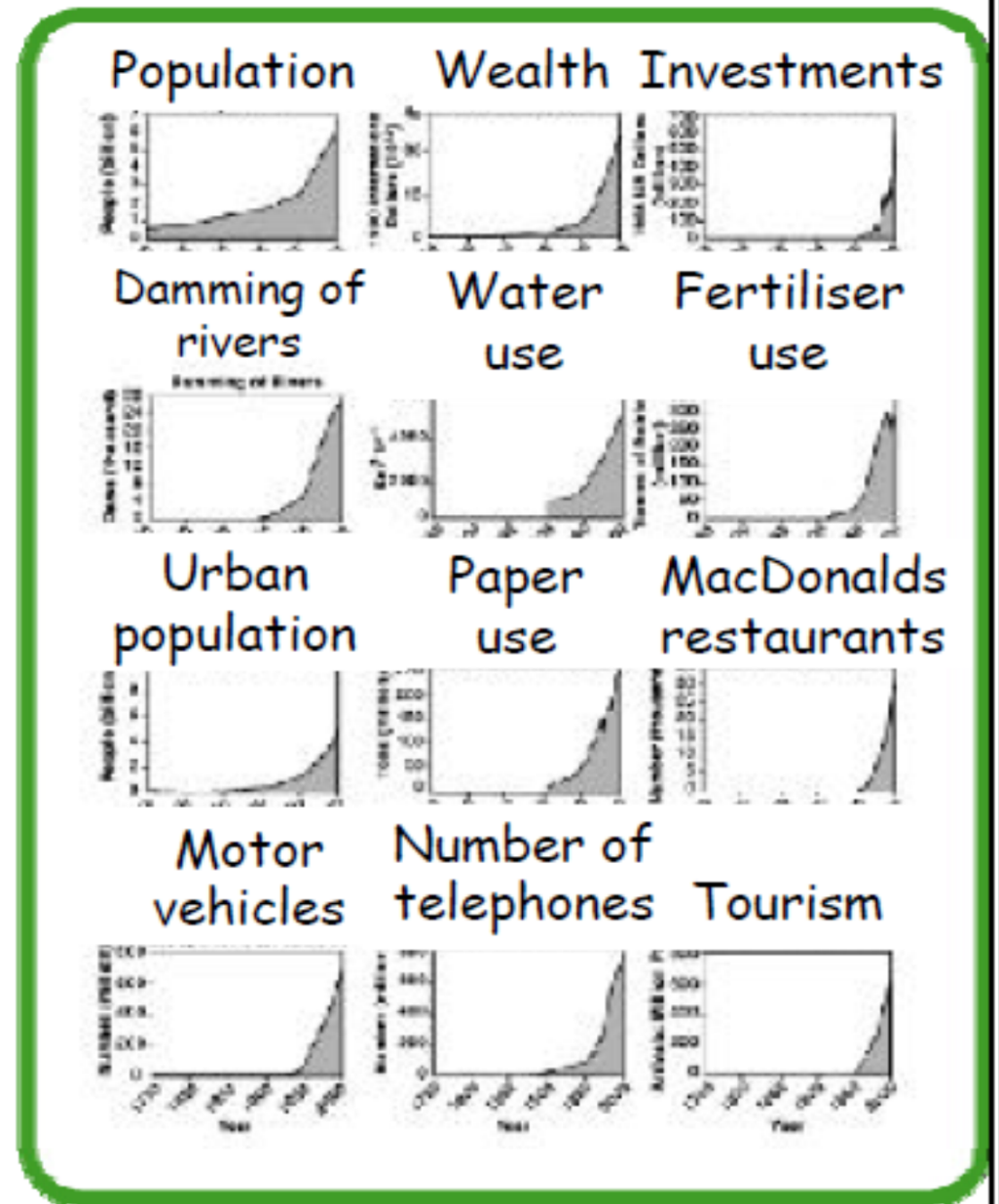
Rosenberg Forum
Jordan March 2013

Margaret Catley-Carlson
Secretary General Advisory Board
Chair, Suez Advisory Board
Vice Chair, Canada Water Network

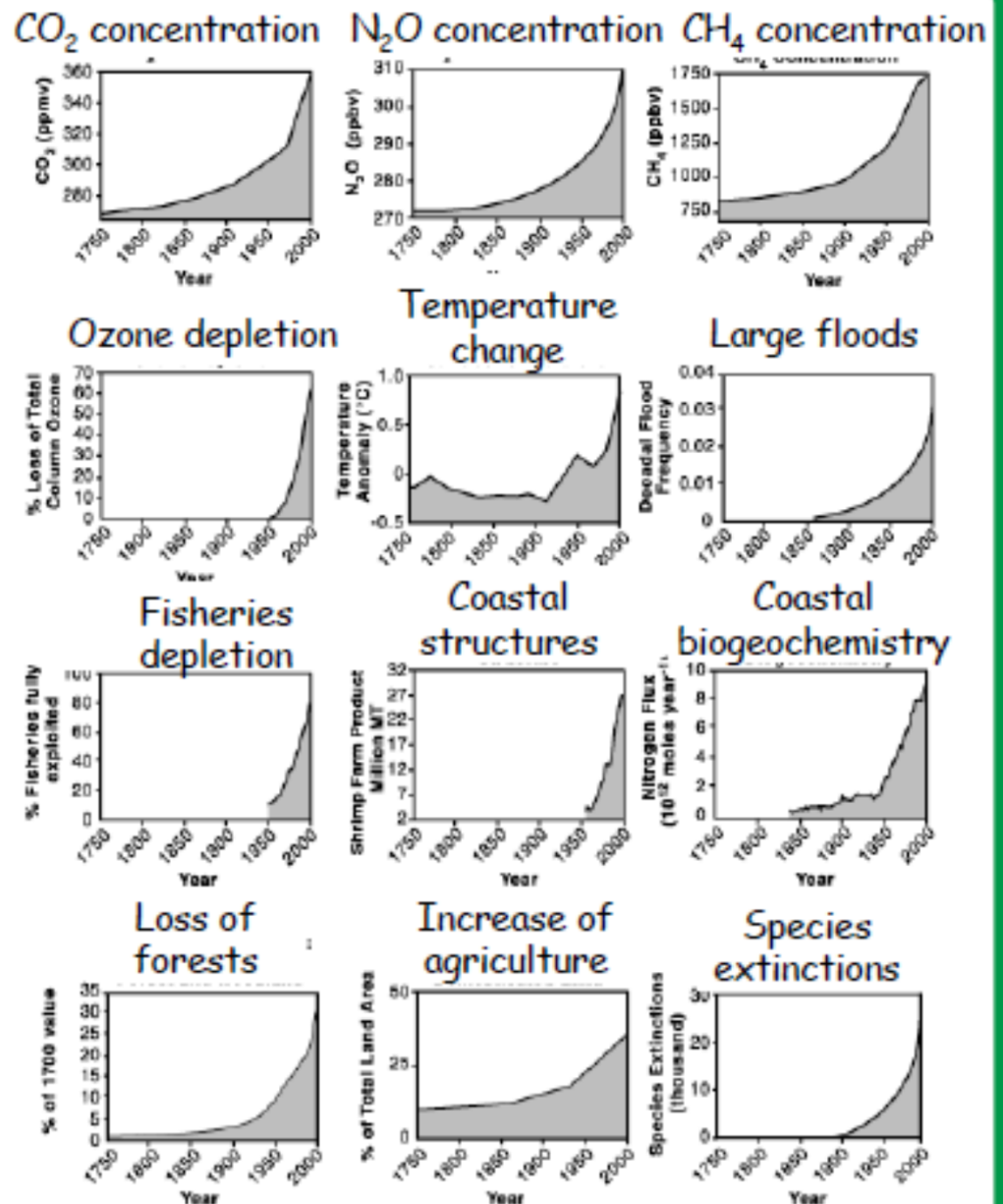
First question: what's changing?

The changing
'human enterprise',
from 1750 to 2000.

Note that around
1950 human
activities began to
accelerate sharply.



The biophysical responses of the Earth System show many of the same features as the acceleration in the human enterprise.



