WATER POLLUTION AND ENVIRONMENTAL CHALLENGES

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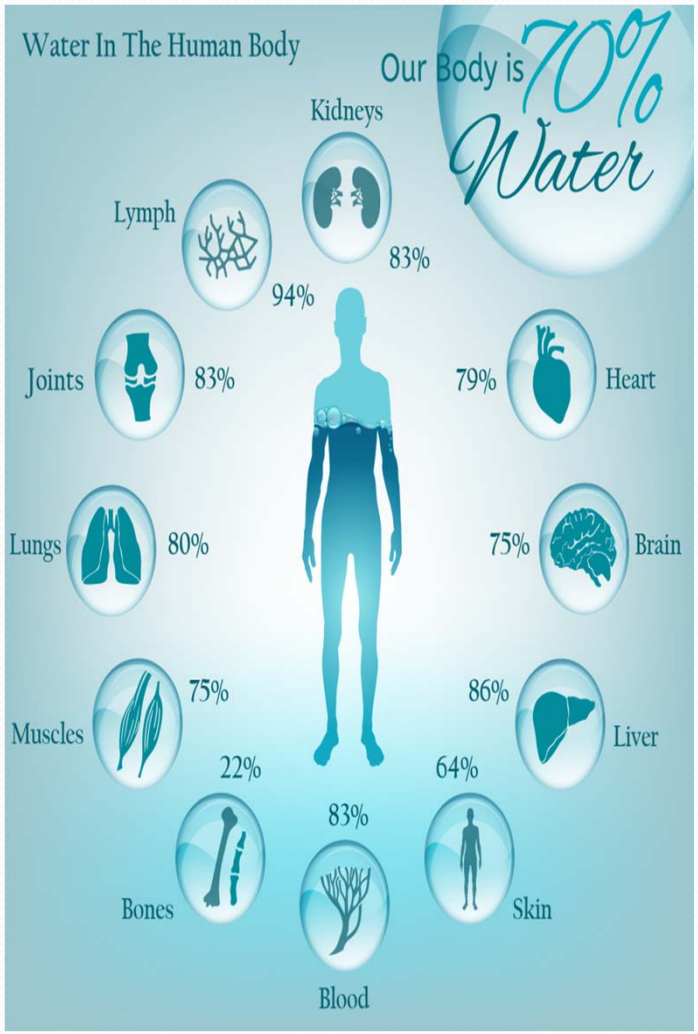
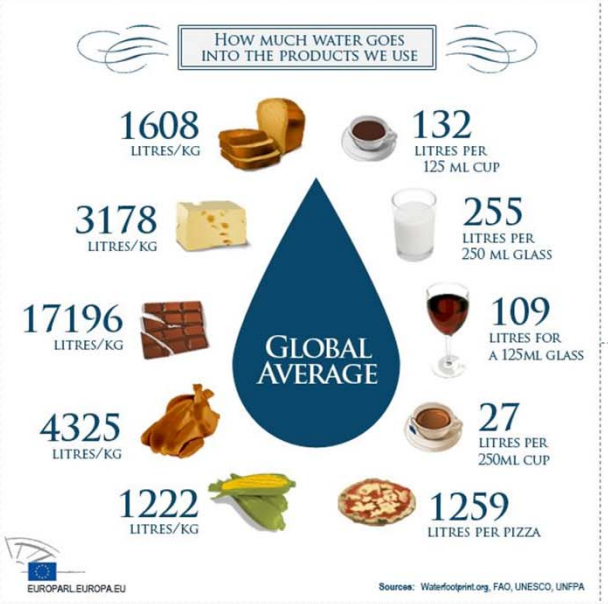
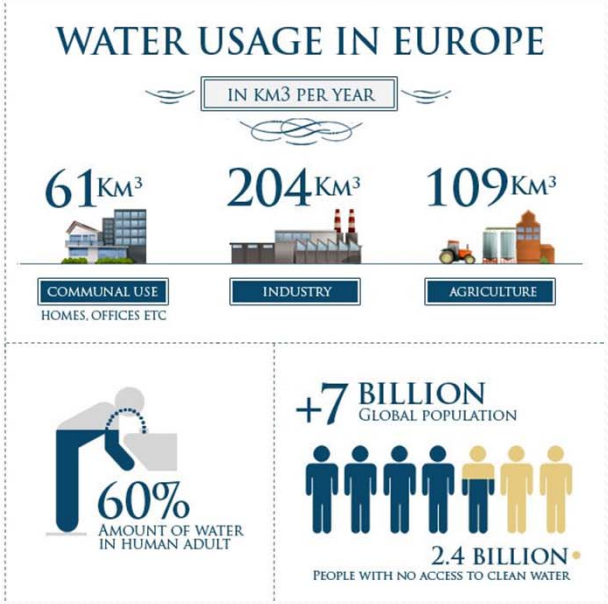
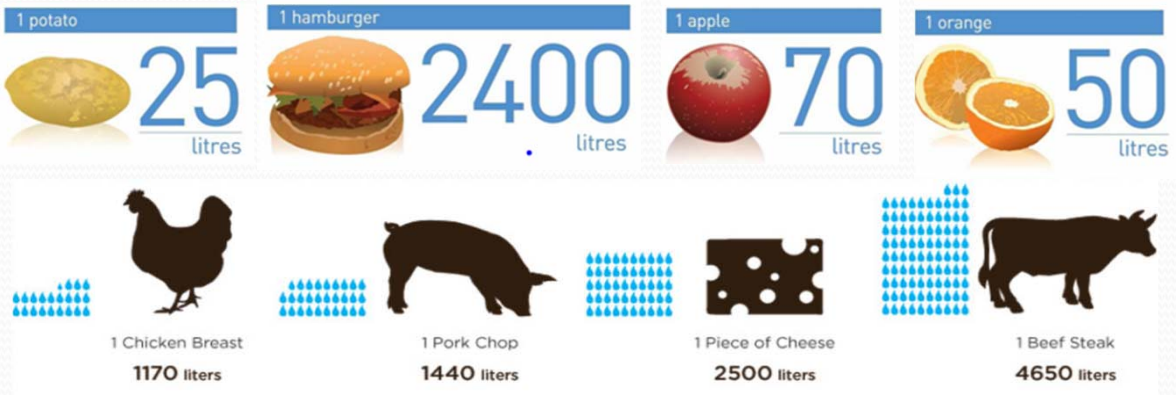
WATER, a vital resource



