

Environmental Studies FACT SHEET



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Number 205

Are we going to run out of water?

This Factsheet:

- Describes the water scarcity problem.
- Explains why it is expected to get worse.
- Outlines why the main problem is not just the amount of water available but also the factors stopping people getting what is available:
 - 85% of the world population lives in the driest half of the planet.
 - 783 million people have no access to clean water and almost 2.5 billion do not have access to adequate sanitation.
 - Global population growth projections of 2–3 billion people over the next 40 years, combined with changing diets, result in a predicted huge increase in demand for food and energy, and hence water over the 40 years.

Why will we need lots more water?

- Increasing population. More food needed so irrigation will increase. Agriculture accounts for about 70% of global freshwater withdrawals. Many countries whose populations are projected to increase get their water from rivers coming from outside their boundaries (Table. 1)

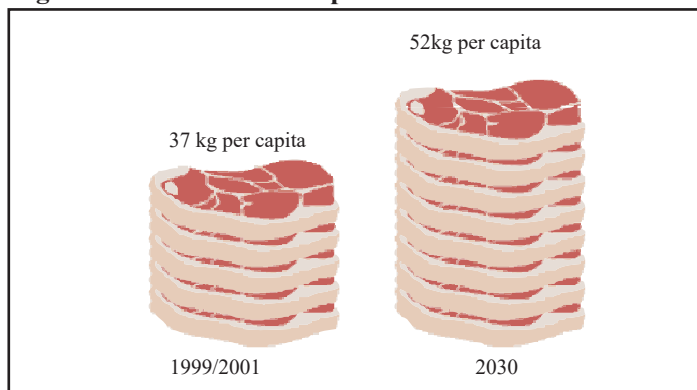
Table 1: Growing populations dependent on transboundary sources

Country	% of water resources originating outside the country	Projected % population growth 2002 – 2025
Bangladesh	91	30
India	34	27
Pakistan	77	78
Cambodia	75	28
Vietnam	59	34
Nepal	6	33

So here, the problem is not so much that we don't have enough water, it is that access to it is unequal.

- The spread of the “western diet” – more meat and dairy (Fig. 1) is also contributing to the problem. Producing meat requires huge volumes of water.

Fig. 1 Global meat consumption



To produce:

1g rice = 3500L water

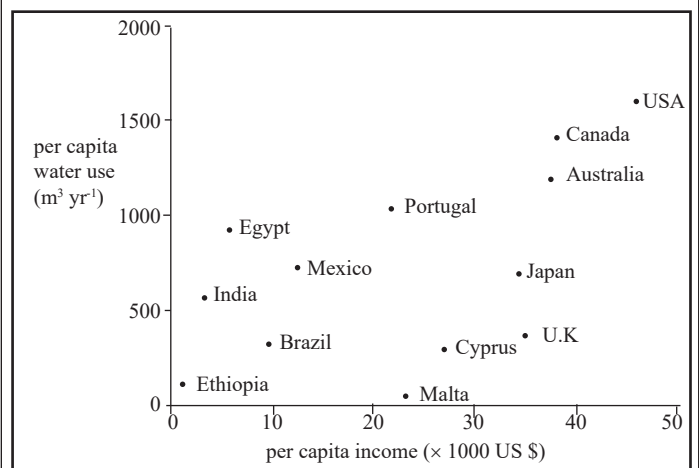
1kg beef = 15000L water

(Source: FAO)

- Increased urbanisation – urban areas require more water but in many countries increasing supply is made extremely difficult because of poor infrastructure e.g. Delhi suffers from old, leaking and inadequate water mains which results in 40% of incoming supply being lost, illegal connections to water mains, illegal wells, rising water tables, lack of metering, waste disposal into rivers and demand that is far above supply
- increased water – using appliances e.g. dish washers
- climate change - the IPCC predicts that water stress will increase as summer rainfall drops in central and southern Europe
- increased use of “virtual-water. European and North American populations consume a considerable amount of virtual water which is embedded in imported food and products. Rich western consumers don't realise how much water it has taken e.g. to grow the tea or coffee that they drink every day
- pollution is reducing the availability of water in many developing countries that lack the energy resources and infrastructure to treat waste water so that it is potable (drinkable)

Typical Exam Question

The graph shows the per capita consumption of water of countries with different levels of economic development.