Water stress – grows and grows

Global Water: Present to 2025

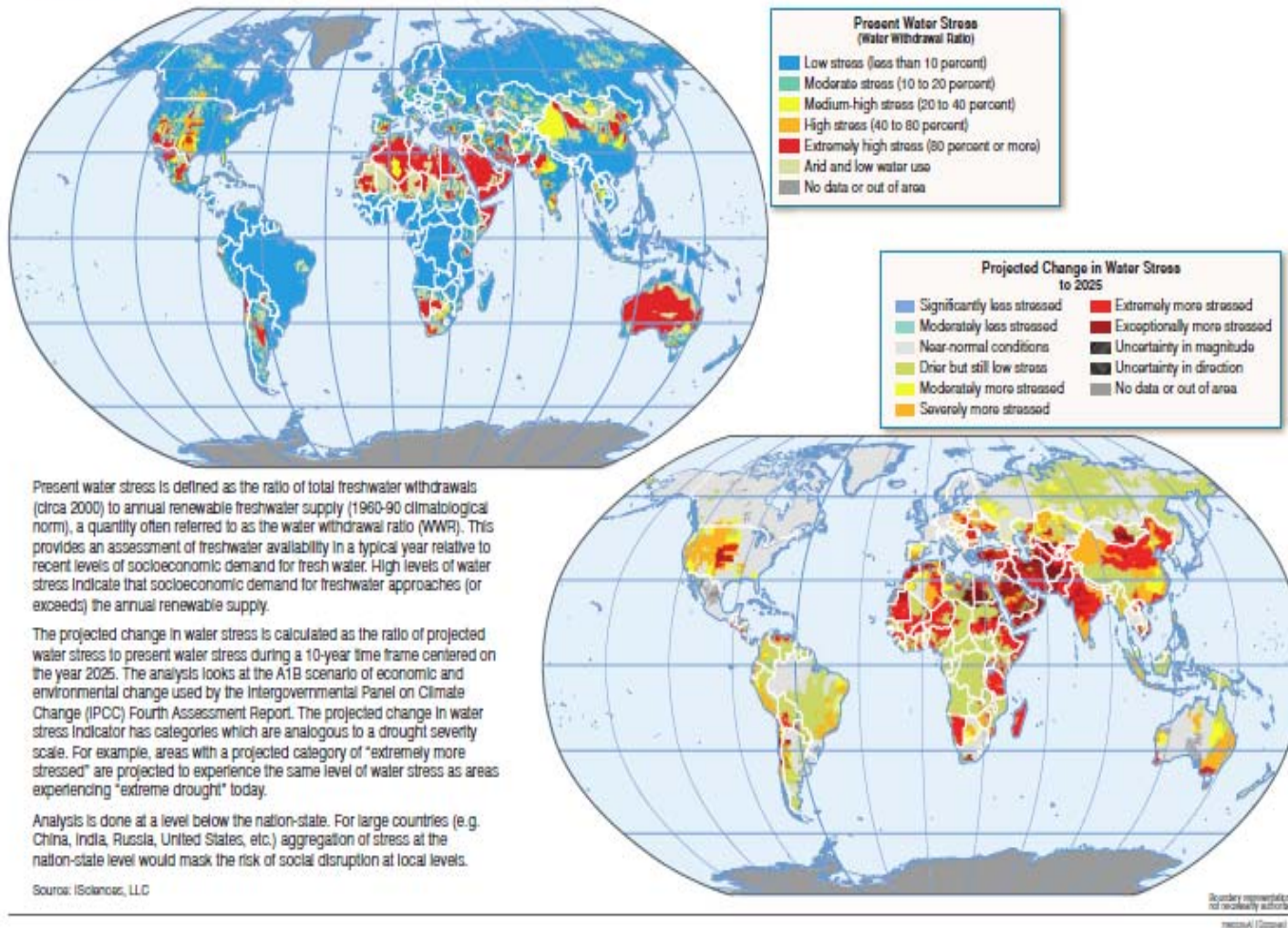
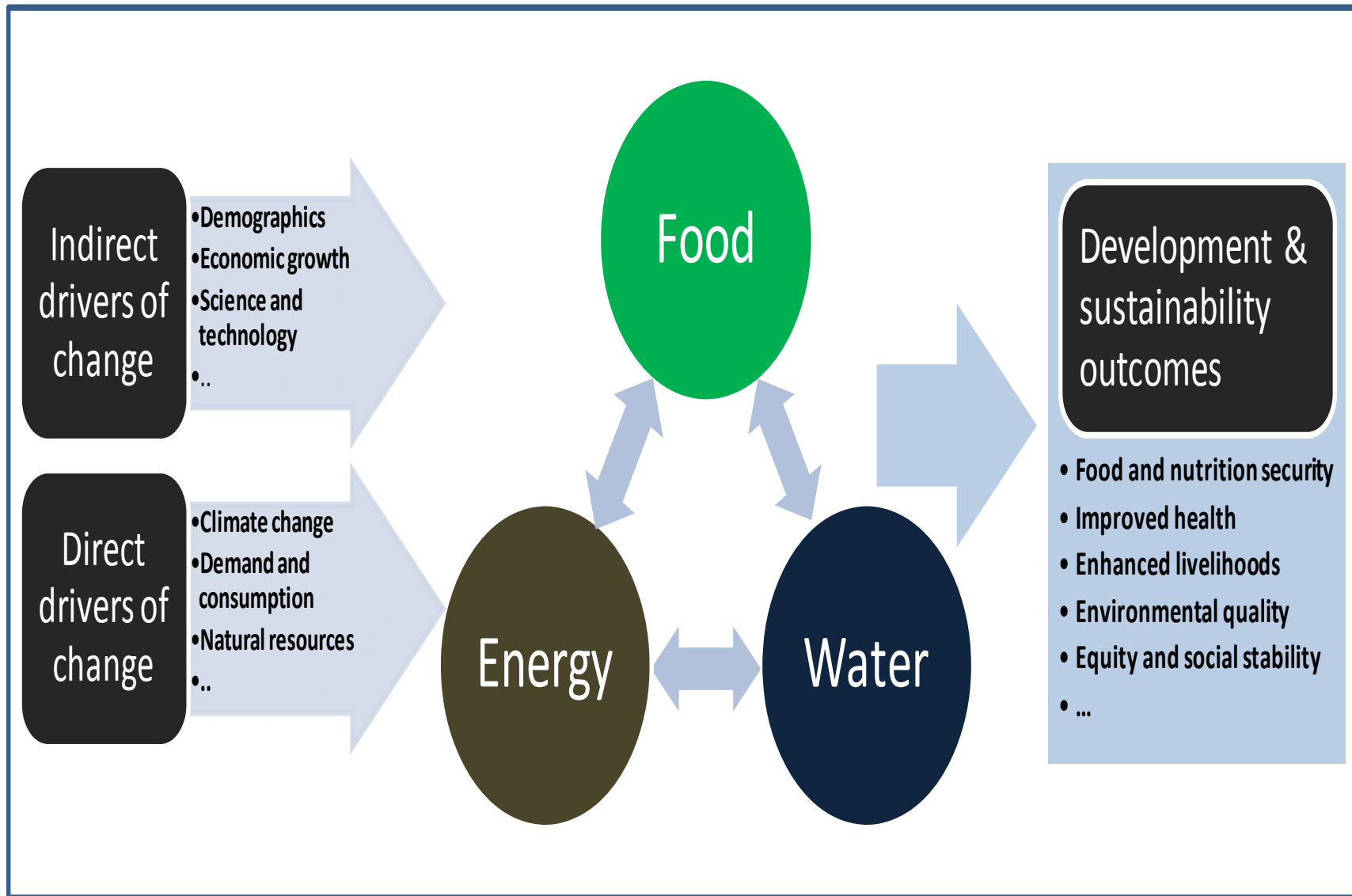


Figure 1. MENA Per Capita Renewable Water Resources, 1950–2050

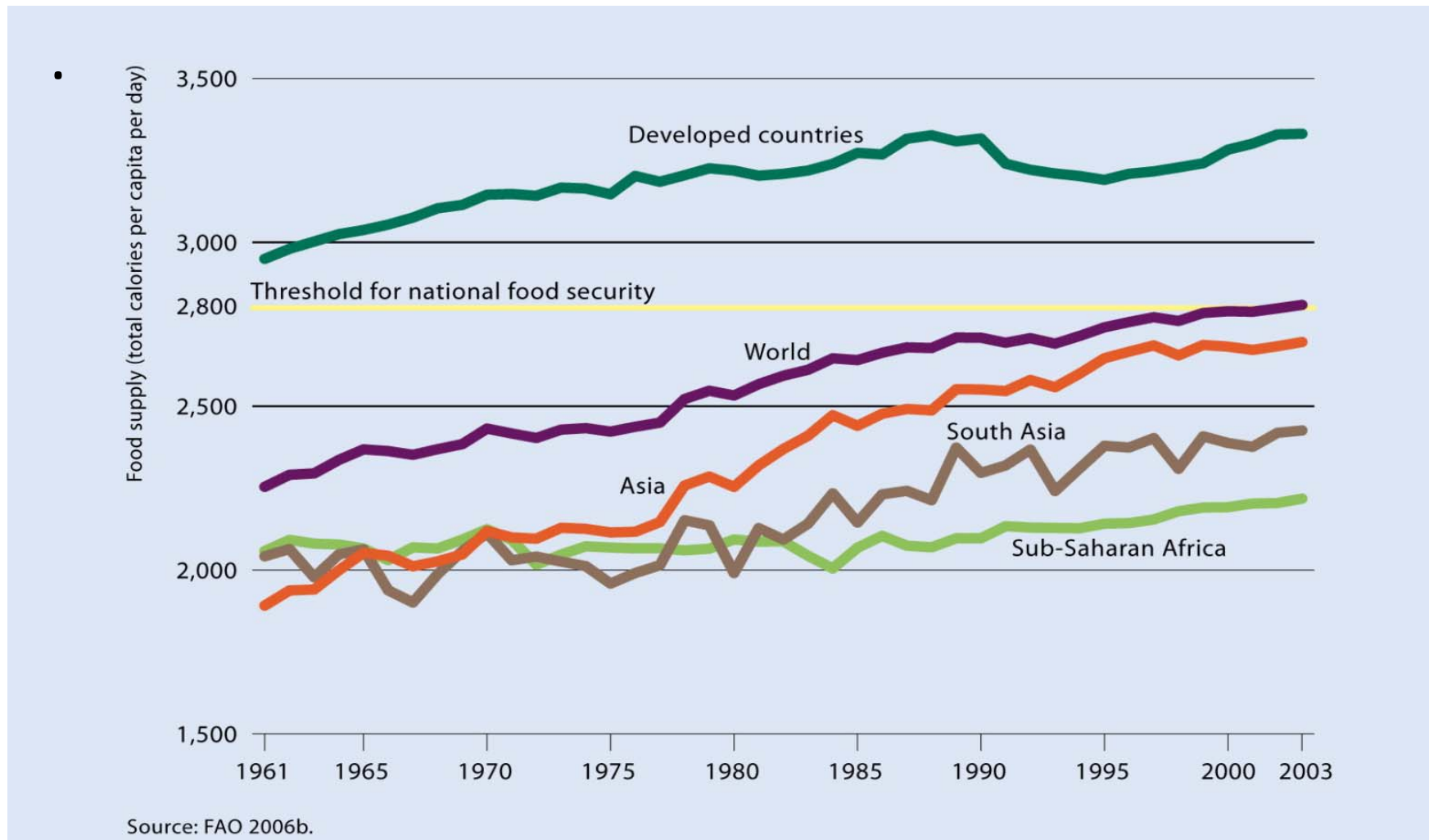


Source: FAO (Food and Agriculture Organization of the United Nations), *The State of Food and Agriculture: Biofuels: Prospects, Risks, and Opportunities* (Rome: FAO, 2008), <ftp://ftp.fao.org/docrep/fao/011/i0100e/i0100e.pdf>