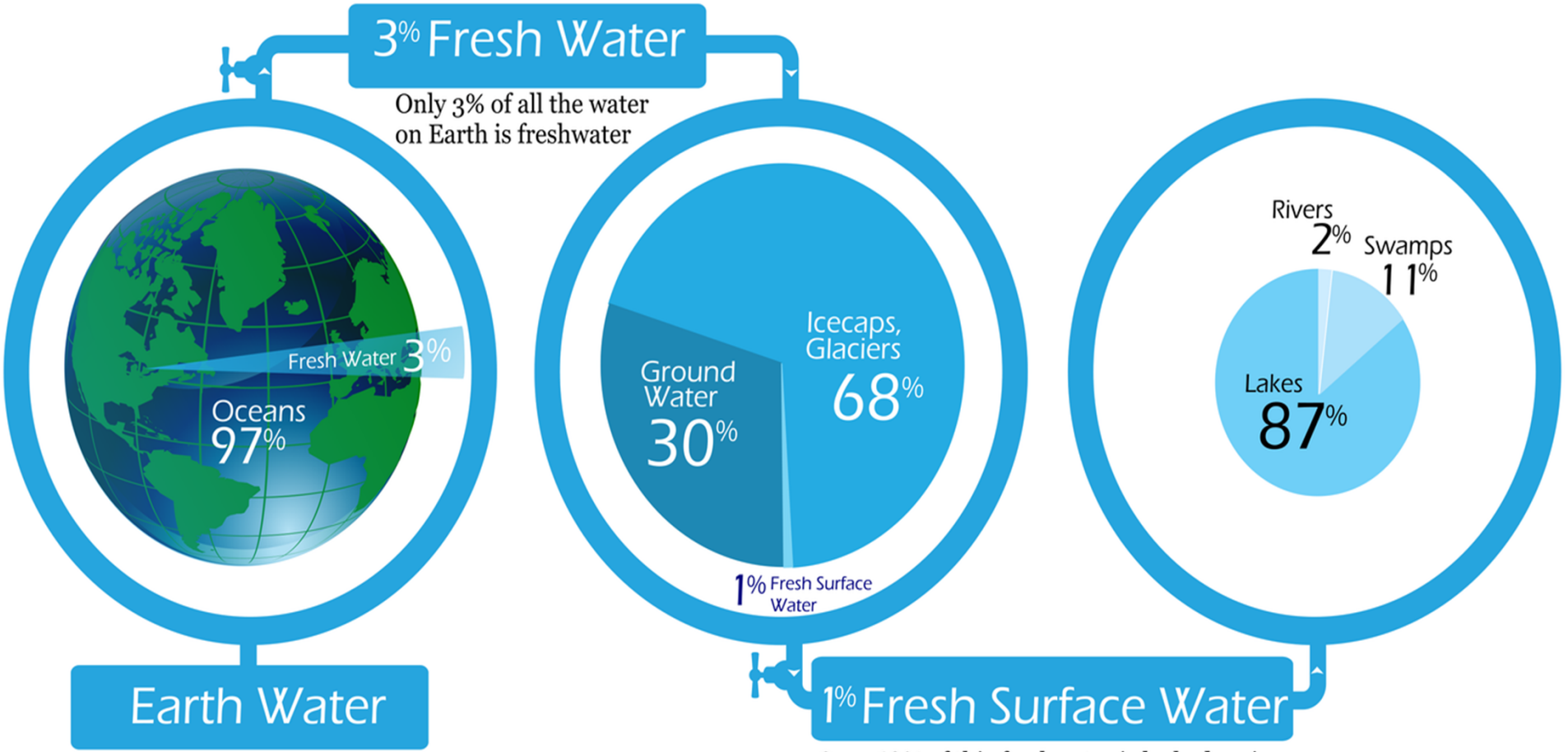






The human body is aprox. 70 % water !