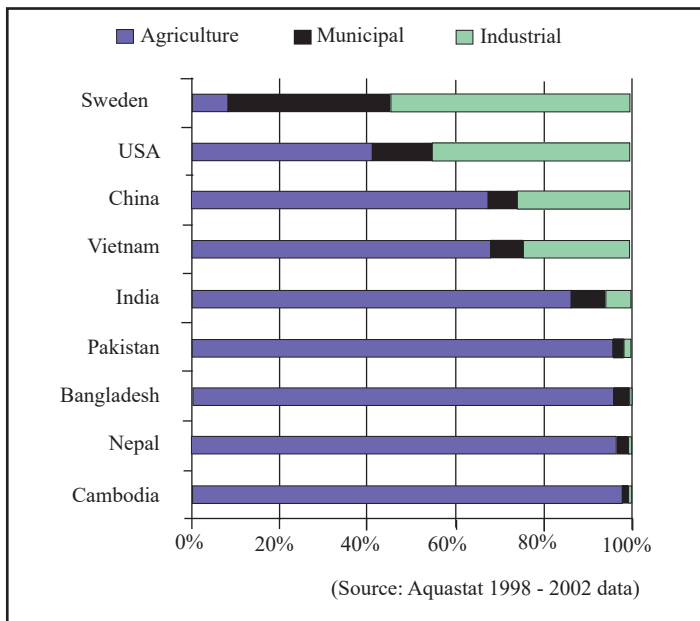


- (a) Describe and suggest reasons for the trend shown (3)
 (b) Identify one country that does not appear to fit the trend and suggest why it doesn't (2)

Mark scheme
 (a) As income increases so does water use;
 More water-consuming appliances;
 More industrial use;
 More use in recreation e.g., golf courses/spas;
 Japan: Limited means of increasing supply;
 UK: Public/industrial understanding of waste/conservation/
 financial restrictions;
 Agricultural/industrial use deliberately monitored &
 controlled;

The percentage and total volume of water used by different countries for different purposes varies enormously (Fig. 2).

Fig. 2 Water use by sector



It’s not all bad news!

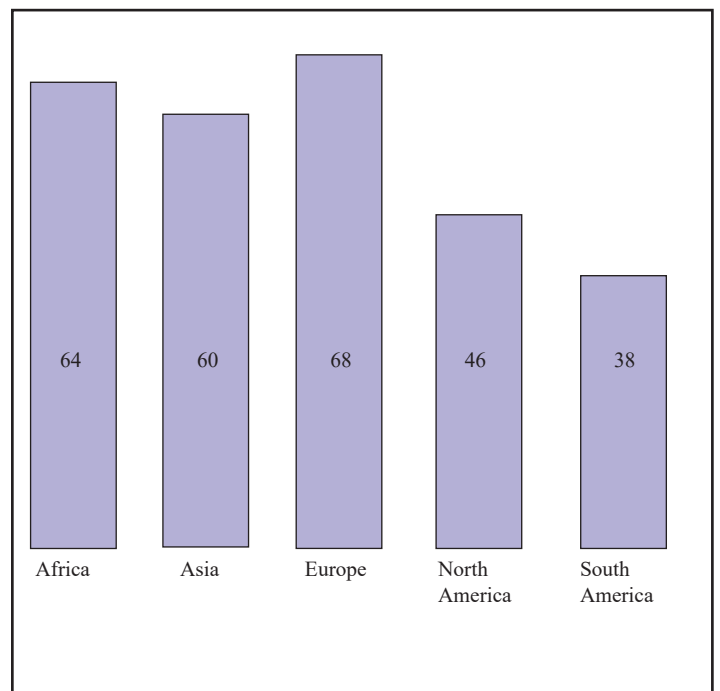
Very poor countries use more water as they develop. However, once a certain level of development has been reached, it is very often the case that water use per unit of GDP falls. This is because:

- Rich countries develop an awareness of the potential problems of water shortage and invest in water conservation.
- Their agriculture relies less on irrigation or their irrigation techniques become more efficient via water recycling / timed sprinklers etc.
- They move from industry based (that uses a lot of water) to service based, which uses a lot less.
- This trend, of more efficient water use per unit of GDP, can be seen in many European countries and the US.

Water conflicts

Rivers don’t respect national borders and most continents have many transboundary rivers.

Fig. 3 Transboundary river basins by continent



So, in total there are 276 transboundary river basins in the world. Water conflicts are increasing as:

- upstream countries take more and more water, leaving less for the next country along.
- countries disagree about water use priorities – drinking water or water to grow export crops?
- some transnational companies, such as Coca-Cola in India, have been accused of using local water supply unsustainably and of depriving people of the water they need for drinking, sanitation and agriculture.
- countries can pollute a river that then flows into another country and this may result in conflict over who pays for treating the pollution
- wealthy countries in the Middle East e.g. Saudi Arabia have cut their own production of cereals to conserve their groundwaters. Instead, they are leasing large areas of land in e.g. Africa to grow their crops – increasing demand in areas that are already water-stressed and depriving local populations access to their own water.
- Himalayan nations are building dams for flood control, water supply and hydropower. In the Himalayas the Ganges is increasingly engineered to control flow and divert water. The Tehri Dam in India diverts 270 million gallons of drinking water daily. The Farakka Barrage, only 18km from the Bangladeshi border, reduces the average monthly discharge of the Ganges from over 2000 m³/sec to under 400 m³/sec. This leaves less water for the countries in the region that are expected to experience large increases in population.

