



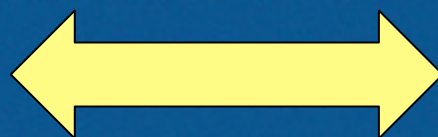
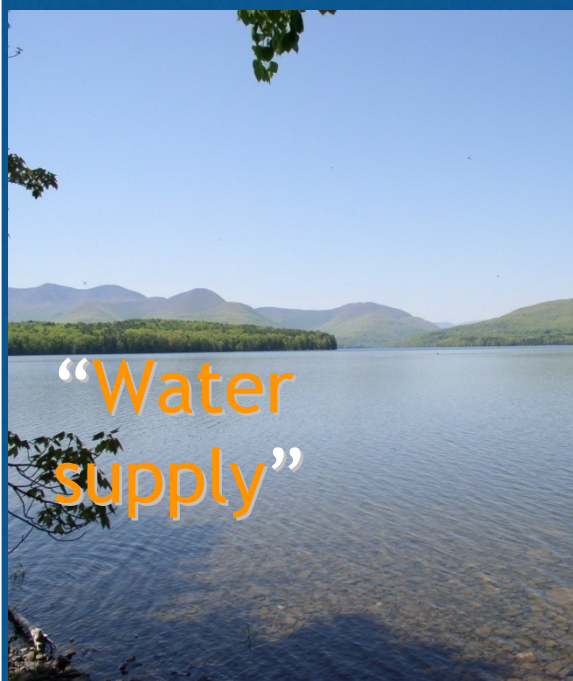
Growing scarcity of water and need for improved water management