Water resources and their accesibility



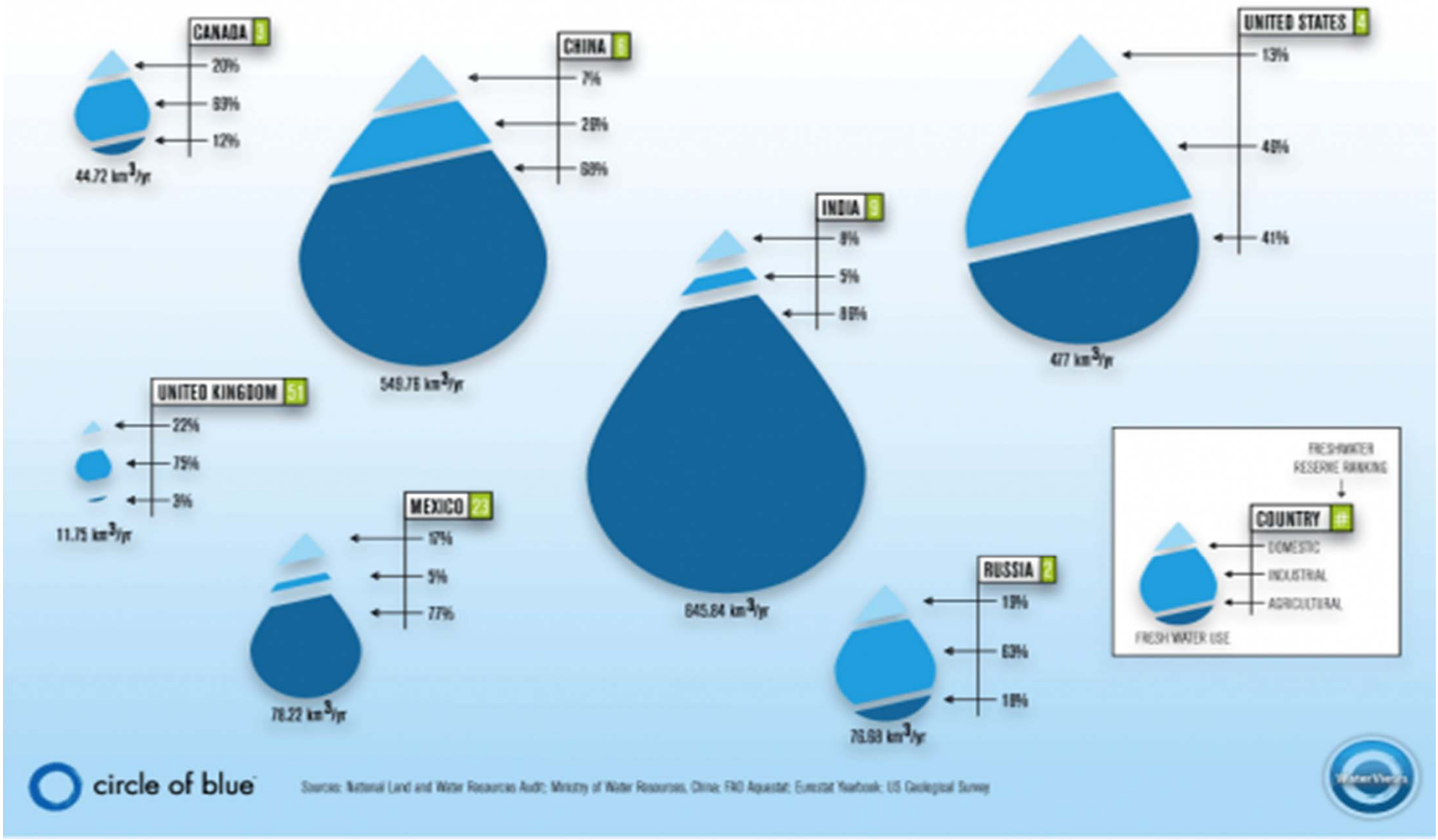
Water uses

Water is a major component of human development activities

The major uses of water resources are:

- ***Drinking & Industrial water production***
- ***Irrigation of agricultural fields***
- ***Energy production***
- ***Recreation, Public services, Salubrity services***
- ***Social and Economic development***

Water consumption- a global perspective



Water scarcity & Consumption

Strawberries for export

Coto Doñana National Park, southern Spain

Regional water scarcity- Aral Sea

Cotton for export

Former Aral Sea, Central Asia

Water resources for drinking and industrial water production

- **Surface water**
  - *"running" water* : rivers and streams
  - *natural and artificial lakes*
  - *seas and oceans*
- **Underground water**

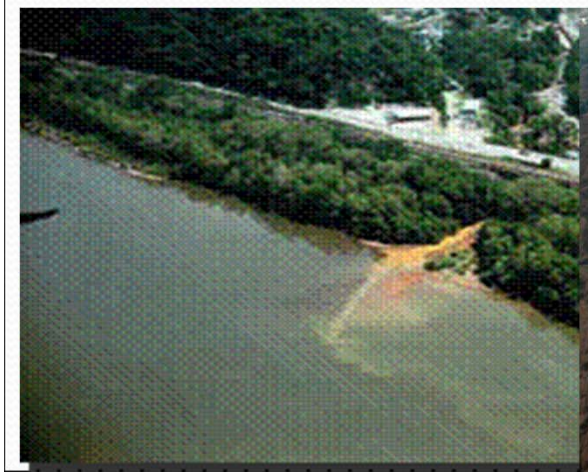
Pollution of natural water resources

Water pollution represents an alteration of the physical, chemical, biological, bacteriological and radioactive qualities of water, over the maximum allowable concentrations (for each quality indicator), produced directly or indirectly by human activities. Polluted waters become inadequate for the normal uses.

Pollution of water natural resources_ Causes

✓ ***Point- sources*** *represented by*: municipal wastewater treated and discharged, industrial wastewaters, with continuous or intermitent discharges, with various treatment degrees;

✓ ***Disperse pollution sources*** *resulted from:* precipitations, waster disposal sites, agricultural fields (pesticides), infiltrations, effluents from animal farms, accidental discharges.



Pollutants types in water and wastewater

Pollutants with effects on the quality of water, aquatic ecosystems and human health:

1. ***Solids of various dimensions*** (large, grit, sand, suspended solids, coloids)
2. ***Biodegradable organic compounds***
3. ***Inorganic compounds*** (dissolved)
4. ***Toxic/ Carcinogenic compounds*** (organic & inorganic)
5. ***Detergents***
6. ***Oil and grease***
7. ***Petroleum compounds***
9. ***Radioactive substances***
10. ***Bacteria, Viruses, Parasites***
11. ***Warm water***

