**Environmental Policy and Legislation**

**4201-431**

# ENVIRONMENTAL POLICY

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Lecture Topic 7: Water

Lecture notes and further information:
http://www.uni-hohenheim.de/apo

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## OUTLINE TOPIC 7 – WATER

- **Main Environmental Problems and Causes**
  *Focus: Water*

  - What is water pollution?

  - Water facts

  - Dimensions of water supply

  - Options for water supply policy

  - Options for water quality policy

  - The water distribution problem

  - Water: A priceless good?

  - Methods of resolution

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## Main Environmental Problems and Causes
## - Focus: Water

Pollution of water resources is the most commonly cited example of an external cost, or externality, in economics.

### What is water pollution?

- For a natural scientist, it is the discharge of a substance into a body of water which results in changes in the functioning of the system.

- For an economist, a definition includes in addition the requirement that water pollution adversely affects at least one person's well-being or that it adversely affects production.
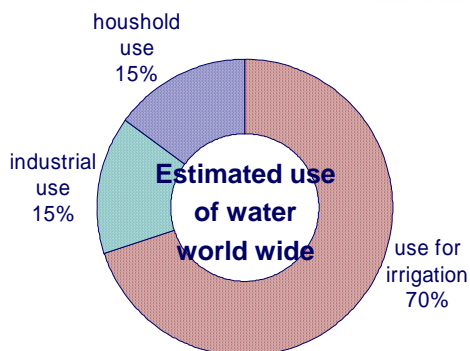
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## Main Environmental Problems and Causes
## - Focus: Water

### Water facts

- Water is infinitely renewable.

- 97% of all the world's water is seawater, 2% is locked up in glaciers, or ice and snow, and only 1% is available for human consumption.

- 1 billion people live without satisfying water supply (FAO).

- Today, 6000 children die because of stomach problems following dirty water supply.

- Each year, some 2000m people suffer from diseases caused by dirty water (WHO).

houshold use 15%

industrial use 15%

**Estimated use of water world wide**

use for irrigation 70%

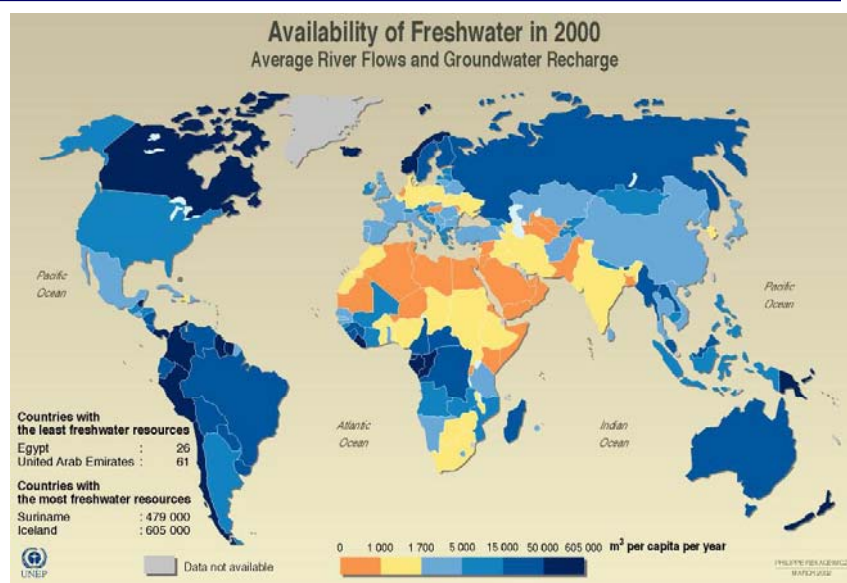## Main Environmental Problems and Causes
## - Focus: Water

### Dimensions of water supply

- **Quantity**
  Some 80 countries, which are home to 40% of the world's population, were suffering from serious water shortages by the mid-1990's.

- **Quality**
  2000: 1.1 billion people without access to safe drinking water.

- **Distribution**
  Some places in the world have more water than they can possibly use (e.g. Canada, Austria, Ireland), others have to little (e.g. Australia, Northern China, Middle East). Water is expensive to transport.