Jean-Marc Faurès

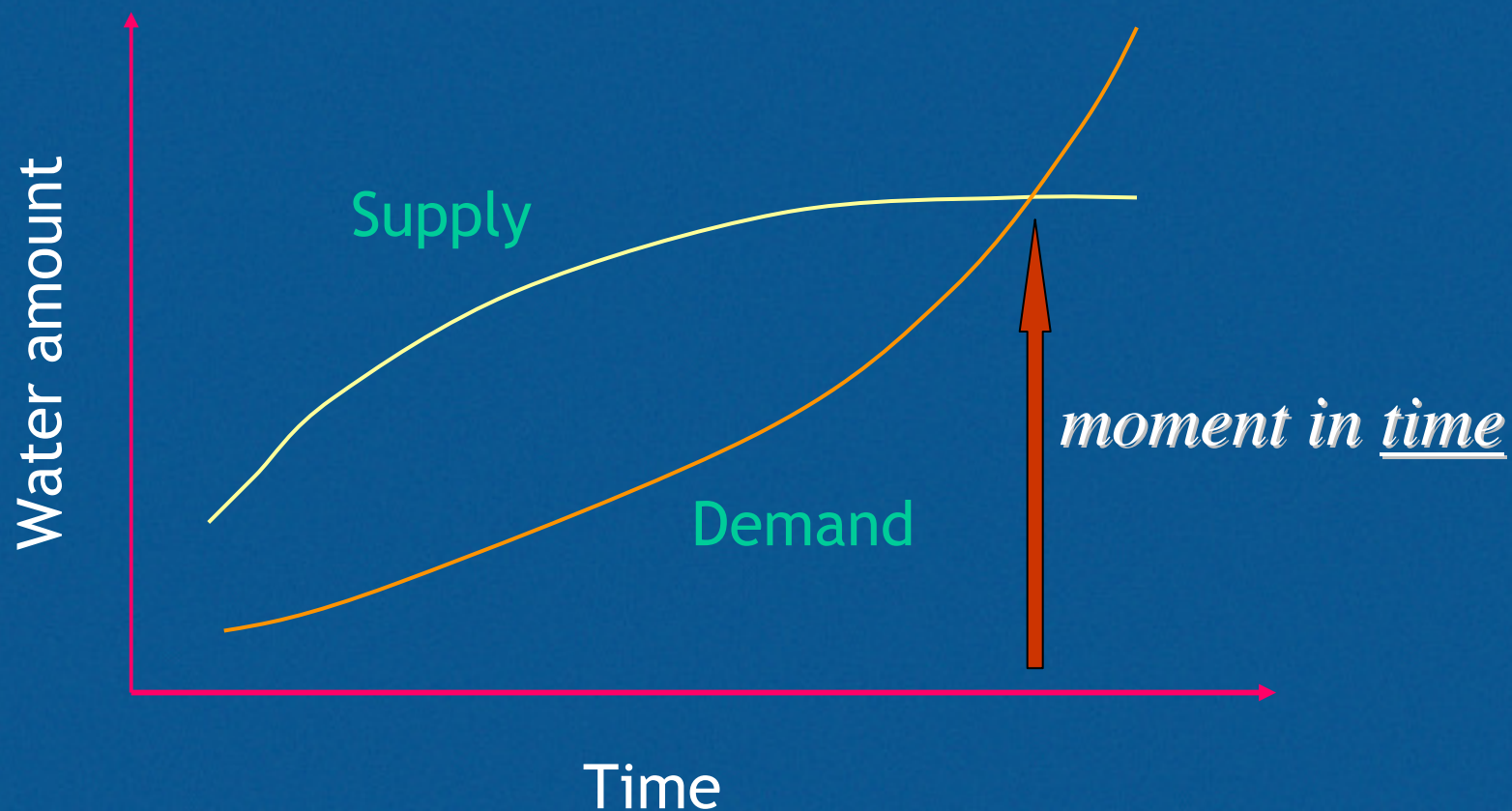
*Water Unit
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Defining Water Scarcity