Global water pollution

Devecser, Hungary, Oct. 5, 2010


Global water pollution

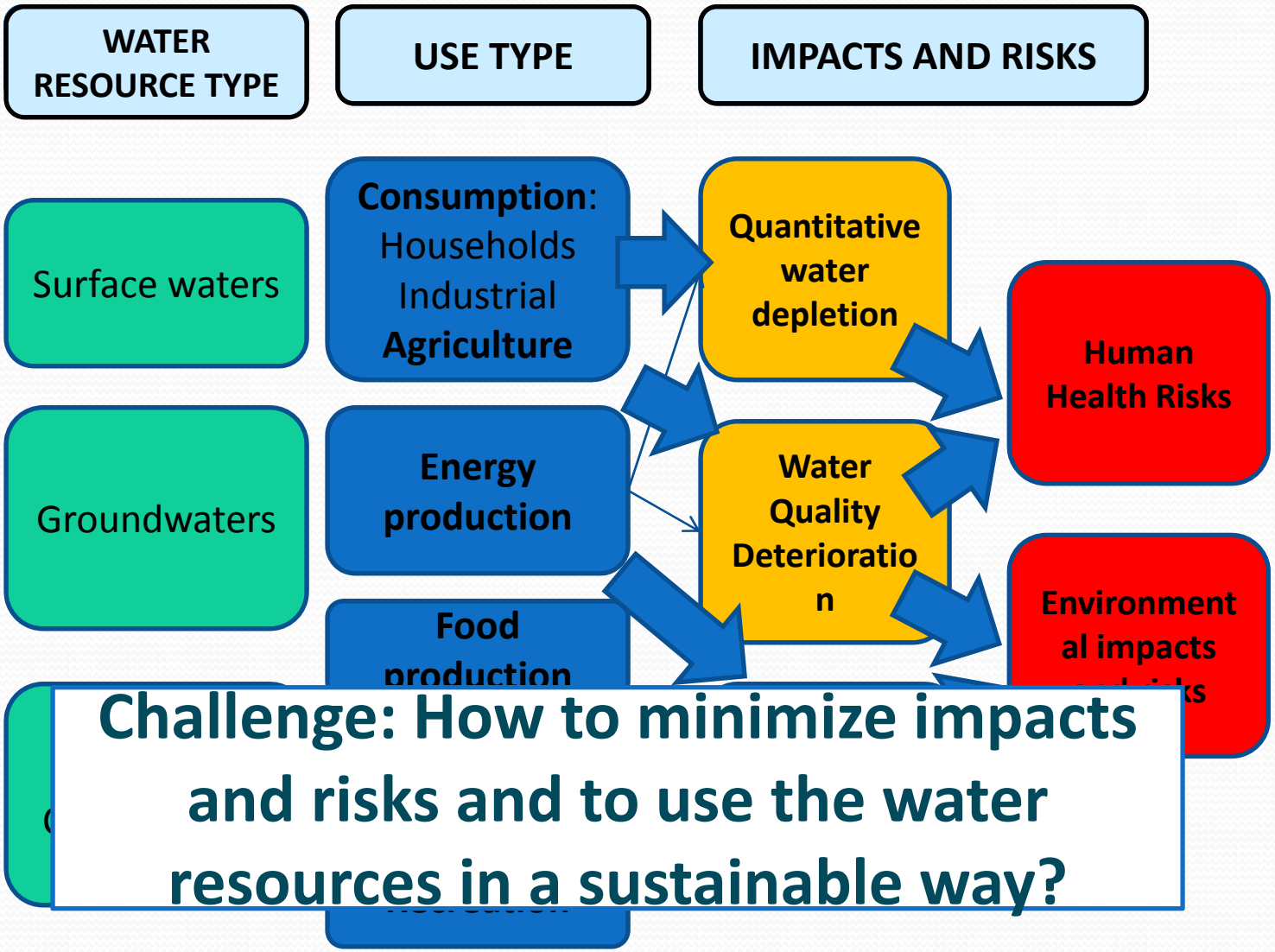
INTEGRATED WATER RESOURCES MANAGEMENT (IWRM)

- "The process that promotes the coordinated development and management of water, land and related sources in order to maximize the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems" (GWP, 2004)
- Water Framework Directive (EC, 2000) Objectives: 2018 "good water status"
- Main issues: **Integration** and **Implementation**

INTEGRATION PERSPECTIVES

- Water cycle- *natural* and *human-related* (Complexity of water systems at all scales)
- **Multi- and interdisciplinarity**
- Integration of policies and practices at the level of stakeholders, national and international organisations (*river basin oriented*)
- Integration with other resources management practices (energy, material resources, etc.) and organisational management systems (ISO standards)
- ***Adaptive water management*** - continuous improvement

WATER USE AND ASSOCIATED IMPACTS AND RISKS



Level 1: Complexity of Water Use Cycle

STAKEHOLDERS' PARTICIPATION

Level 2: Complexity of Management Systems

- ***Stakeholders***
  - **Water Resources Management Authority**
  - **Env**
  - **Age**
  - **Wat**
  - supp
  - **Use**
    - I
    - I
    - A
    - S
  - **NGO**
  - **Univ**
  - **Inst**

