

Water Availability and Climate Change

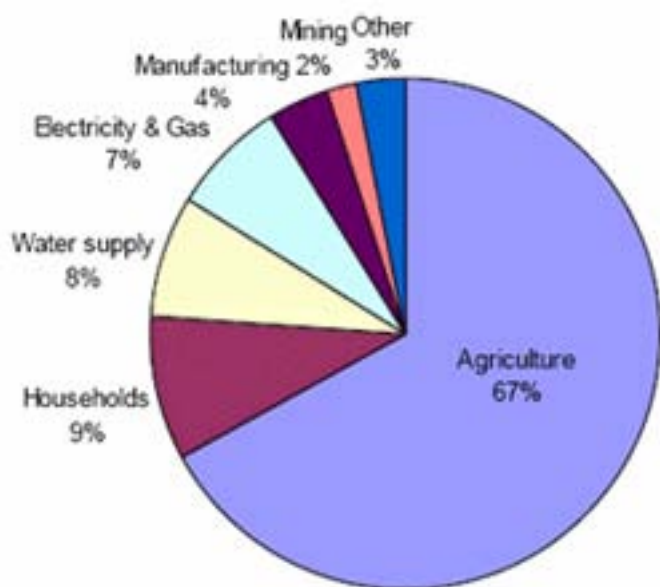
Khaldoun Bawanah

Water Quality Measurement Division Head

Aqaba Special Economic Zone Authority

Aqaba – Jordan

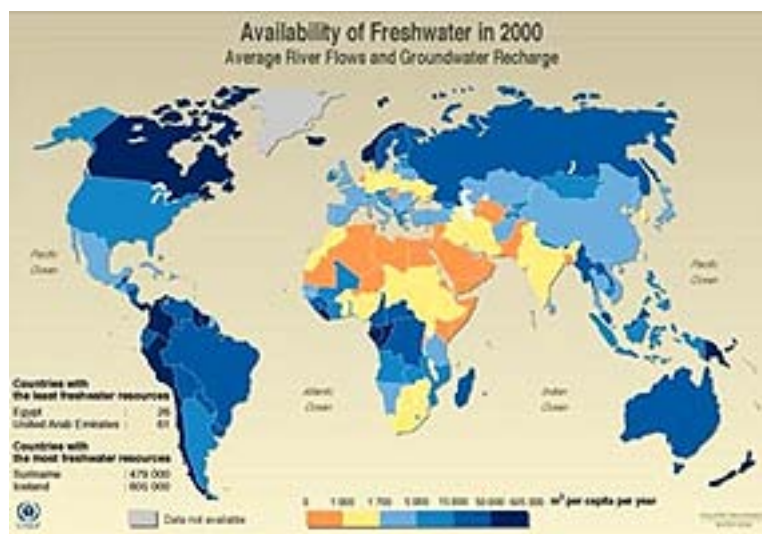
The vast majority of the Earth's water resources are salt water, with only 2.5% being fresh water. Approximately 70% of the fresh water available on the planet is frozen in the icecaps of Antarctica and Greenland leaving the remaining 30% (equal to only 0.7% of total water resources worldwide) available for consumption. From this remaining 0.7%, roughly 87% is allocated to agricultural purposes (IPCC 2007). The figure below showing Water use in the world (2005).



These statistics are particularly illustrative of the drastic problem of water scarcity facing the world. Water scarcity is defined as per capita supplies less than 1700 m³/year (IPCC 2007).

According to the Comprehensive Assessment of Water Management in Agriculture, one in three people are already facing water shortages in 2007. Around 1.2 billion people, or almost one-fifth of the world's population, live in areas of physical scarcity, while another 1.6 billion people, or almost one quarter of the world's population, live in a developing country that lacks the necessary infrastructure to take water from rivers and aquifers (known as an economic water shortage).

There are four main factors aggravating water scarcity according to the Intergovernmental Panel on Climate Change IPCC:



Source: World Resources 2000-2001: People and Ecosystems: The Fraying Web of Life. World Resources Institute, Washington DC (2000).

- Population growth: in the last century, world population has tripled. It is expected to rise from the present 6.5 billion to 8.9 billion by 2050. Water use has been growing at more than twice the rate of population increase in the last century.
- Increased urbanization will focus on the demand for water among a more concentrated population. Asian cities alone are expected to grow by 1 billion people in the next 20 years.
- High level of consumption: as the world becomes more developed, the amount of domestic water used by each person is expected to rise significantly.
- Climate change will shrink the resources of freshwater.

The effect of climate change on freshwater availability

Climate changes in the world influence ecosystems, livelihoods and development through changes in regular weather – i.e. daily, seasonal and annual patterns – and through irregular extreme events. The main influences are temperature, rainfall and runoff, sea level, tidal fluctuations and extreme events such as storms, floods and drought.

Those climatic and hydrological parameters are all changing in the world with knock on effects on water volume and flow, and on saline intrusion and soil and water quality. Records in some countries show that average annual temperatures and rainfall have increased, as have sea levels and the occurrence of storms with

impacts on settlements, lives and natural systems, most clearly in coastal and estuarine situations.

There are actions that can be taken to prepare for a more variable climate and we can make a case to our policy makers to prepare for change. The most important immediate action concerns the way we manage our water and energy resources. Improving our management of water and energy today will prepare us to adapt tomorrow. Improved understanding of our water resources will allow more efficient and flexible allocation systems and better investment in infrastructure, both to improve access to water and reduce risks from climate change.

Key changes to the hydrological cycle (associated with an increased concentration of greenhouse gases in the atmosphere and the resulting changes in climate) include:

- Changes in the seasonal distribution and amount of precipitation.
- An increase in precipitation intensity under most situations.
- Changes in the balance between snow and rain.
- Increased evapotranspiration and a reduction in soil moisture.
- Changes in vegetation cover resulting from changes in temperature and precipitation.
- Consequent changes in management of land resources.

- Accelerated melting glacial ice.
- Increases in fire risk in many areas.
- Increased coastal inundation and wetland loss from sea level rise.

Changes in Precipitation and Drought Patterns

Projections of changes in total annual precipitation indicate that increases are likely in the tropics and at high latitudes, while decreases are likely in the sub-tropics, especially along its poleward edge. Thus, latitudinal variation is likely to affect the distribution of water resources.

While some areas will likely experience a decrease in precipitation, others (such as the tropics and high latitudes) are expected to see increasing amounts of precipitation. More precipitation will increase a region's susceptibility to a variety of factors, including:

- Flooding
- Rate of soil erosion
- Mass movement of land
- Soil moisture availability

These factors are likely to affect key economic components of the GDP such as agricultural productivity, land values, and an area's habitability (IPCC 2007).