The NEXUS: food, water and energy are interlinked

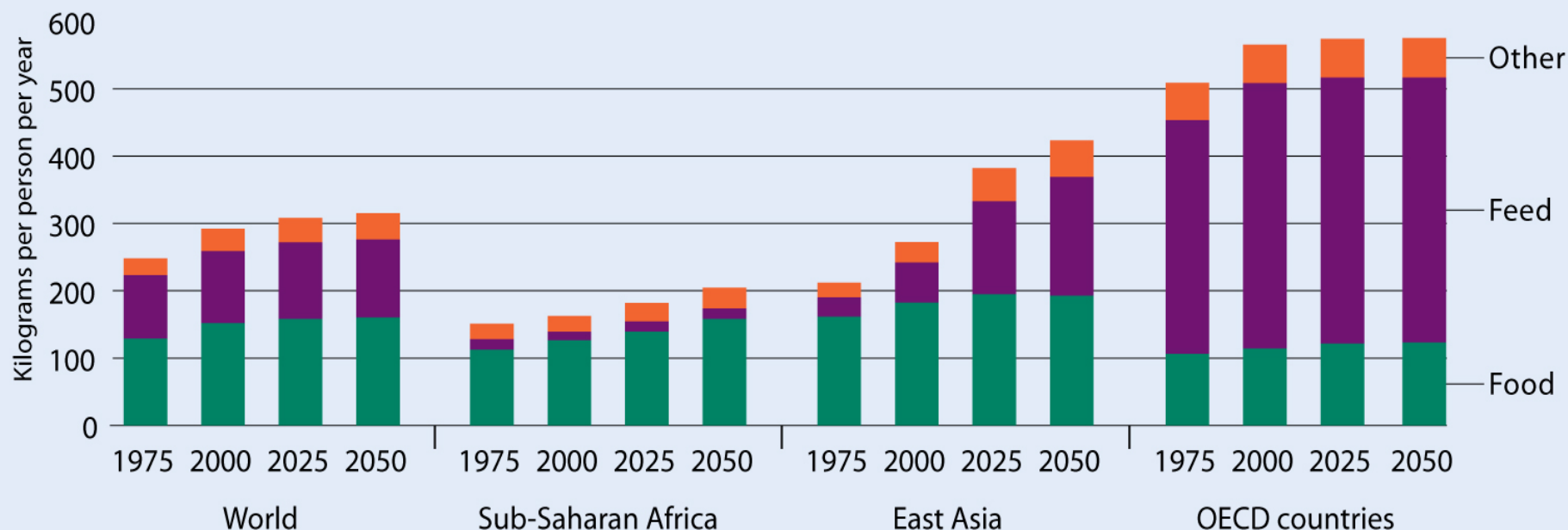


Rising food security concerns – THE 17/40%



It takes a litre of water to produce every calorie, on average

How much more water for cereals?



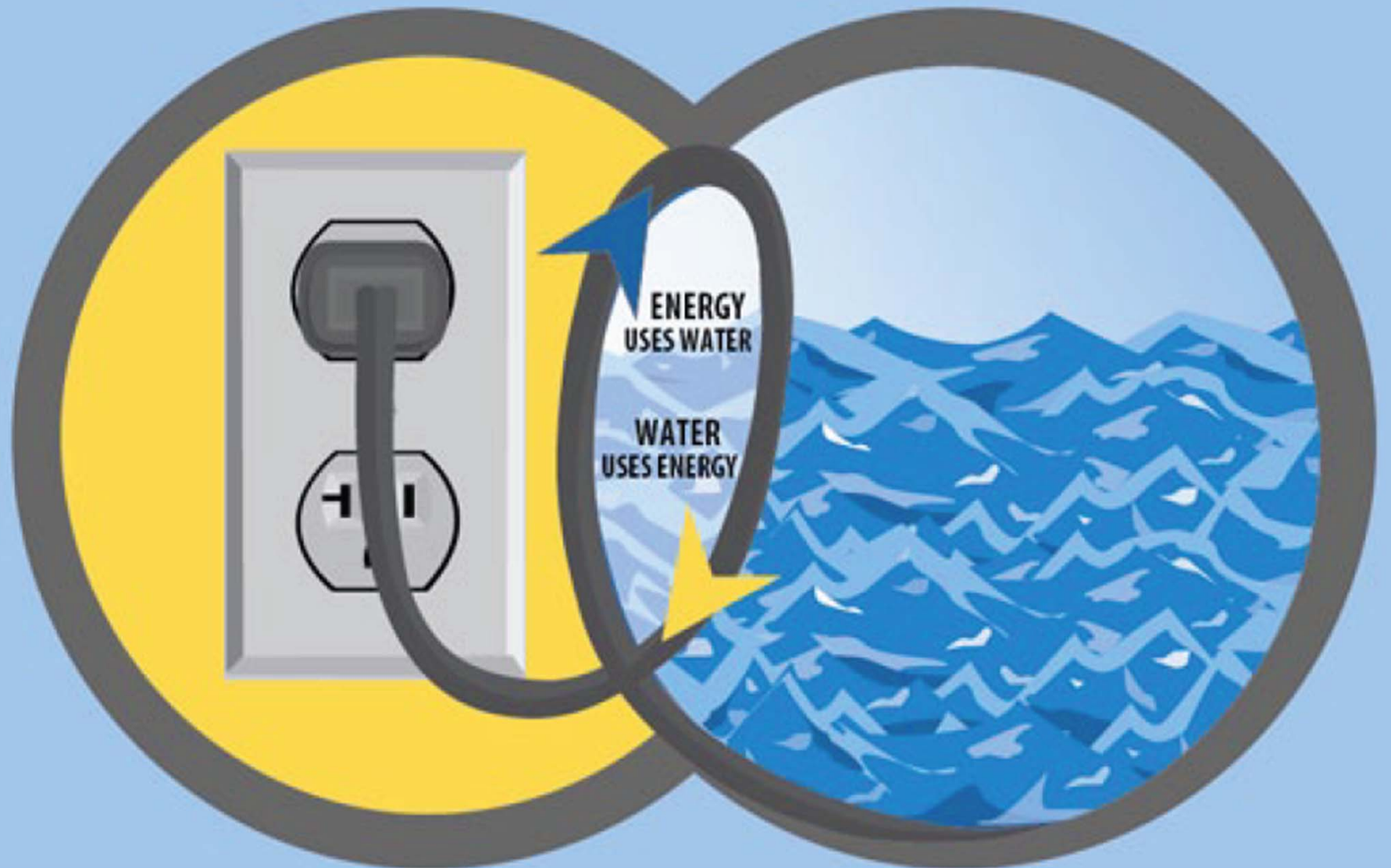
Source: For 1975 and 2000, FAOSTAT 2006; for 2025 and 2050, International Water Management Institute analysis done for the Comprehensive Assessment of Water Management in Agriculture using the Watersim model.