“Water scarcity” establishes when the aggregated “demand” by the various users, including environment, cannot be satisfied by the existing “supply” of the resource (*at a given place and at any moment in time*)



given place





While **global renewable water resources** availability are **not changing** much over time, **global water use** has been **continuously growing**, ...and in the last Century has been growing at more than twice the rate of population increase

Expressions/Indicators:

“**stress conditions**” = 1000-1700 m³ y⁻¹ person⁻¹

“**chronic water scarcity**” = 500-1000 m³ y⁻¹ person⁻¹

“**absolute water scarcity**” <500 m³ y⁻¹ person⁻¹

By 2025: 1.8 B people - in “absolute water scarcity”



Factors affecting supply and demand of water

Factors affecting Supply

1. Climatic variability
2. Climate change
3. Degradation of water quality
 - Eutrophication:
 - Municipal and industrial waste streams
 - Animal manure and waste
 - Chemicals, pesticides, pharmaceuticals, heavy metals, etc.

MOSTLY IN URBAN ENVIRONMENT

1. Population Growth

Basic Water Needs

	<u>(Liters $d^{-1} p^{-1}$)</u>
Drinking	2-4
Domestic	40-400
Food	1000-5000





Around J.C. time

~ 200 M

Around 1600

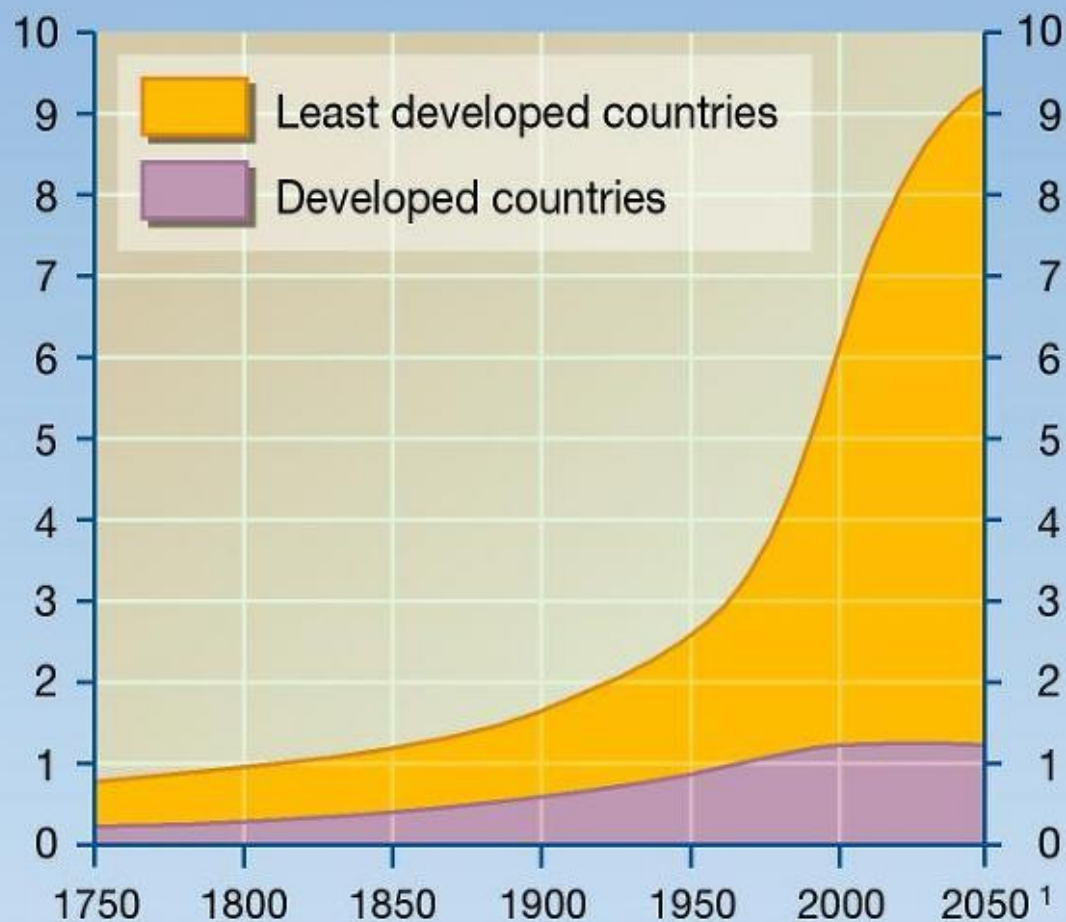
~ 300 M

<1700 3 X

1700-1900 3 X

1900-2050 5 X

Billion human beings



2. Urbanization

in 1960

1/3 Urban

2/3 Rural

in 2007

1/2 Urban

1/2 Rural

in 2050

2/3 Urban

1/3 Rural

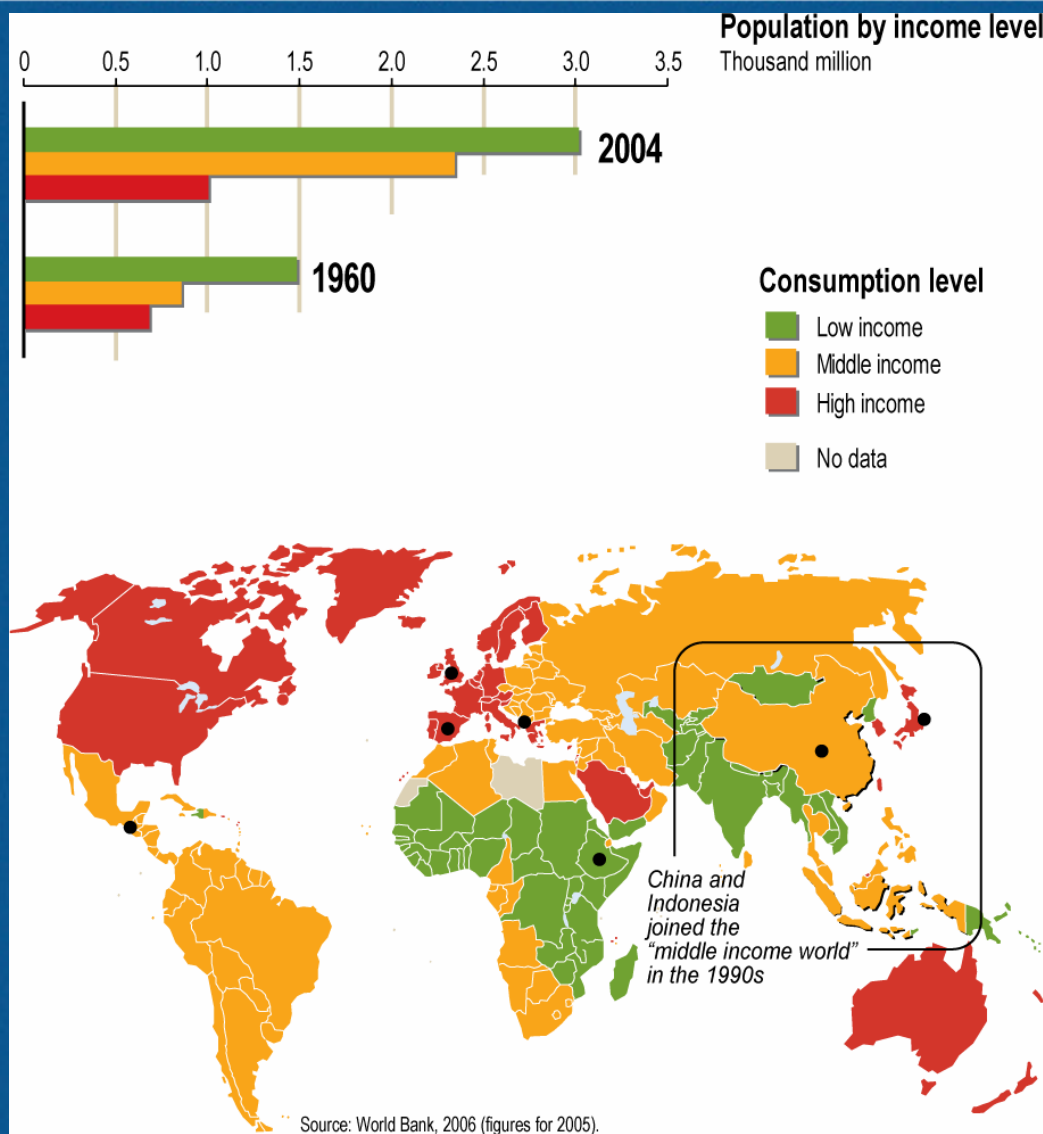
- Changes in dietary preferences
- Concentration of water demand
- Increased per capita water use





3. Income

- Change in food habits toward richer diets
- Overall increase of demand in products and services
- Higher consumption (including luxury cons.)
- Increase of waste