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## Water: Quantity Problem



Availability of Freshwater in 2000
Average River Flows and Groundwater Recharge

Countries with the least freshwater resources
Egypt : 26
United Arab Emirates : 61
Countries with the most freshwater resources
Suriname : 479 000
Iceland : 605 000

Data not available

0   1 000   1 700   5 000   15 000   50 000   605 000   m³ per capita per year
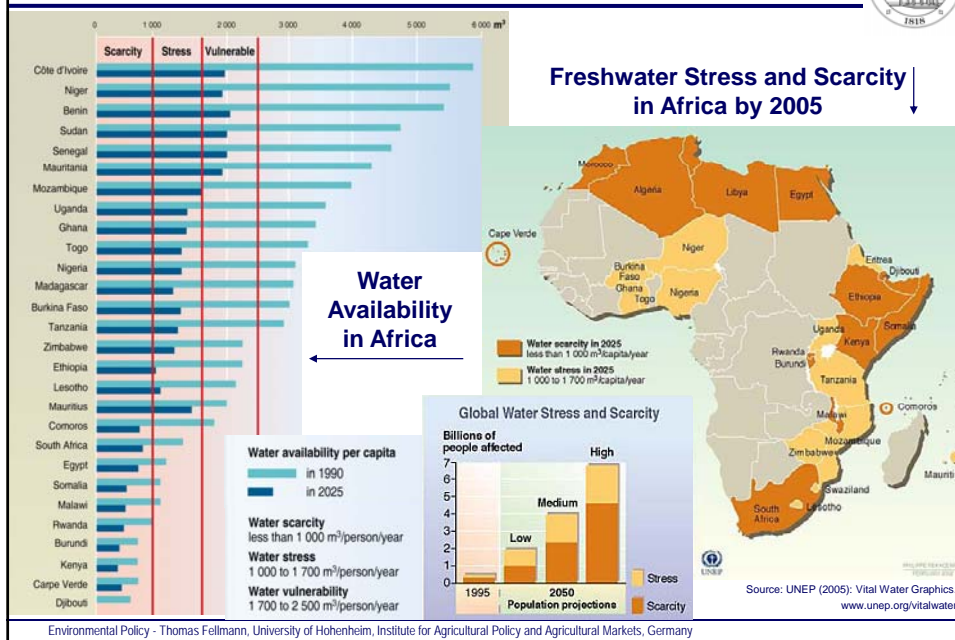
Source: World Resources 2000-2001, People and Ecosystems: The Fraying Web of Life, World Resources Institute (WRI), Washington DC, 2000.

## Water: Quantity Problem



Freshwater Stress and Scarcity in Africa by 2005

Water Availability in Africa
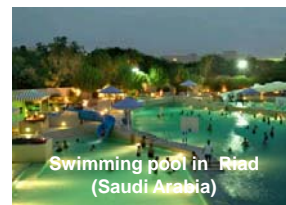
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## Water
### - Scarcity Amid Plenty

- **Bangladesh**
  officially the wettest place on earth → suffers frequent water shortages → surface water is badly polluted → ground water contains much arsenic.


Flood in Bangladesh


Irrigation in Israel

- **Middle East**
  belongs to the most arid regions in the world → Israel is pioneer of drip irrigation → Israel is deliberately using too much water from Jordan river as bargaining chip in peace negotiations.

- **Saudi Arabia**
  is depleting fossil ground water and desalinating seawater to grow wheat → true cost of S.A. wheat is estimated 100 times the world price.


Nefud desert in Saudi Arabia.


Swimming pool in Riad (Saudi Arabia)

**Water: Quantity Problem**
- Options for Water Supply Policy

- **Water right doctrines**
  promulgated out of state statutory law and common law which are different for surface and ground water.

- **Water development**
  → construction of irrigation systems.

- **Water pricing**
  → sale of water from development projects or the sale of existing water rights; payments for water rights resulting from the employment of conservation practices are included in water pricing

- **Water management and conservation systems**
  wide range of licensing-mandated management practices and water allocation system; this might - in a extreme - involve governmental appropriation of water rights.
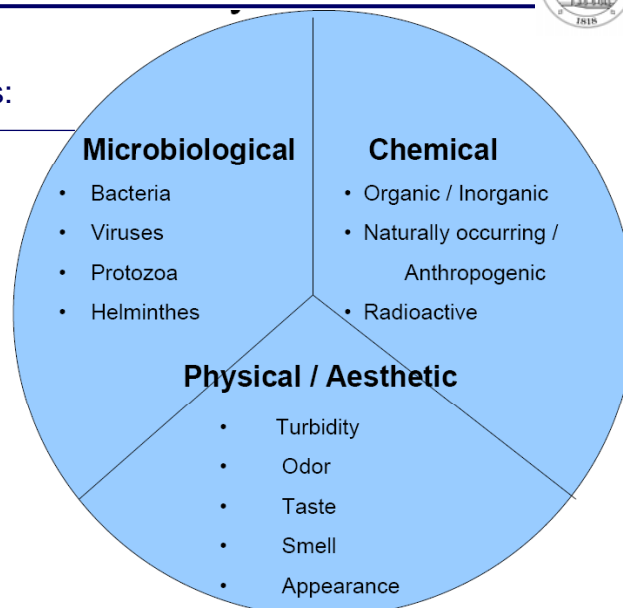
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**Water: Quality Problem**