Food demand doubles in 50 yrs - diet and population

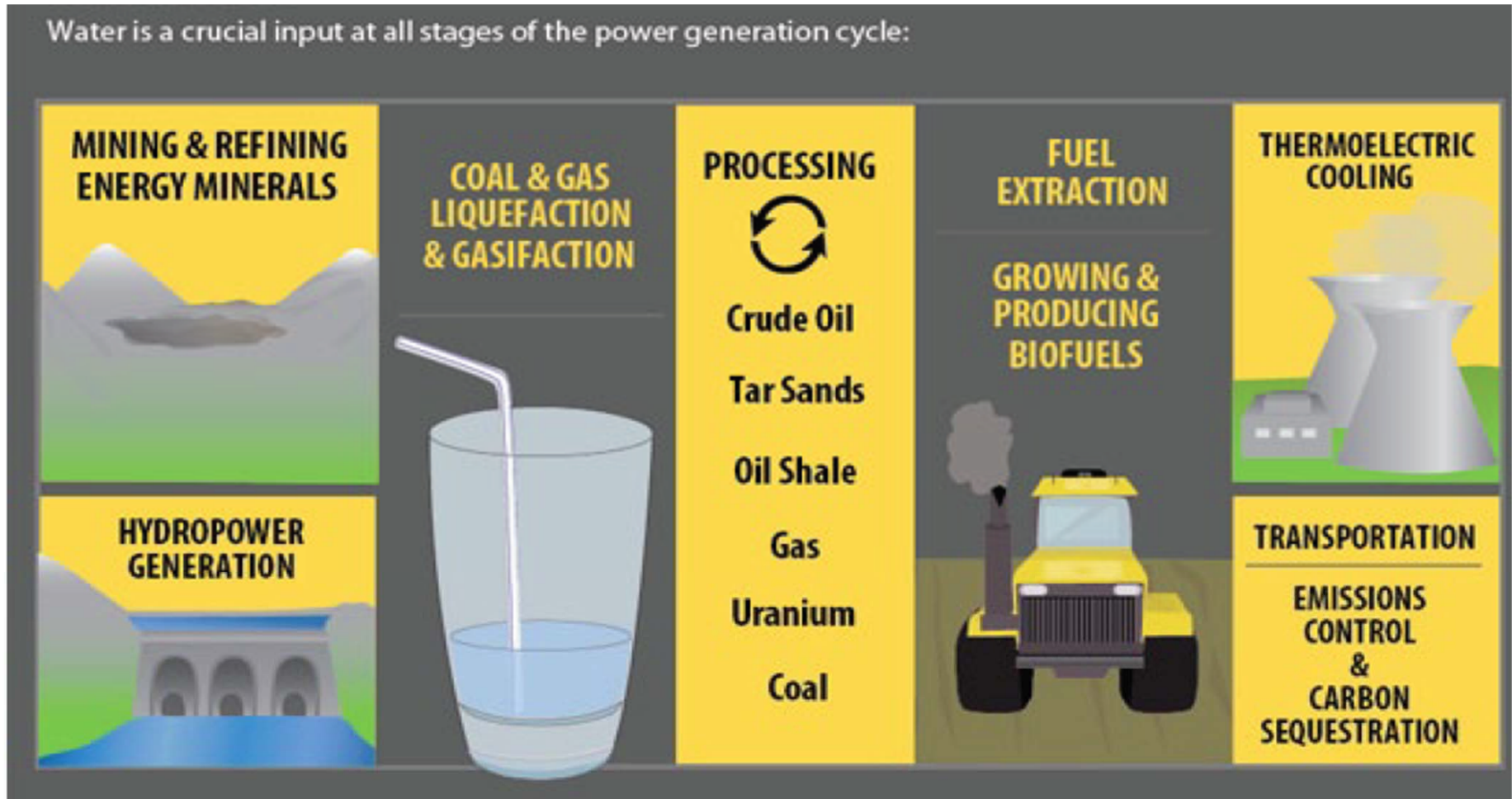
Water Needs (ET) will double – without water productivity gains WANA increase

ENERGY – OTEN the BIGGEST USER

Water and energy are engaged in cyclical interplay.

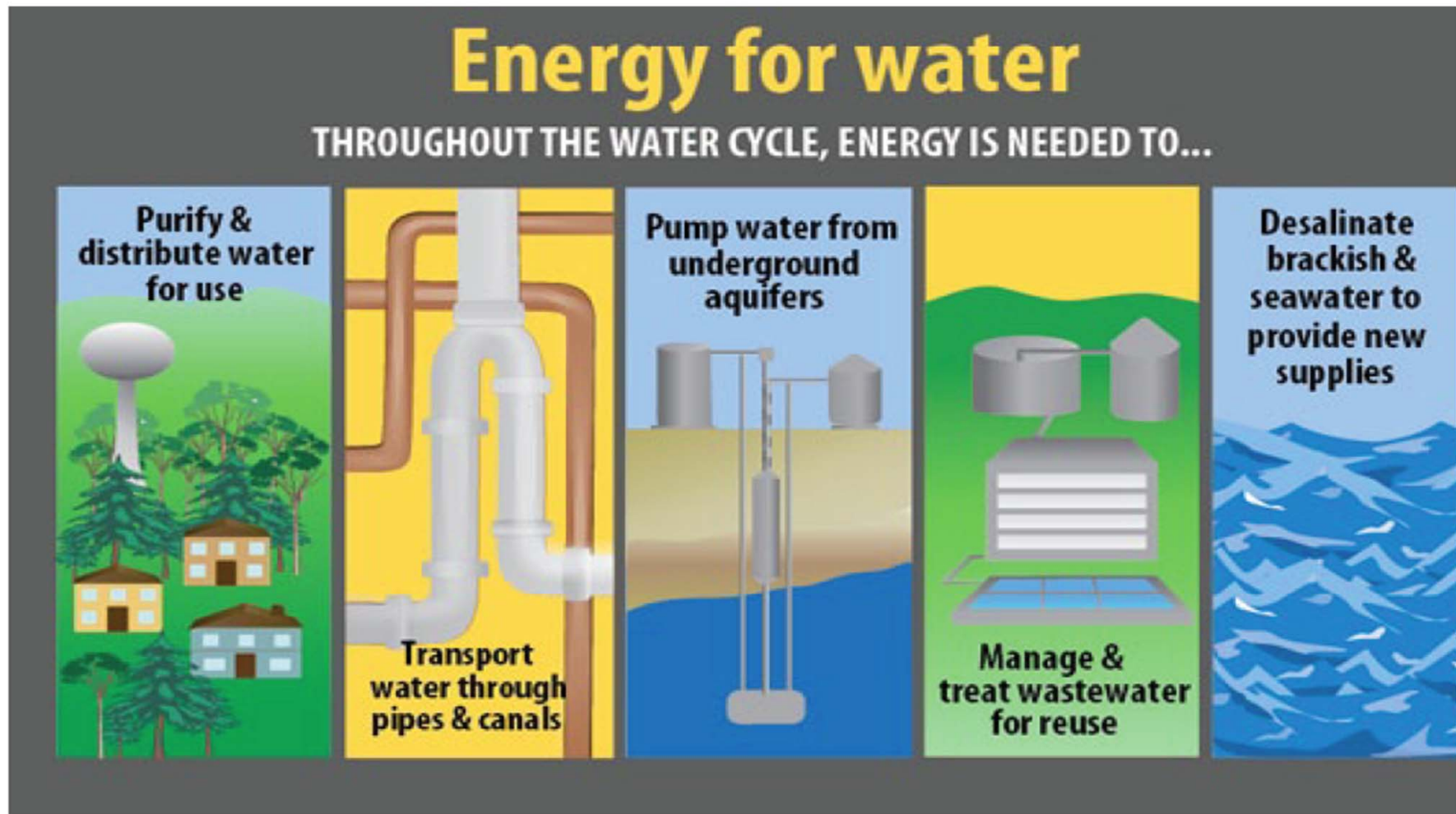


Water is needed to make Energy



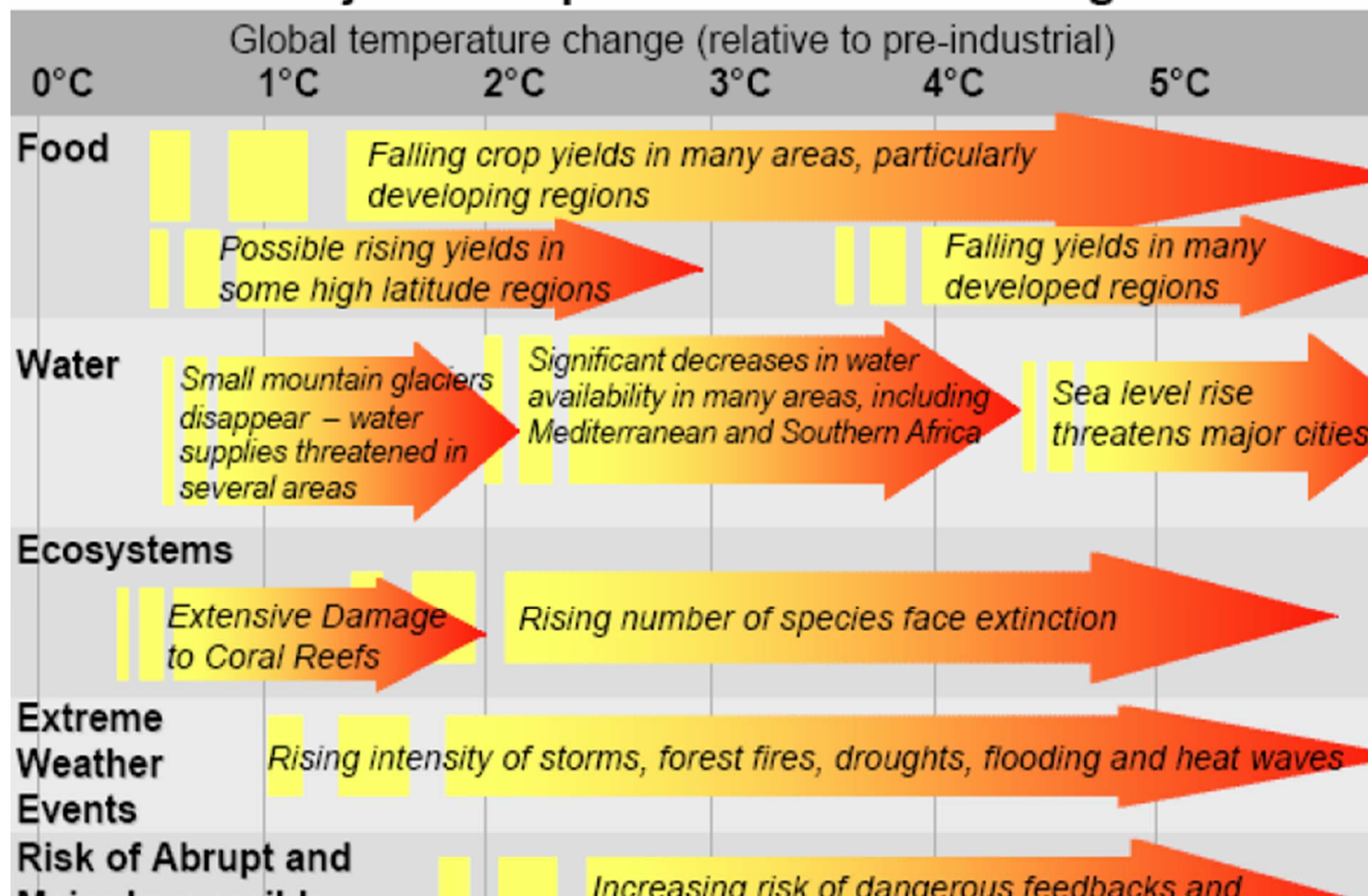
And vice versa....