- ***Issues***
  - Different Interests
  - Different Objectives

& Skills

ments

ds

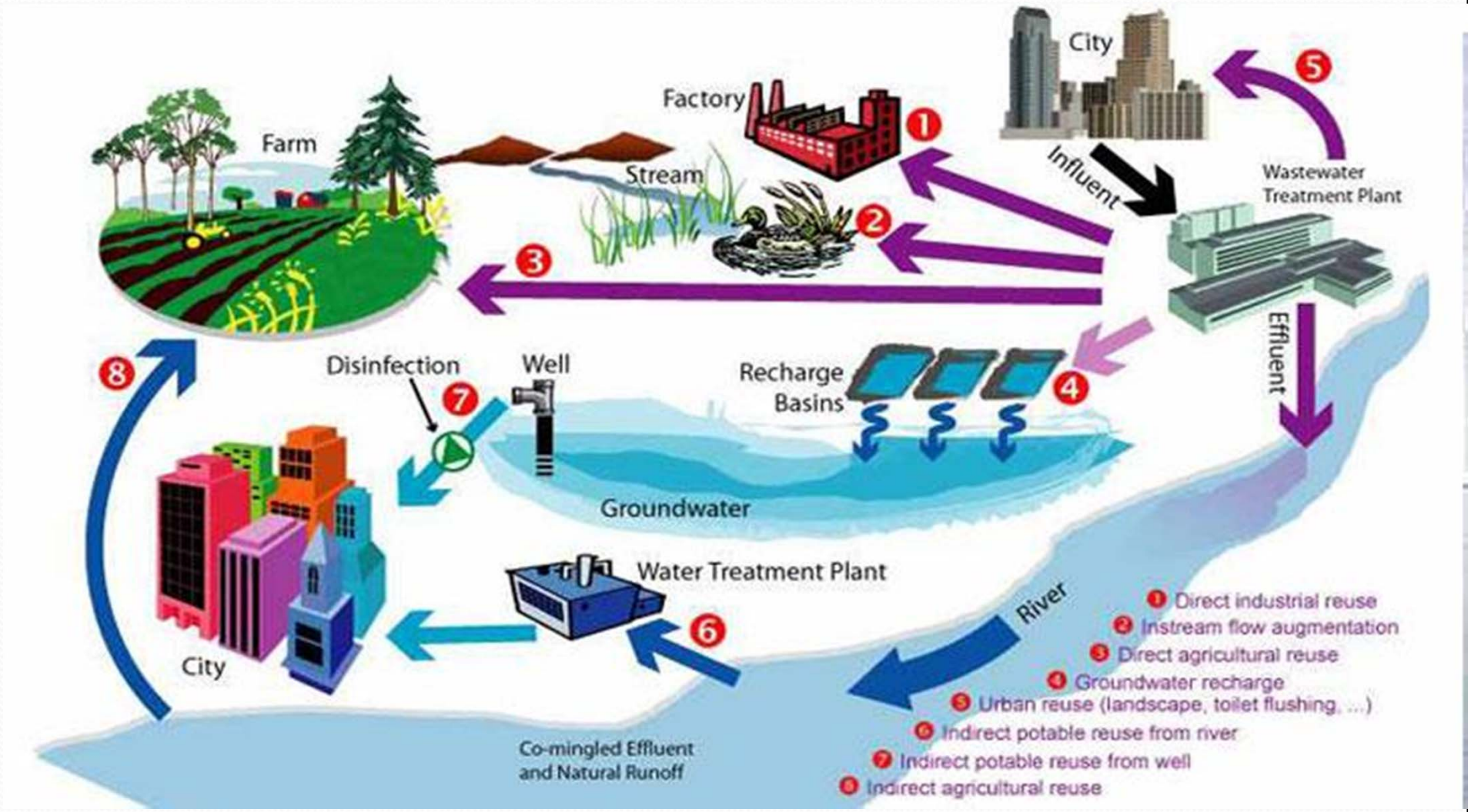
al

***Challenge*:**

How to create a common language and effective cooperation for specialists in:

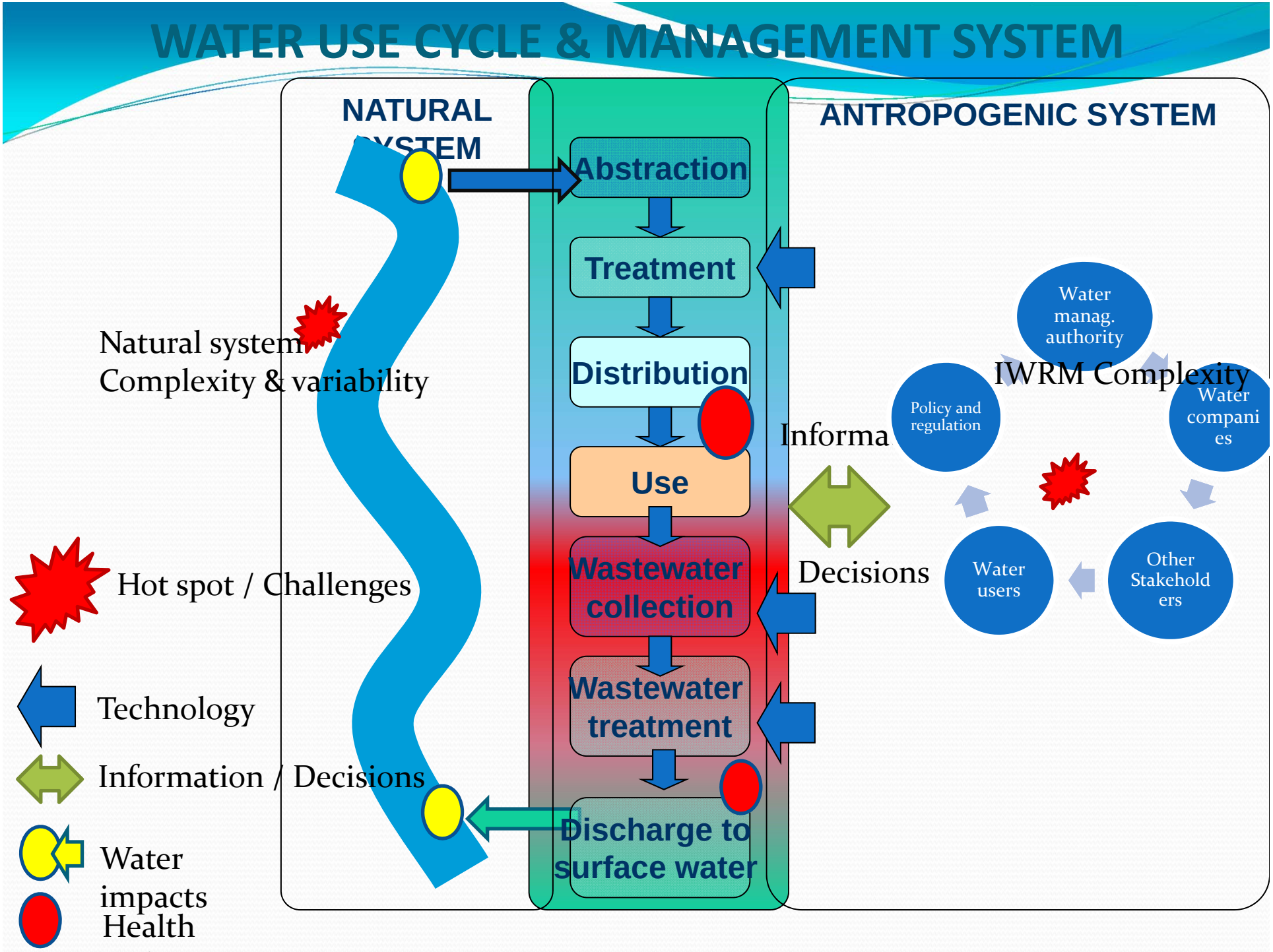
- **Hydrology, Hydrogeology,**
- **Chemistry, Hydrobiology, Ecology**
- **Civil engineering**
- **Resource management**
- **Environmental Engineering**
- **Climatology**
- **Economics, Sociology, etc.**