Changing Diets



Product	(m ³ per Kg)
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Beef meet	15
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Sheep meet	10
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Pork meet	6
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Chicken meet	2.8
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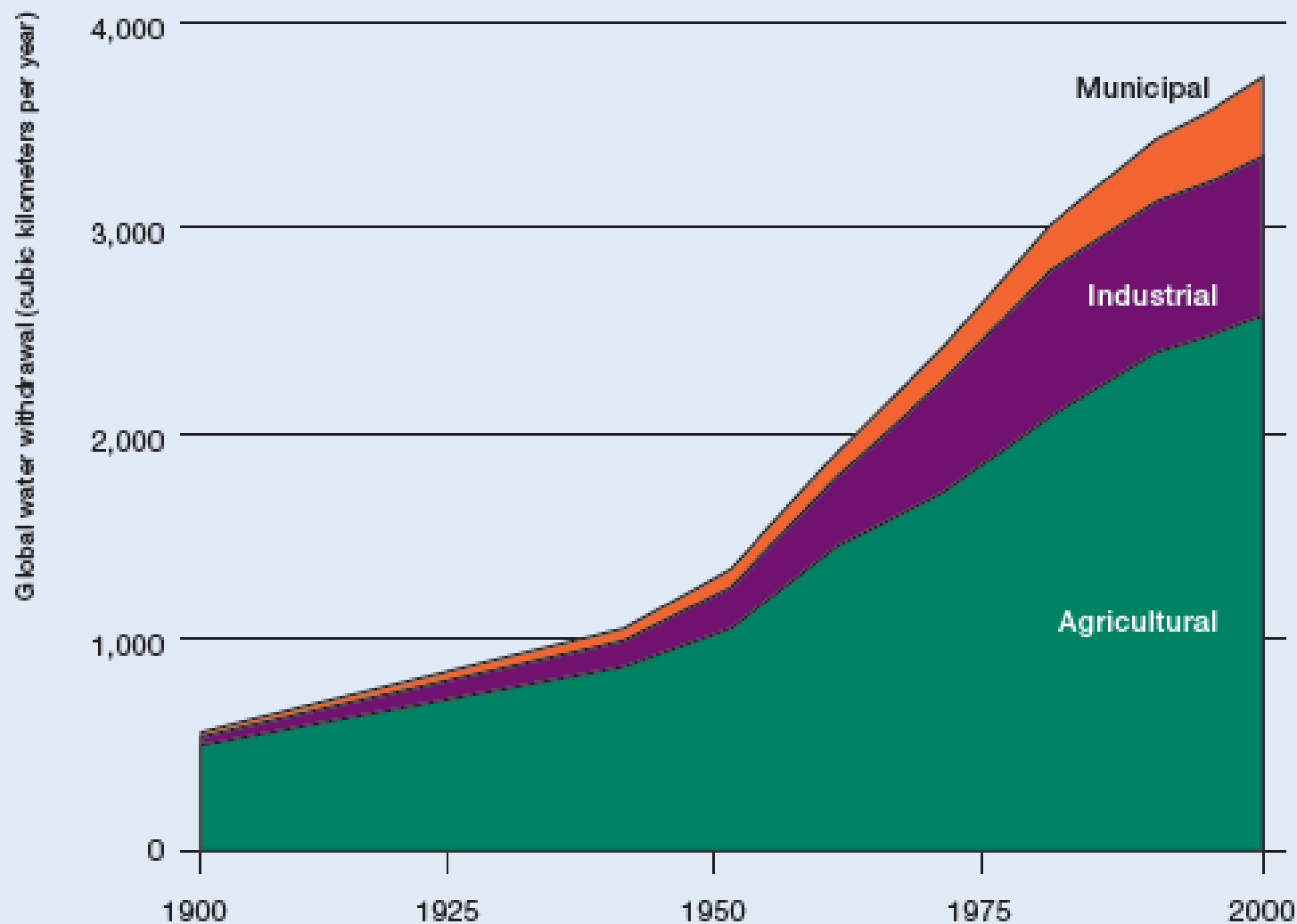