Jordan 15% of energy to water sector... goal of 20% power for water alternative energy sources



Emerging Risks: what's changing?

Projected Impacts of Climate Change



Water scarcity and the next global Food crises?

- We could be facing annual **losses equivalent to the entire grain crops of India and the US combined.**
- Qatar – looking at desal agriculture.....



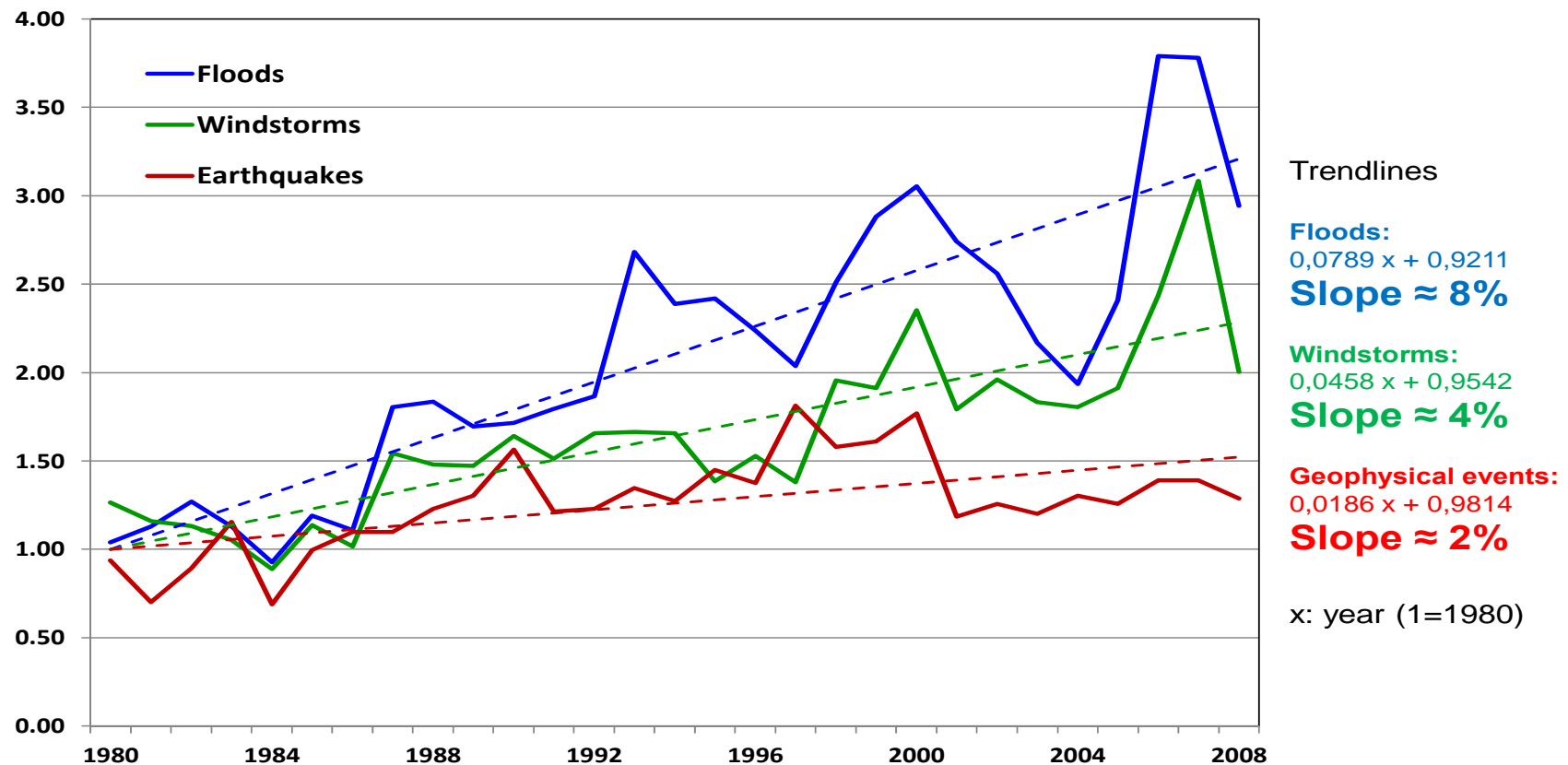
Response on Food side

- Variability – the real enemy
- Global search for draught resistant seeds
- New cropping experiments
- Mixed pattern of reduction of water use
 - Depends on incentives, price of water
 - Some early warning systems.
- New attention to Wastewater –
- Biosaline

How Climate Variability looks to an Insurance Company

New Disasters & catastrophes 1980 – 2008

(normalized by the value of the respective trend line of the absolute numbers in 1980)



How it looks to live through it



AND MORE PLAYERS ARE WORRIED.

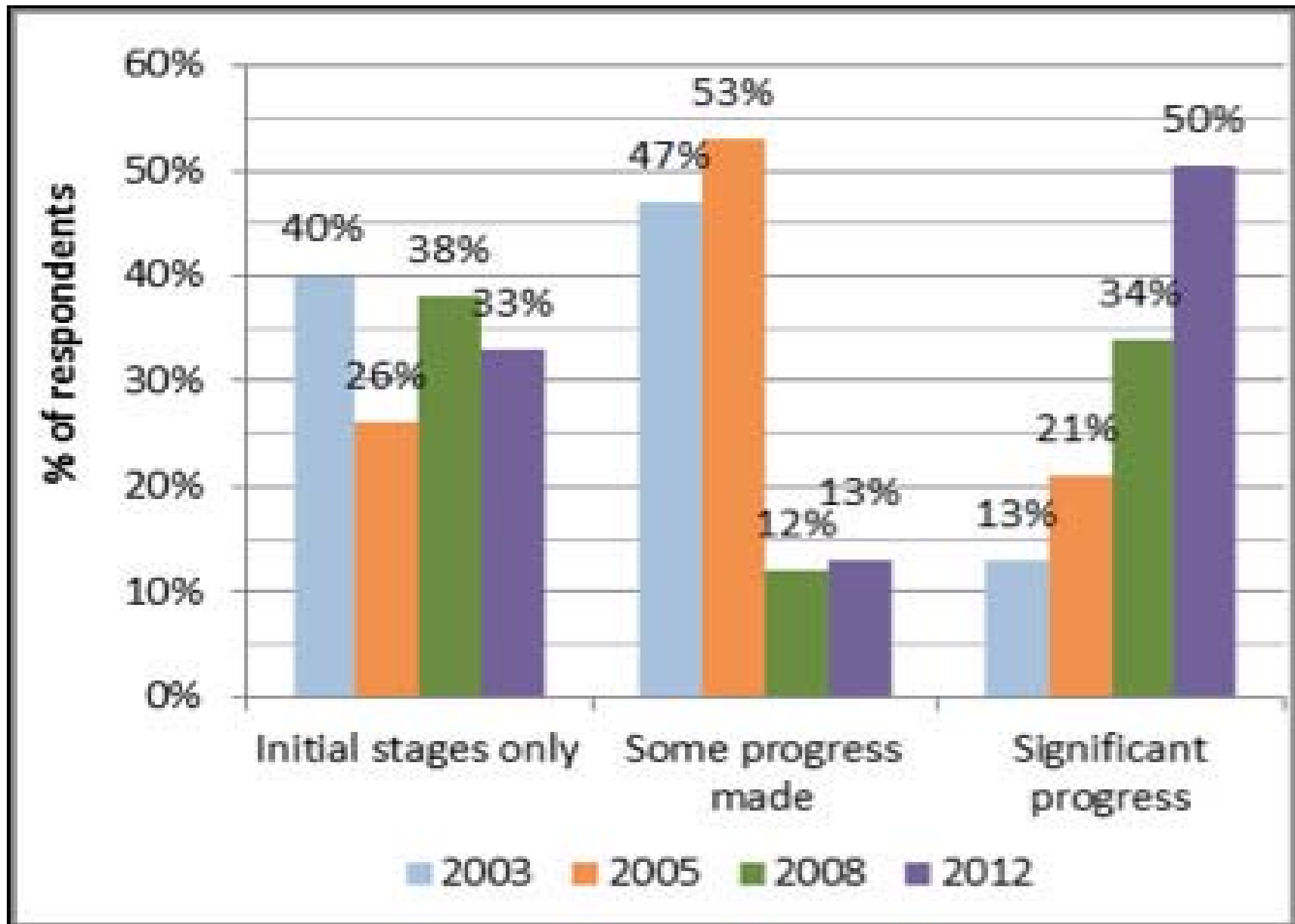
USA Intelligence Community Assessment

Our Bottom Line: During the next 10 years, many countries important to the United States will experience water problems—shortages, poor water quality, or floods—that will risk instability and state failure, increase regional tensions, and distract them from working with the United States on important US policy objectives. Between now and 2040, fresh water availability will not keep up with demand absent more effective management of water resources. Water problems will hinder the ability of key countries to produce food and generate energy, posing a risk to global food markets and hobbling economic growth. As a result of demographic and economic development pressures, North Africa, the Middle East, and South Asia will face major challenges coping with water problems.