The water use cycle and recycling/reuse

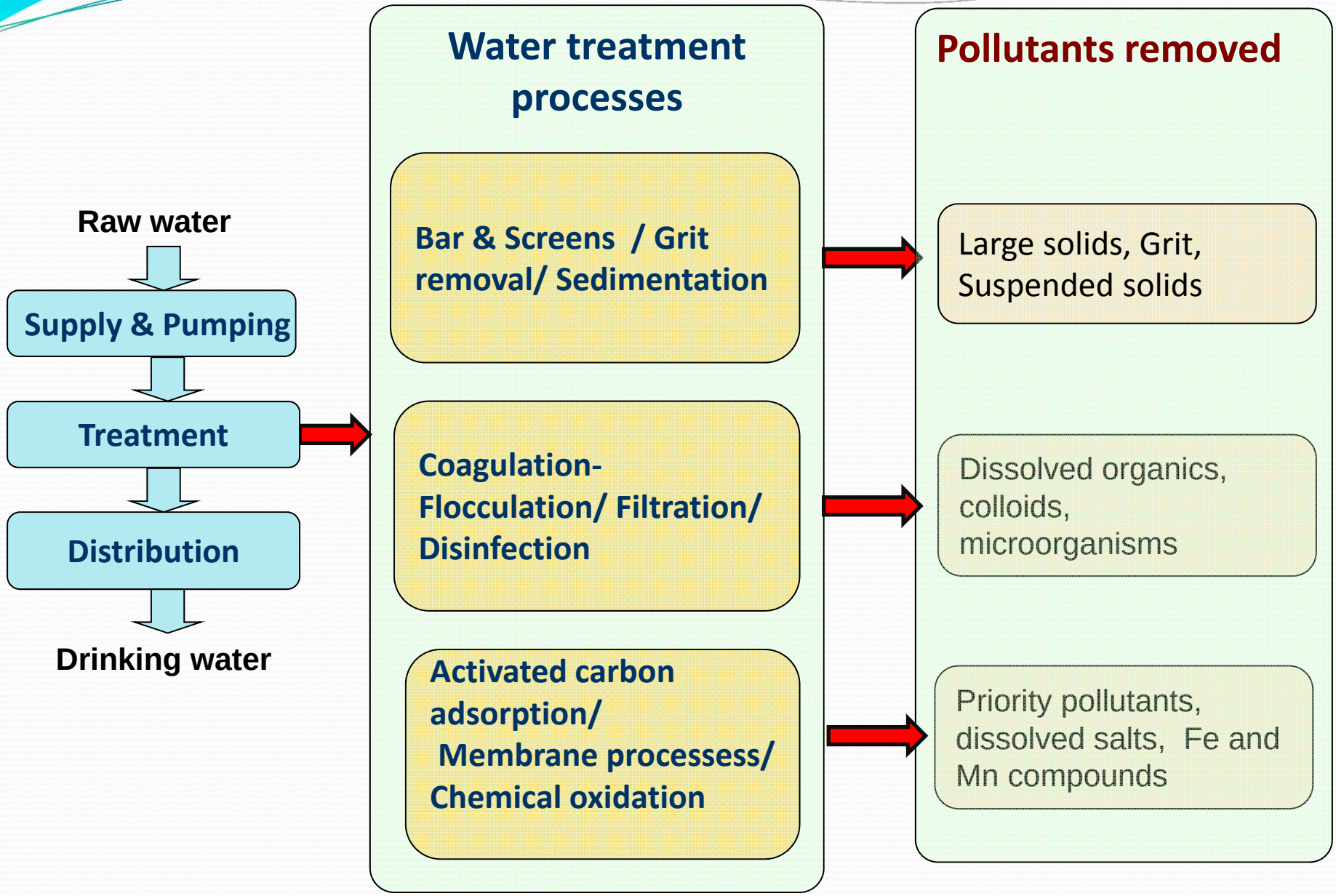


Source: http://www.aquaplanet.us/

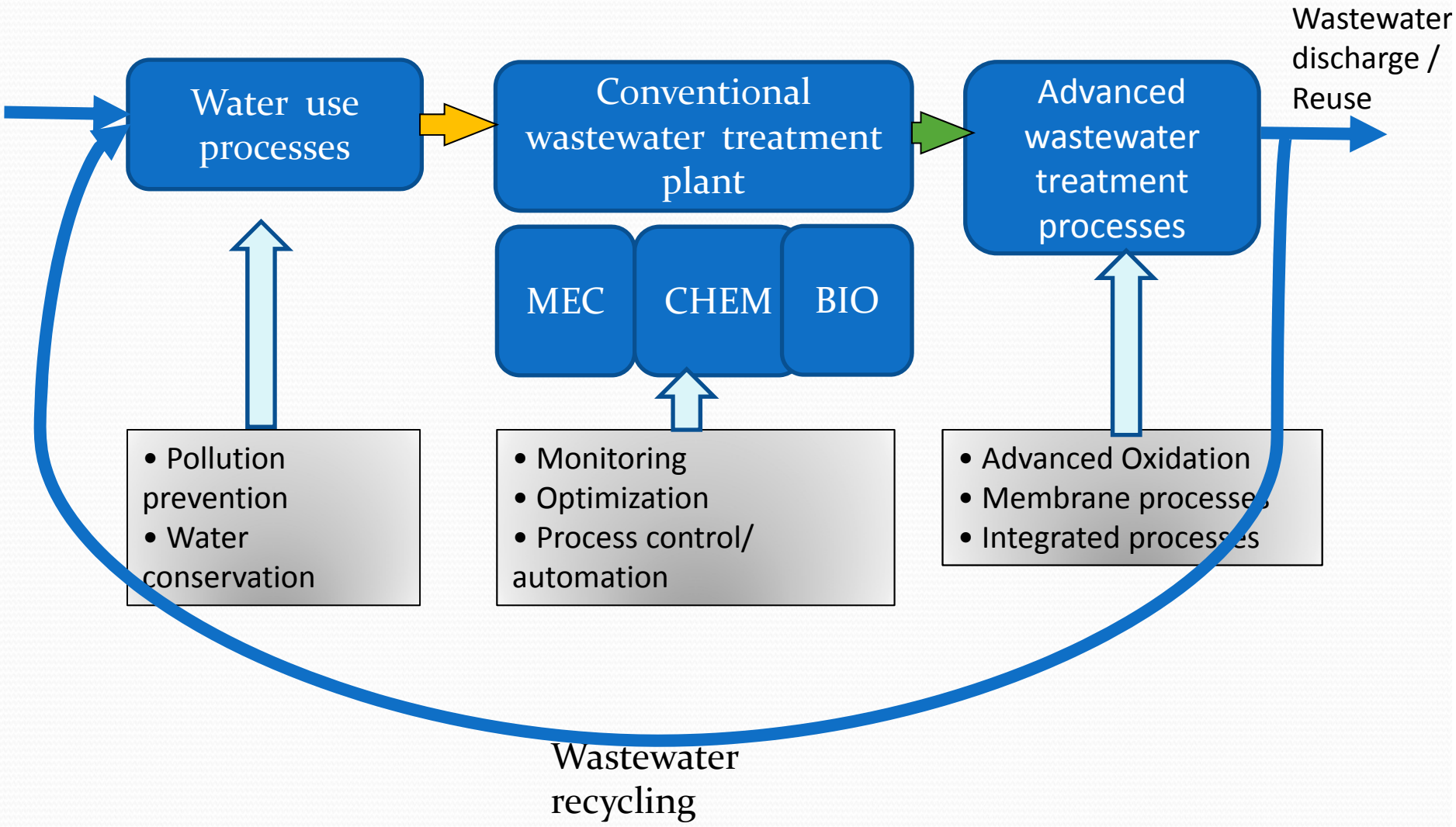
WATER USE CYCLE & MANAGEMENT SYSTEM



Drinking water treatment processes

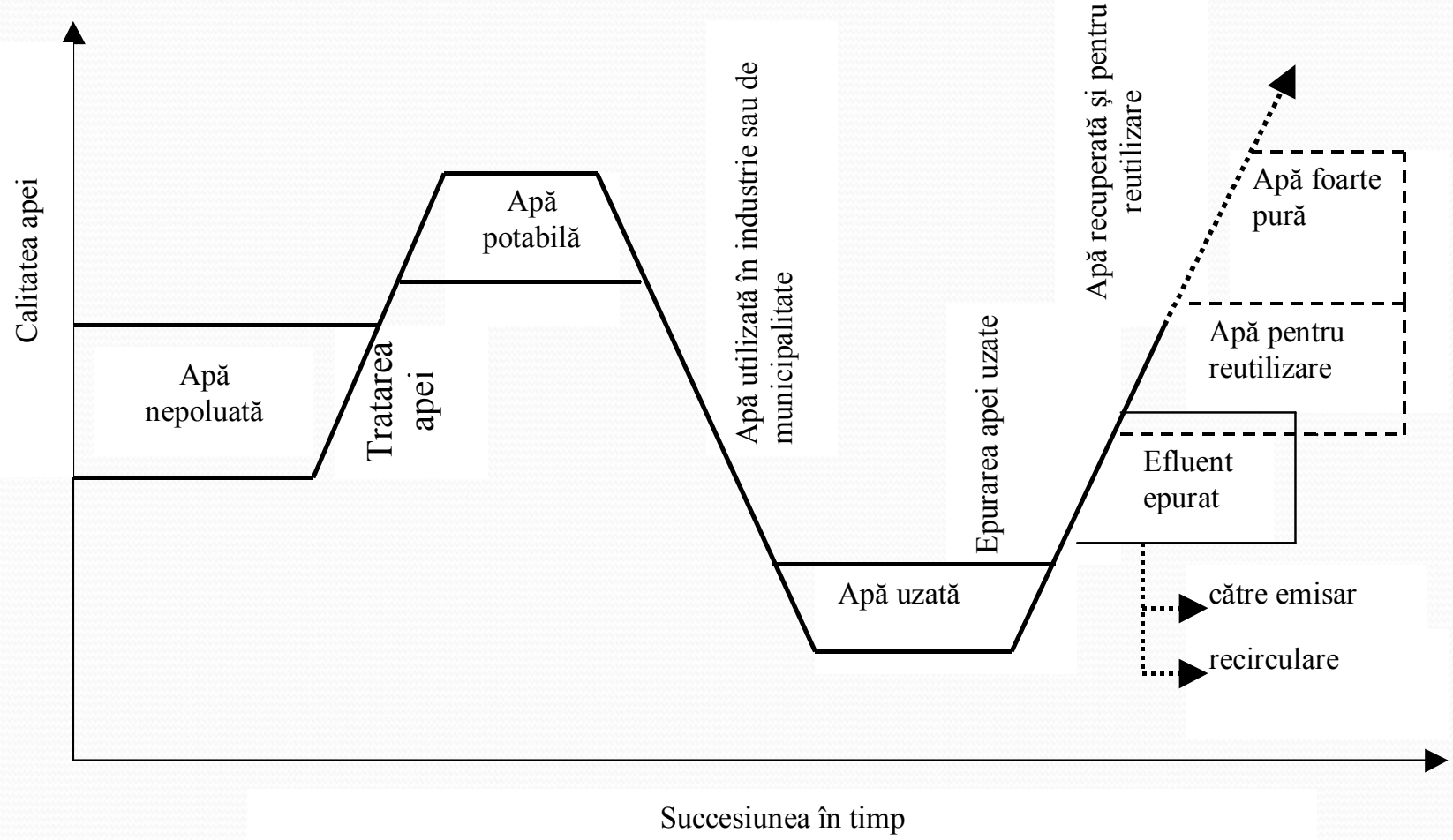


Wastewater treatment processes



Water qualitative changes in its use cycle

During water treatment, use, wastewater treatment and reuse, many quality changes occur in water (quantified by various indicators)



Emerging pollutants

Emerging pollutants

- **norman-network.net** :
- reference laboratories, research centres and related organisations for the monitoring and biomonitoring of emerging environmental substances
- **Emerging pollutants** = substances that have been detected in the environment, but which are currently not included in routine monitoring programmes at EU level and whose fate, behaviour and (eco)toxicological effects are not well understood.
- **More than 1200 substances** (February 2019)

Priority pollutants

- **EU Initiatives and Legislation:**
  - **Decision no. 2455/2001/EC**
  - **Directive 2008/105/EC**
  - **Directive 2013 / 39/ EU**
- **56 priority substances**
- **Environmental (& biota) quality standards**
- **10 substances on the Watchlist**
- **USEPA**
- **126 priority pollutants**

Water footprint of Products/Processes/Services/Nations

Green water footprint

- volume of rainwater evaporated or incorporated into product.