Eggs	4.7
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Cheese	5.3
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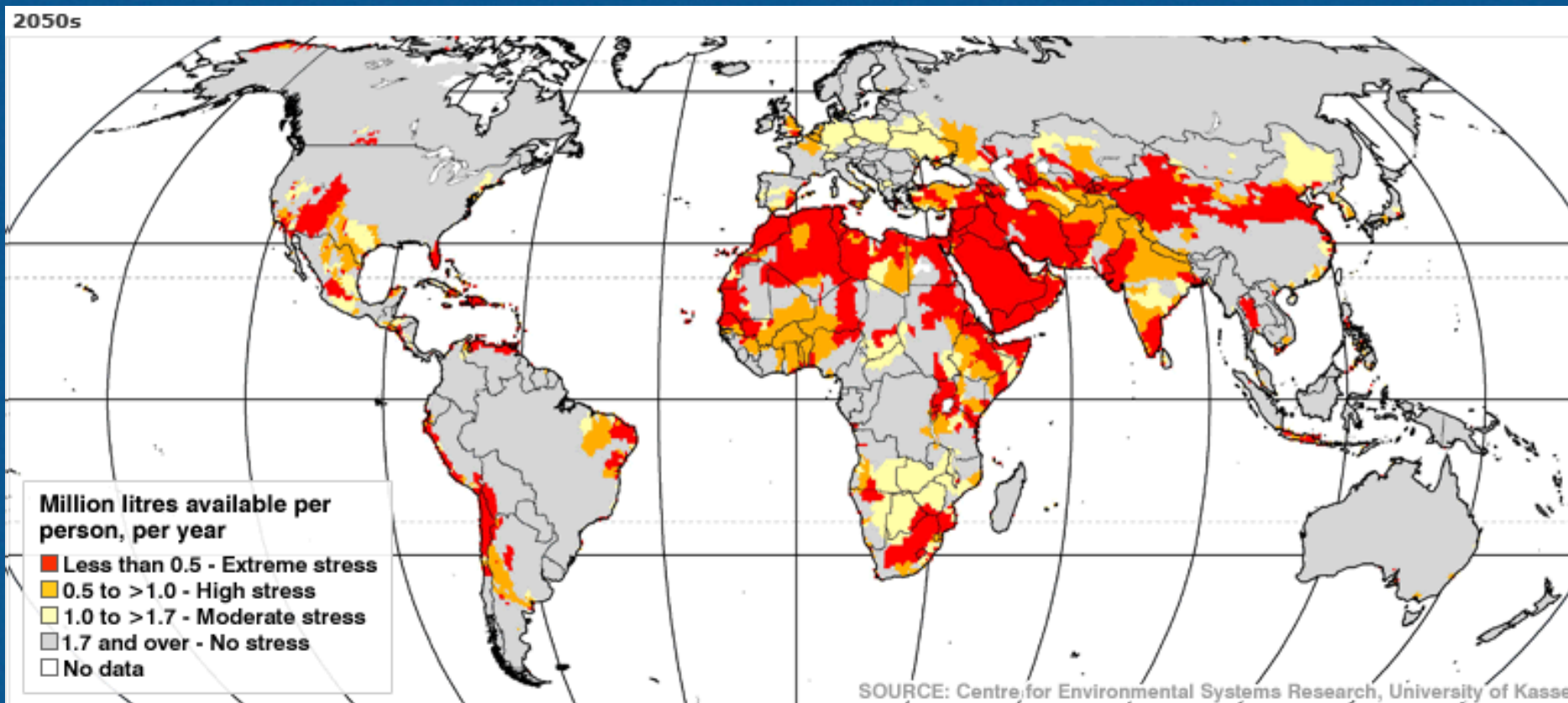
Milk	0.9
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Cereals	1.5
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Demand for water