Water Governance

- No secret that water is badly managed – or simply not managed in many places.
- Most water problems = poor governance
- Governments –
 - Water is expensive, emotional, fraught, no win issues
 - Governments role everywhere
 - Traditional - Infrastructure, capital projects. Even service delivery –
 - High visibility, ‘solution’, corruption

Countries pay attention – more on the policy level.
IMPLEMENTATION???



Prospects on Global Level?

- Not the 20th Century conference diplomacy
 - Kyoto Conf diplomacy - worked for CFCCs – no longer
 - Coalitions of the willing
 - Rio + 20 Output “longest suicide note in global history”
 - Tough to get water on the Rio+ agenda – talked to the choir
 - SDG (MDG successor) by no means clear re water situation
 - Fragmentation, fragmentation, fragmentation.
- Yes, New forms emerging
 - Multicentered, multispectral, decentralized, won't fit together well.
 - E-U Water Directive – sets a framework for governance/management.

3 Big Changes – tough Governance issues.

New help with Management Elements?

- Global Demand Explosion - the 40% gap
- New and Emerging Threats
- The Urban Dimension and New Water ideas

Some new players, some new **(managerial)** roles

- Policy attention and enunciation
- Data collection and assembly
- Monitoring
- Regulatory Framework
- Risk management
- Improving practice to reduce water use, find water/energy synergies
- Training
- Shaping investment

Awareness and policy attention; The Global 40% gap:

- For a long time, only the Water Sector – changing
- 8th Global Risks report for the Davos meeting
- 50 global risks from five categories – economic, environmental, geopolitical, societal and technological
- 2012 water - **fifth** top global risk in terms of likelihood in 2012
- 2013 report - rated at the fourth spot
- **However, in terms of impact, the report puts water supply crises as the second top risk during 2012 and 2013.**



COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

Strengthening the Government Hand

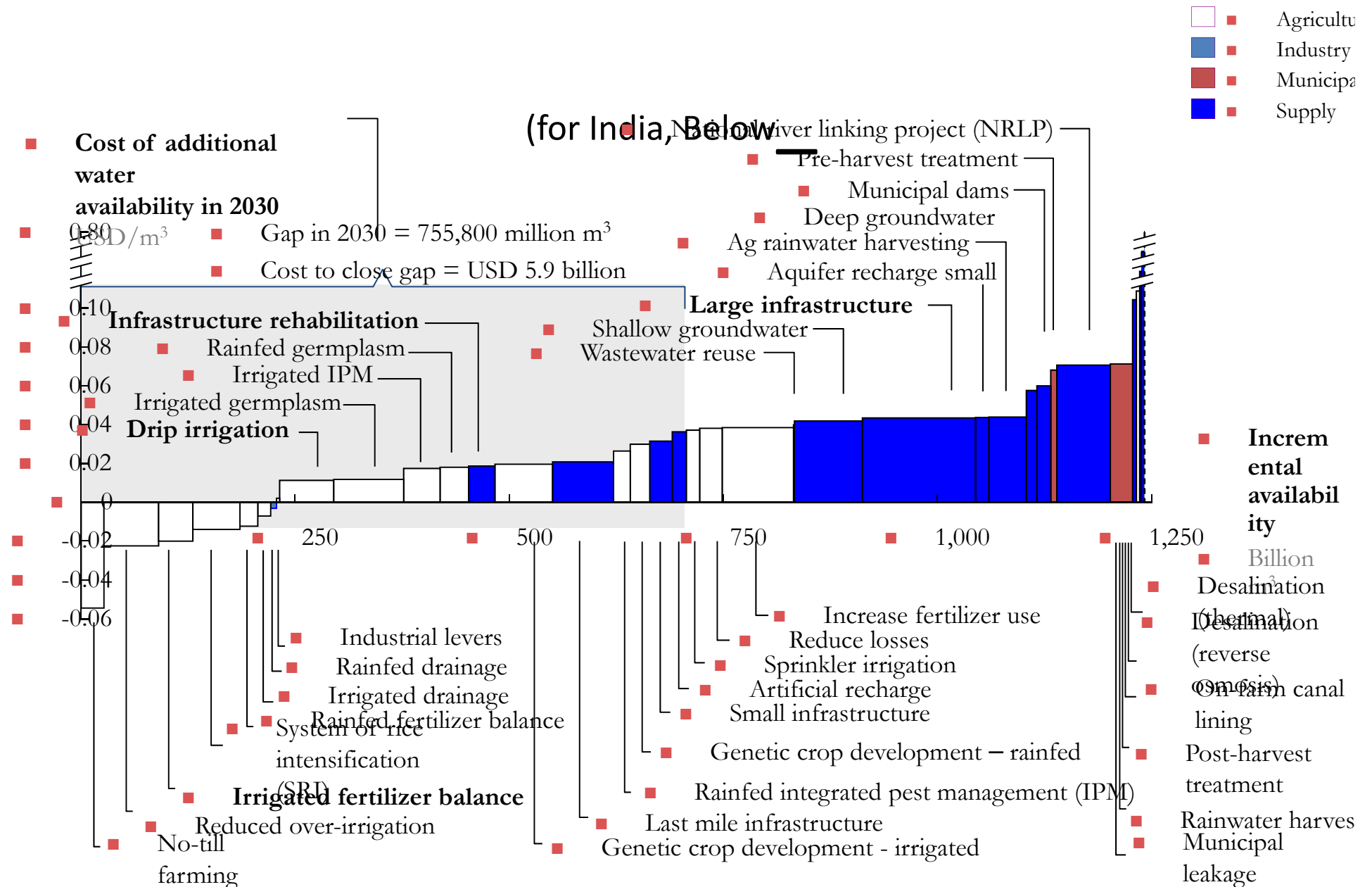
- Global Private Sector
- “growing competition for scarce water resources is a growing business risk, a major economic threat that cannot be ignored, and a global priority that affects all sectors and regions.” Global Resource Group, est 2012
- Also – growing theme of decoupling growth from resource extraction – including water.

Data collection and assembly

- Once a Government role – once national
- Now
 - Google Water being launched this week
 - IBM and Waterfund – 20 m collaboration on defining costs of water
 - Can see and find water electronically
 - IBM - \$20 m to major computing center for water management
- BIG data – Big change –
 - From centrally held, non transparent “our initiative with IBM Research will finally bring real financial transparency to the water sector.” Initial focus: Unsubsidized cost of freshwater production....
 - Decentralized, no single owner, transparent, multilayered, information depositories.
- Enables Civil Society

Monitoring

- Smart Meters – do energy consumption, water rising or falling, water consumption – ALL of Malta is Smart metered
- Oil Sands – monitors all along tailing ponds, rivers
- Remote communities – can monitor quality
- All of this can be connected into data.
- New players in the monitoring field