New approaches to desalination using graphene
 Desalination involves removing the salt from seawater to produce drinkable water. The ocean resource is huge. The current problem is that it takes huge amounts of energy to filter the salt out effectively.
 Scientists are now studying graphene, a one atom thick material that could filter salt water cheaply. It has nanometre-sized pores, is strong and flexible and could revolutionise the process!

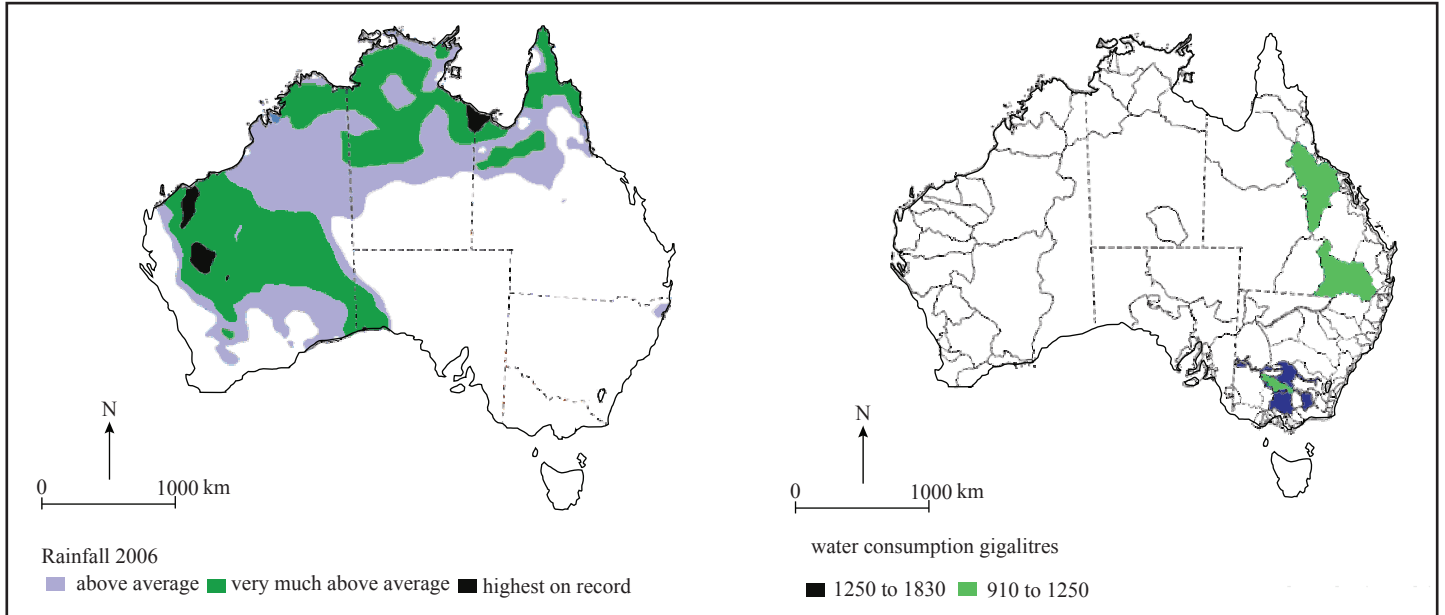
What do WaterAid think?
 ‘Running out’ of water’ is not the main problem. Water scarcity is often rooted in power, poverty, inequality and poor management (known as socio-economic water scarcity).
 However, demand will continue to exceed supply as a result of:

- growth in both population and per person consumption;
- rapid and unplanned urbanisation;
- industrial development;
- changing food preferences;
- more intensive agriculture;
- climate change.

The spatial mismatch

Often the rainfall isn't where the greatest demand for water is! (Fig. 4)

Fig. 4 Rainfall and water consumption in Australia



References/further reading

www.WaterAid.co.uk WaterAid's *Water security framework*

The problem in particular cities:

B. D. Richter et al (2003)/ Tapped out: how can cities secure their water future? Water Policy 15) 335-363

Practice Questions

1. (a) Suggest why, as very poor countries develop, per capita water use often increases (2)
 (b) Suggest ways in which people in richer countries could reduce the amount of water they use without reducing their living standards (4)
2. Suggest why water shortages may slow down economic and social development in poor countries (3)

1. (a) Increasing population requires more irrigation;
 Increased reliance on inefficient irrigation;
 Lack of water conservation techniques/technology;
 Industrial development that uses water inefficiently;
- (b) Grey / waste water re-use;
 Water efficient appliances;
 Water meters;
 Mulching to cover soil;
 Avoid garden watering / collect rainwater;
 Toilet cistern bag / dual flush toilet;
 Use waste water to flush toilets;
 Push taps;
 Use shower instead of bath;
 Use water control low water-demanding plants;
2. May slow down agricultural development/limit food production;
 May lead to migration reducing effective workforce;
 May help spread disease as waste water/polluted water is used for drinking/washing;
 e.g. cholera / dysentery;
 So reduces life expectancy;
 May result in a lot of time being spent collecting water so less time for employment;
 May limit industrial development;

Mark schemes