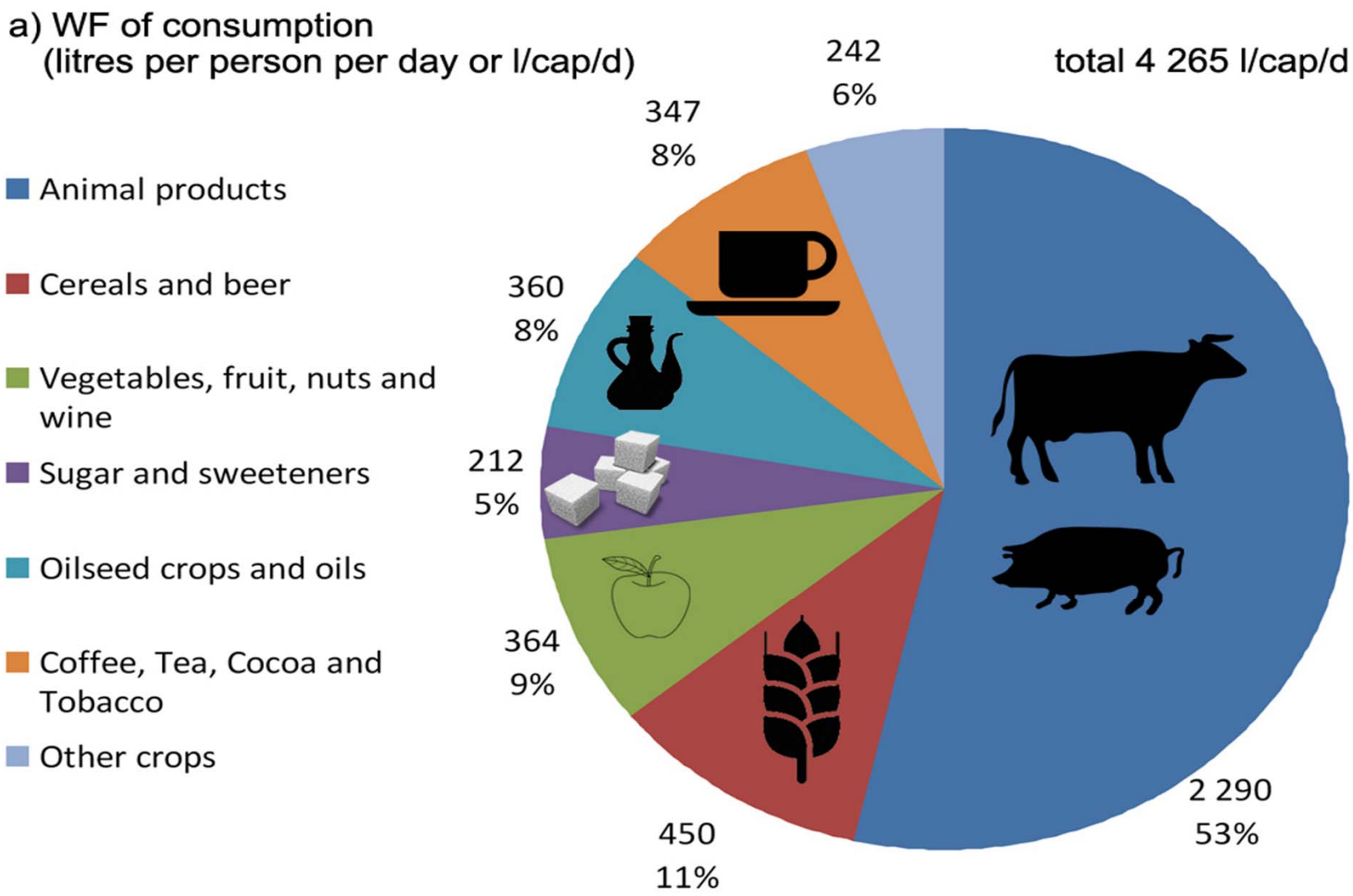
Blue water footprint

- volume of surface or groundwater evaporated, incorporated into product or returned to other catchment or the sea.

Grey water footprint

- volume of polluted water.

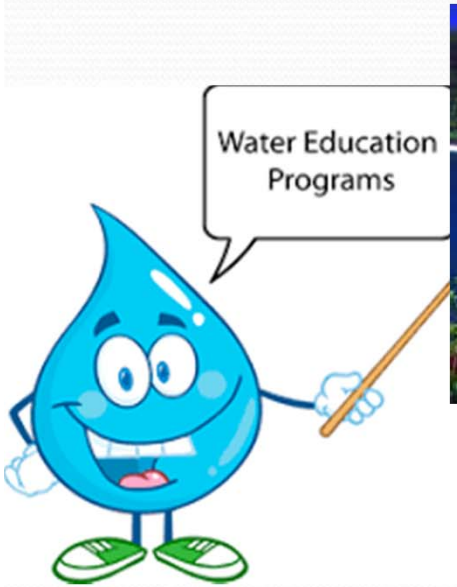
Water Footprint of consumption products



D.Vanham and G. Bidoglio, 2013, "A review on the indicator water footprint for the EU28" , *Ecological Indicators* journal, vol. 26, p. 61-75

Education/Awareness/Communities involvement

(*Water for all* ! In a *"water smart society"*)



Water and wastewater manegement- Countries' perspectives

- Do you think that there are countries in Europe under water stress?
- What do you know about the Stakeholders' involvement in your country?
- Do you know which is the operator responsible in your town for the drinking water distribution and wastewater treatment ?
- What do you know about the quality of water services in urban areas ?
- What do you know about the quality of water services in rural areas?
- Do you have any educational programs about water conservation?
- Do you know if wastewater is recycled and where ?

Thank you for your attention !