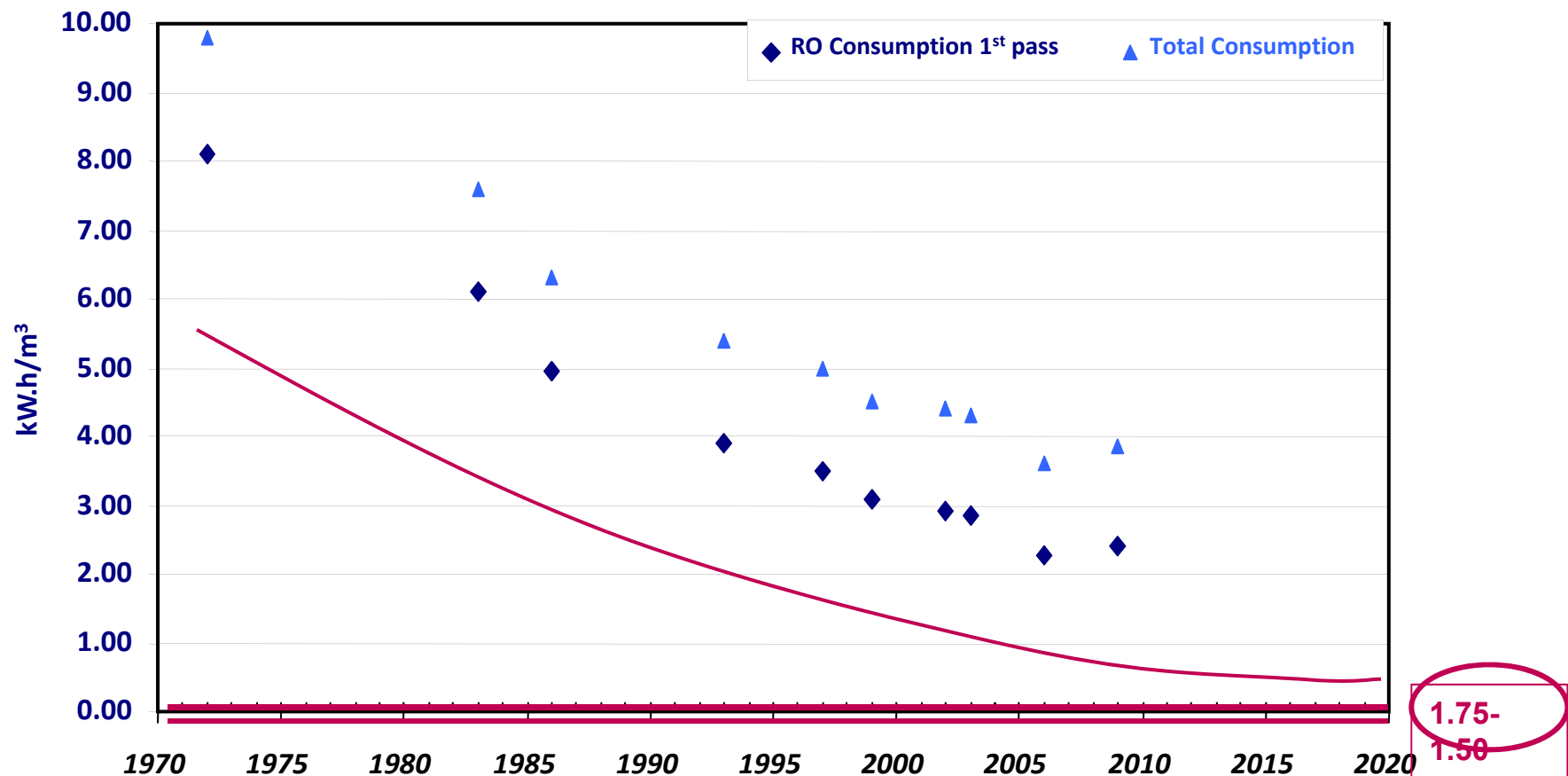


Improving practice to reduce water use, find water/energy synergies

- **Sector practitioners: Six Marseilles Commitments on Water-Energy Nexus link**
 - TARGET 1 – WATER SHOULD SAVE ENERGY;
 - Create a typology of measures implemented by public authorities and water utilities in cities totaling 500 million inhabitants, aiming at a minimal improvement of 20% of energy efficiency of municipal water and wastewater systems by 2020 compared to 1990 level.
 - International Water Association –(IWA) Paul Reiter - Ger Bergkamp
 - paul.reiter@iwahq.org -Ger.Bergkamp@iwahq.org
 - Target 2 - – DESALINATION SHOULD BE ENERGY CHEAPER.
 - Energy Task Force, to develop a guide allowing 20% energy reduction in desalination by 2015
 - International Desalination Association (IDA) Leon Awerbuch
 - letleon@comcast.net
 - 4 more on Hydro optimization, oil and gas water use, etc etc

Energy consumption of Reverse Osmosis : Trends

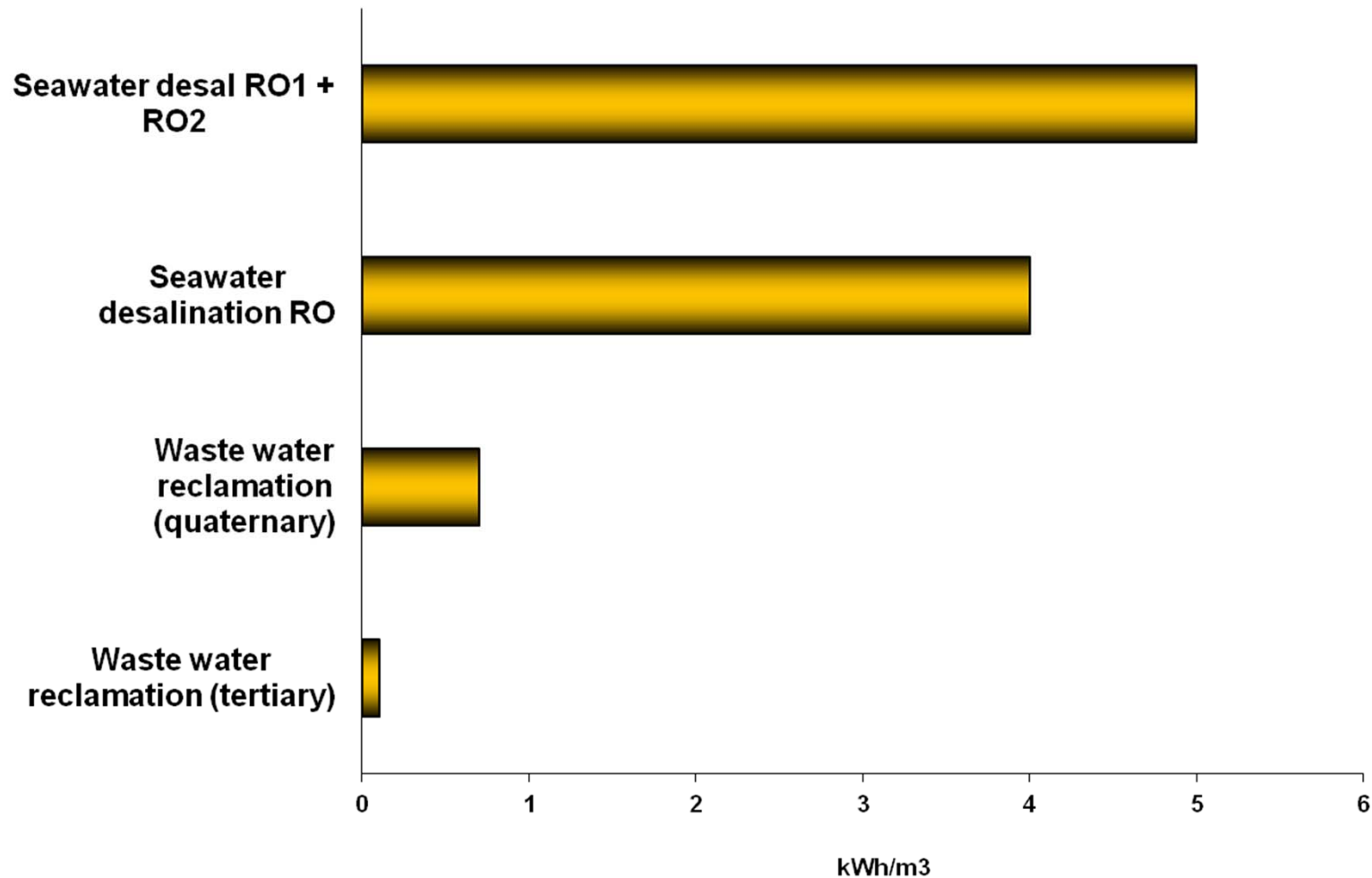
Energy Consumption Evolution for Seawater RO



Thermodynamic limit for TDS of 36 g/l at 25°C (conv factor 0.5) : 1.1 kWh/m³

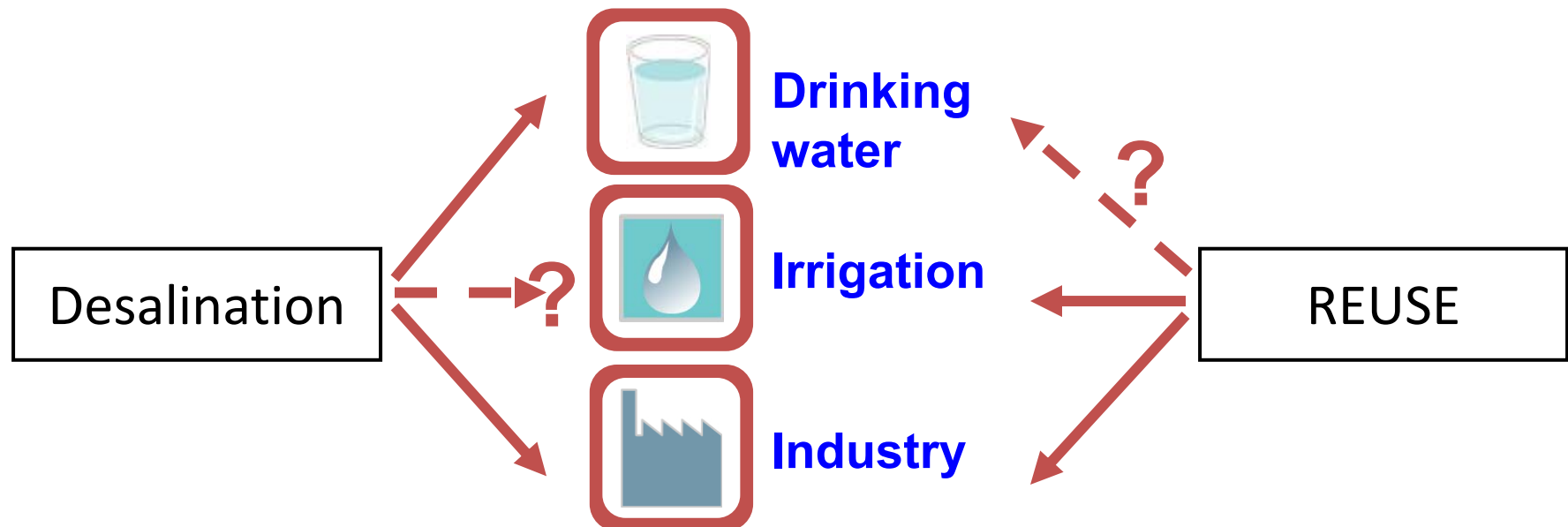
Water reuse is less energy intensive than desal ...