Water Quality
- 3 Broad Categories:

*Water-Related Diseases:*
Water-related diseases are estimated to claim 3-7 million lives each year. This includes water-borne, water-washed, water contact diseases, as well as water (insect) vector diseases -i.e. those associated with water habitat (e.g. malaria, dengue) and thus with water resources & habitat management.
(WHO, 2004)

**Microbiological**
- Bacteria
- Viruses
- Protozoa
- Helminthes

**Chemical**
- Organic / Inorganic
- Naturally occurring / Anthropogenic
- Radioactive

**Physical / Aesthetic**
- Turbidity
- Odor
- Taste
- Smell
- Appearance

## Water: Quality Problem

Options for a water quality policy → four general approaches

- free market

- tax inputs

- performance standards
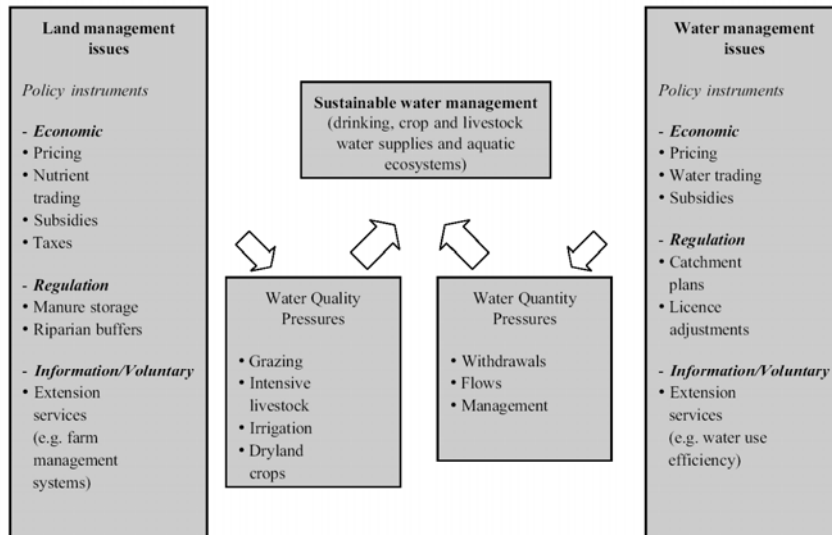
- prescribe practices

## Water: Distribution Problem

- Closely related to water supply and quality policy.

- However, the most difficult issue within the context of water policy.

- Geographical and social distribution uneven → water transportation unthinkable due to high transportation costs

- Best way to deal with water is to price it and thus treat it as an economic good, subject to the laws of supply and demand.

- Main question: Who owns the Water?

## Water: Sustainable Water Management



Source: OECD Secretariat adapted from Seamus Parker (see Workshop Proceedings publication).

## Water: A Priceless Good?

- Low water prices cause particular problems in developing countries → little incentive to conserve water.

- Low water prices don't support the poorest → they don't have access to piped water → low prices support the middle class.

- Anything scarce and in demand commands a price → water for human consumption is scarce → it needs to be priced.

## Water: A Priceless Good?

- Efficient and effective water pricing systems provide incentives for efficient water use and quality protection.

- A price can encourage farmers to use a more efficient way of irrigation (e.g. drip irrigation).

- Water pricing systems generate funds for infrastructure development and expansion.

- "rule-of-thump" to determine the maximum price:
  50% of the population may have to pay 4% of income.

## Water
### - Methods of Resolution

- **Chile**
  Proper pricing for water. Water stamps for poor people to meet their bills.

- **South Africa**
  Government is put in charge of the country's water. Water allocations are temporary and tradeable. Basic minimum quantity (25 l) of water is cheap or free. Higher charges for greater consumption.

- **Australia**
  Separation of water rights from property rights $\rightarrow$ water belongs to the crown, users have only access rights. A system of trading was introduced.