Levels of water stress



Dimensions of water scarcity

- Availability: *is there water ?*
- Accessibility: *Can I bring this water to my field ?*
- Cost: *Can I afford paying for that water ?*
- Quality: *Is available water of the required quality for a given use ?*
 - irrigating trees, cereals
 - irrigating vegetables
 - drinking

The need for a comprehensive framework

1. Augment the “*supply*”
2. Preserve/conserve the “*quality*”
3. Increase water use “*efficiency*” & “*productivity*”
4. Revise the “*demand*” management

Rain-water harvesting/storage structures

- roof-harvesting
- soil moisture management
- run-off farming
- small dams



Use of non-conventional water sources

- Re-use of drainage water
- Use of treated waste water
- Use of brackish water
- Water from desalination



Different qualities for different uses

Preserve/conservate the “*quality*”

- Control of point- & nonpoint-source pollution
- Forestry - buffer zones - urban & peri-urban protection
- Wastewater treatment

- Institutional capacity building
- Public awareness

More effective water technologies

- *Water lifting devices*
- *Shallow wells*
- *Localised irrigation*



Adoption of all best management practices in Agriculture

- *Improved on-farm water management*
- *Improved soil fertility*
- *Better pest, weeds & disease control*
- *Reduced post-harvest losses*



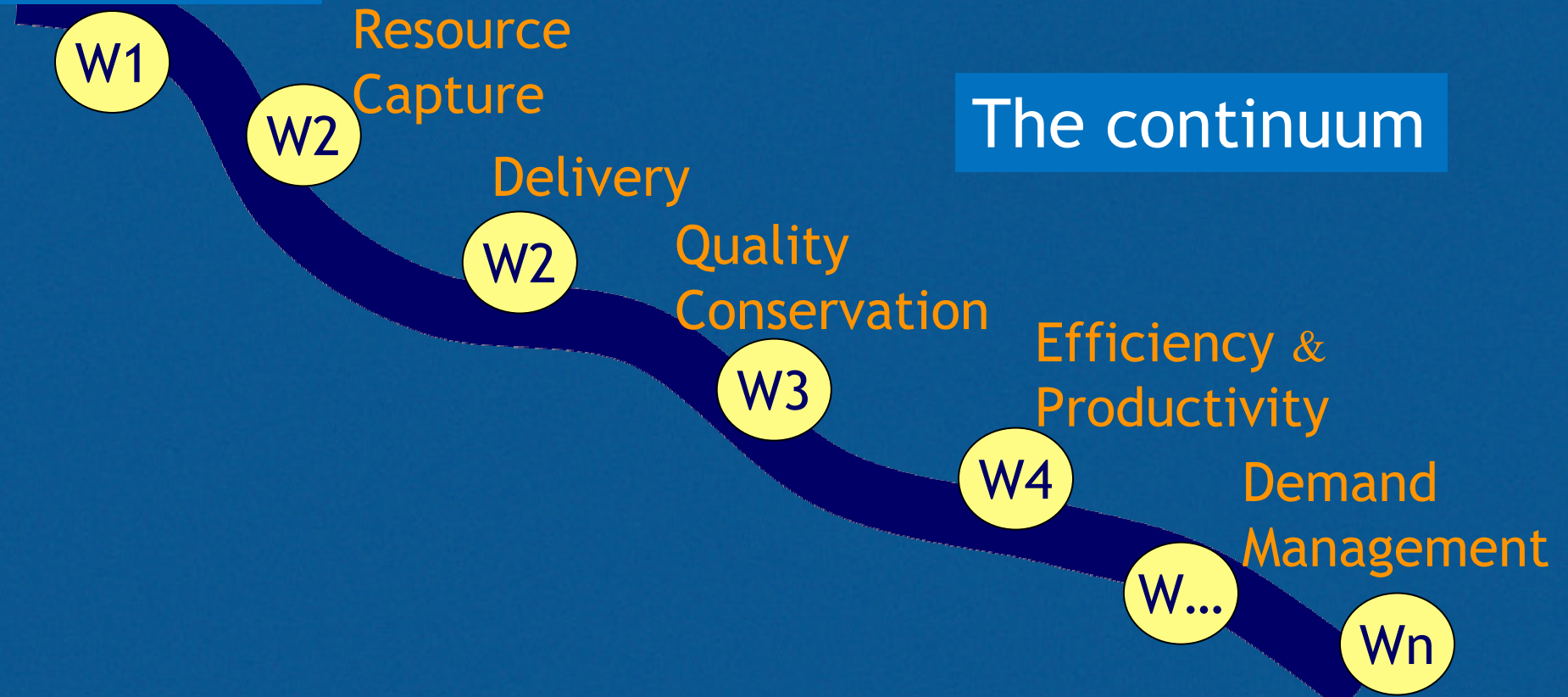
- ❑ Reduce waste
- ❑ Reduce luxury consumption ?
(public awareness, water-use policies)





FAO response in coping with water scarcity

From Sources



To end uses



Thank You



www.fao.org/nr/water