Compared energy requirements



Non conventional water sources :
a promise in a water scarce world

2 Complementary sources

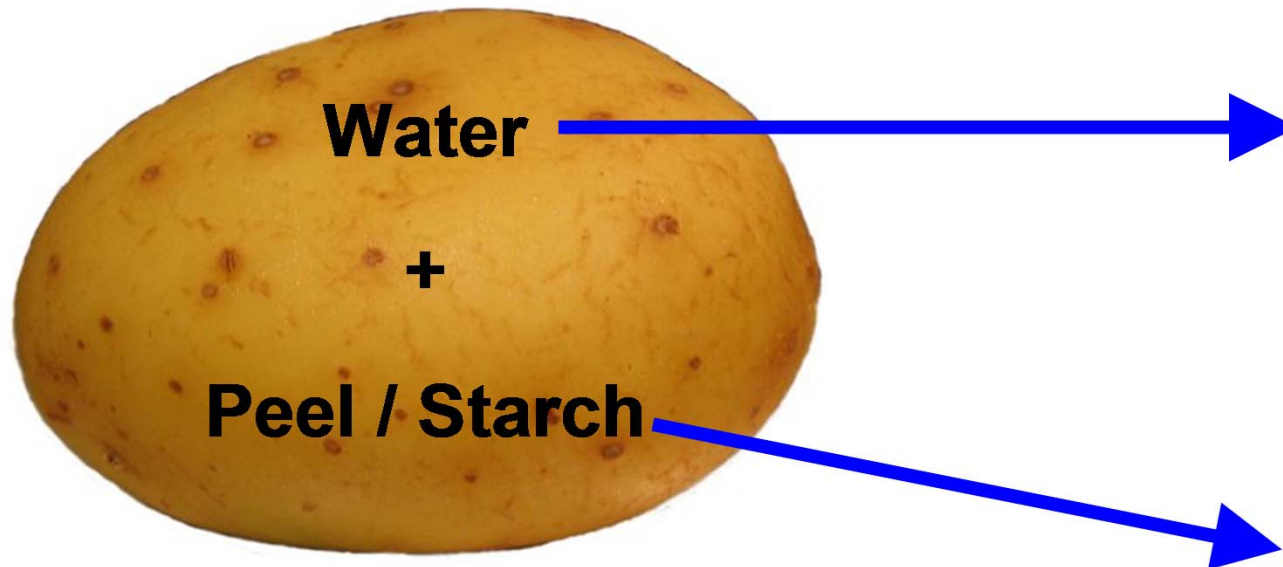


- 2.4 Billion people live near the sea
- Desalination is already an alternative for more than 200 million people
- 2 – 3% of the global production of potable water

- 368 km³/year wastewater collected in the world
- Only 160 km³/year wastewater are treated and 7,1 km³/year (4,5%) reused.

We are developing the first near Zero Water Potato Chips process in Canada...

**Near Zero Water
Potato Chip Processing**



4 Phase Plan in Development

**1st Near Zero Water Large scale Food plant in
Canada**

PUBLIC AUTHORITIES USING PRIVATE SECTOR EXPERTISE:

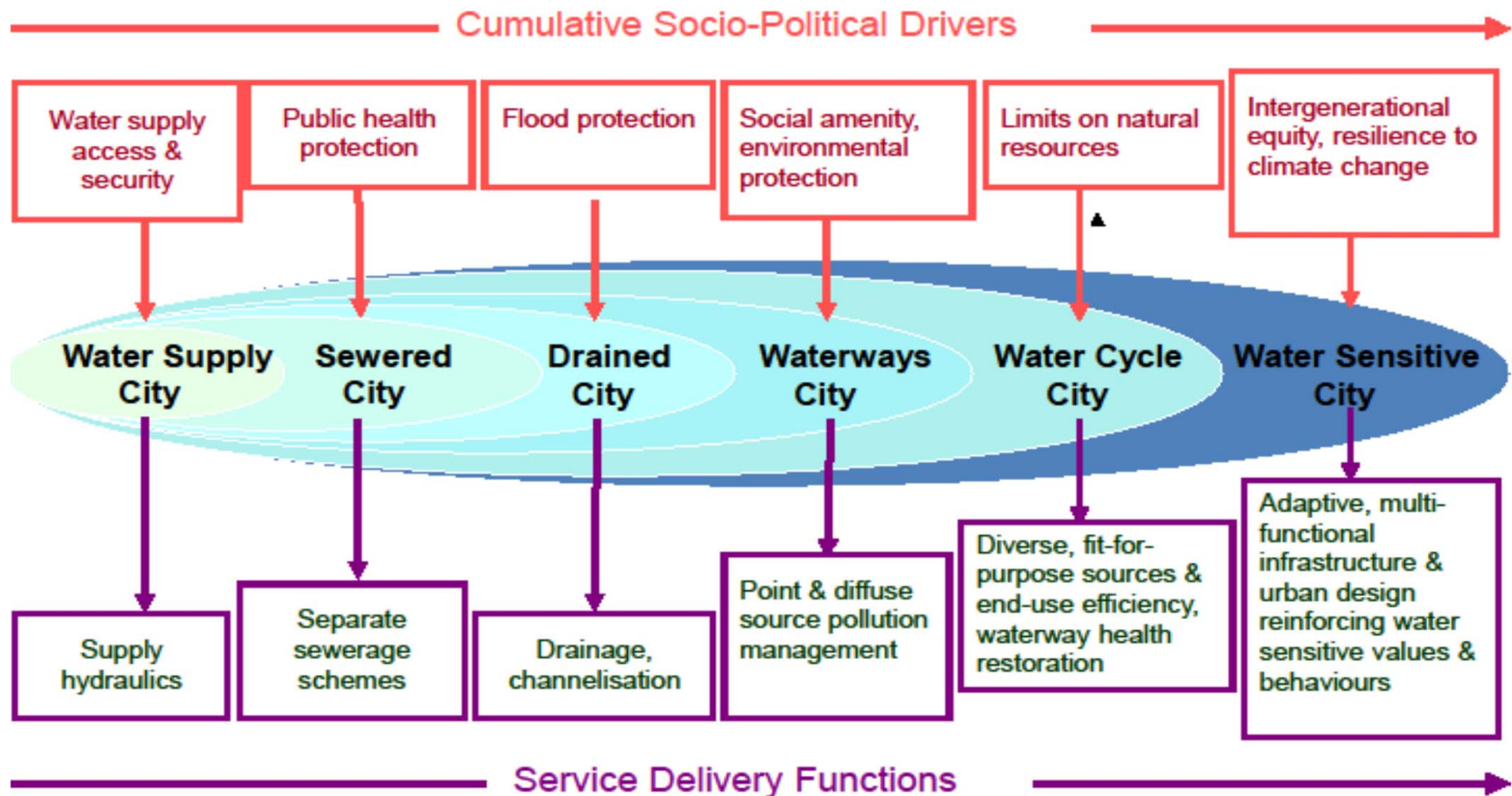
COLORADO :MULTI-OBJECTIVE PERFORMANCE

- Colorado River - many objectives
 - agricultural, municipal, industrial, hydroelectric power, recreation, fish and wildlife, flood control, and water quality.
 - metrics currently being developed for each of these objectives.
 - Diverse group of stakeholders consisting of federal, state, tribal, and local interests is being assembled to define standardized metrics to evaluate risks to the various resources.
 - demands are being indexed for future climate scenarios
 - uncertainty in supply and demands over the next 50 years, adaptation and mitigation strategies to resolve the imbalances.
- CH2M

Cities – where water change is happening

- Municipal demand will increase by 80b cu m by 2025 – 40% higher
- Conjunction of need to build or replace infrastructure with climate proofing
- Booz Allen Hamilton estimate
 - U\$A 22.6 trillion water & waste water – 2005-2030
 - 40% Asia
 - 20% Europe
 - 22% Latin America
 - 16% US and Canada
 - 1% WANA
- Untreated waste water – Asia 90%
- New players – corporatized utilities; financial houses, PPP structures to get these off public balance sheet.

Evolving Urban Water Hydro-Social Contract



Brown *et al* (2008), and Wong and Brown (2008)

Energy from Waste Water

- Reduction of energy consumption –GHG
- Produce energy for local use
- Reduction landfill
- Production biosolids for agric use
- Wessex Water Avonmouth Biogas
 - Sewage +++ imports large quantities of biodegradable wastes for co-digestion – sells excess energy to national grid.

Risk management

- Financial analysis section – first to ring bell
- IBM and others – new risk models.
- Davos Risk study – non moment on Climate Change second highest risk across world.

Regulatory Framework

- Total importance – increasing corporate demand.
- New approaches –
 - Community monitoring
 - Data transparency
 - Corporate association best practices
 - Forestry
 - BCSD
 - Annual reports
 - Part of Triple Bottom line.