**Water and change**

* Identify the ways in which water is utilized at the regional scale. Examine the environmental and human factors affecting patterns and trends in physical water scarcity and economic water scarcity. Examine the factors affecting access to safe drinking water.

**Water stress:** Where demand exceeds supply, leading to shortages.

**Safe drinking water:** Water safe for human consumption. Free of harmful pollutants and bacteria.

For around 40% of global population, lack of water is a constant threat. Precipitation is unevenly distributed. Water shortages may be due to:

* **Physical water scarcity:** Demand for water is greater than the supply. Does not have to be in an arid environment.
* **Economic water scarcity:** Water is available but for economic reasons not able to be utilized. This might include extraction or transportation costs or pollution of water.

Utilization at the regional scale:

Precipitation can be divided into green water (60% - absorbed by soil and plants, then respired) and blue water (40% - collected in rivers and lakes available for withdrawal before it evaporates or reaches the ocean). People directly use only 1.5% of total precipitation.

Agriculture is the largest cause of utilization, which is mostly irrigation (75% of blue water). Industrial and domestic uses are, however, growing at faster rates. The amount of water used by populations depends on water availability and levels of urbanization and economic development. There can be large variations in water demand within countries, depending on land use (agriculture).

Developed: Agriculture accounts for around 40% of total water use.

Developing: Agriculture accounts for around 80% of total water use.

As countries develop, domestic and industrial water demand grows rapidly.

Environmental and human factors affecting water scarcity:

**Climate change:** Rising sea levels may cause saltwater intrusion into aquifers. Warmer temperatures increase evaporation.

**Climate:** Arid regions cover 40% of the world’s land area but receive only 2% global precipitation. This uneven precipitation distribution causes physical water scarcity.

**Population growth:** Larger populations increase water demand. This includes domestic demand, agricultural demand and industrial demand (processing).

**Pollution:** Increased sewage (from urbanization) and use of fertilizers cause chemicals and metals to pollute water sources.

**Political control:** Countries having control over water resources.

**Mismanagement & groundwater depletion:** Unsustainable use of water causes water shortages or salinization.

Problems caused by water scarcity:

* **Drought:** Drought is below average supply of water over a prolonged period.
* **Crop failure:** Irrigation not possible.
* **Livestock death**
* **Famine** from undernourishment.
* **Conflict** over lack of resources (River Jordan drainage basin).
* **Refugees**

Solutions to water scarcity:

Possible solutions include:

* **Sewage treatment**: Using a number of processes to remove contaminants, using physical, chemical and biological (microorganisms) treatment.
* **Desalination**: New processes like reverse osmosis are used to desalinize water. Countries like Saudi Arabia have adopted this process, however it requires a high level of technology and is energy intensive.
* **Conservation methods and charities**: Awareness on reduced water consumption and aid for developing countries (water filters).