

**WATER, DISEASE AND WAR**  
(no associated reading)

**General Human Water Use**

- Human needs (source: U.N.):
  - 5L a day to survive.
  - 50L a day for drinking, cooking, bathing, sanitation.
- 86% of water use is for agriculture.
- 9% of water use is for industrial products.
- 5% is for domestic water use.
- There is an estimated ~10 million km<sup>3</sup> of usable freshwater.
- It is estimated that 6.5 billion people need 8,000 km<sup>3</sup>.

“There is certainly enough water for every person on the planet, but too often it’s in the wrong places at the wrong times in the wrong amounts.” –de Villiers “Water Wars”.

**Water inequality**

There is massive global inequity in the availability of clean water. Lack of clean water is associated with growing populations and lack of infrastructure due to poverty.

- 1 in 5 people have no access to safe drinking water.
- By 2025, it is predicted that ½ of people will not have access to clean water.

*Physical water-scarcity*—not enough water to produce food for themselves. However, this can be combated by importing resources, especially if the nation is rich. E.g, Middle East.

*Economic water-scarcity*—lack infrastructure and institutions to use water and move it around in space and time. Water may be physically available. E.g., sub-saharan Africa.

“Water flows uphill to money.”

**Water footprint**

The total volume of water that is used to produce the goods and services used by an individual. This concept is a helpful way to understand water use.

Major factors influencing water footprint:

1. Volume of consumption
2. Patterns of consumption
3. Climate
4. Agricultural practices

Check out this awesome website: [www.waterfootprint.org/](http://www.waterfootprint.org/)

It includes a calculator so that you can estimate your own water consumption.

There are huge differences across countries in per-capita water footprint. The top five countries are:

1. USA 2500 m<sup>3</sup>/person/year
2. Italy 2300 m<sup>3</sup>/person/year
3. Thailand 2250 m<sup>3</sup>/person/year
4. Nigeria 2000 m<sup>3</sup>/person/year
5. Russia 1800 m<sup>3</sup>/person/year

## **WATER ASSOCIATED DISEASES**

- Every year, >5 million people die from water-related diseases.
- 1.5 million children die each year from diarrhea (usually caused by water-related diseases)

### **Types of water-related diseases**

#### **1. Diseases spread by vectors that depend on water**

The most prevalent and virulent diseases of this type are:

*Arboviruses*—viruses spread by mosquitos. These include:

Malaria  
Yellow Fever  
Dengue Fever

#### **2. Pathogens that contaminate water**

Viruses—e.g., hepatitis  
Bacteria—e.g., cholera, typhoid  
Protists—e.g., giardia  
Helminthes—e.g., schistosomiasis.

## **WATER AND HUMAN CONFLICT**

- Water is becoming increasingly limited.
- Water is unevenly distributed across the globe.
- Water resources often cross political boundaries, where upstream neighbors are in the power position. 261 of the world's rivers are shared by at least 2 countries.
- 37 recorded occasions of military action between rival countries over water during the last 50 years. (Postel and Wolf 2001).
- *Inadequate water supplies can cause war, and war can cause inadequate water supplies.*

### Theory of wars

*Malthusian theory*—wars are caused by expanding populations encountering limited resources.

*Economic theory*—wars are started to pursue new markets or natural resources.

### Predictions:

- Water wars.
- “Water is the new oil.”
- “Fierce national competition over water resources has prompted fears that water issues contain the seeds of violent conflict”

--Kofi Annan, United Nations Secretary-General

### Types of Water Conflicts

#### 1. Water as a means to inflict damage.

- Pollution/diversion of water resources has a long history in warfare.
- There are many examples of terrorism as well as formal wars that targeted water resources.
- *Example. Germany 1945.* Polluted large reservoir with sewage as biological warfare.
- *Example. Sudan, Darfur. 2003-2007.* Civil war has led to destruction of water resources, including bombing wells and intentionally contaminating or poisoning wells.

#### 2. Water scarcity driving human migration increasing ethnic violence.

- Water scarcity, especially during drought periods, can drive human migrations. These migrations often trigger social unrest.
- *Example.* Conflicts in sub-saharan Africa. Genocides in Darfur and Rwanda were caused by cultural conflicts between pastoralists and farmers, perhaps in part due to water-stress.

#### 3. Transfer of water rights from public to private entities.

- There is a trend of transferring rights/administration of water to private entities.
- Privatization has the potential to increase infrastructure and use efficiency.
- Private corporations have the potential to make massive amounts of money on water. Privatization is in part fueled by the World Bank/IMF. For example, loan

agreements from IMF with at least 6 countries include stipulations of water privatization.

*Example: Water war of Cochabamba Bolivia, 2000*

- Government sold water rights for \$200 million to private consortium of companies (U.S. based), mainly Bechtel.
- Bechtel et al. immediately raised rates by at least 35%. A person working minimum wage earns ~\$70/month. Water costs were now >\$20/month.
- Massive protests
- Government installed martial law
- Increasing violent protests (blockades blocked off food/transportation from cities)
- Bechtel leaves Bolivia.
- While this has been perceived as a victory against privatization of water resources, ~50% of people of Cochabamba remain without water and have to buy from water trucks which are often extremely expensive and polluted. Bechtel is still trying to collect \$25 million in compensation from the country of Bolivia.

#### **4. Conflict over shared resources.**

- Water resources often cross boundaries, whether they are states (as in the U.S.), or countries.
- Upstream pollution can contaminate downstream water.
- Upstream dams can decrease downstream water availability. Thus, upstream dams that are built without consent increase conflict between countries.

*Example: India and Bangladesh. 1960s-1970s.*

- India constructed a series of dams on the Ganges River to increase water supplies to the city of Calcutta.
- This decreased downstream water in the Ganges in Bangladesh.
- This led to periodic violence and massive migrations of Bangladeshi to India, provoking ethnic conflicts.

*Example: China and Tibet.*

- Tibet is the source of 10 of the largest rivers in Asia, the source of fresh water for ¼ of the world's population.
- Some have hypothesized that the strategic importance of Tibet for China's water resources has increased conflict.

## **WHAT CAN YOU DO?**