

THE WATER SITUATION

Water is life. For millions of years life on earth has been dependent on water for survival, and today water holds the key to our future survival. When Neil Armstrong landed on the moon in 1969 he described Planet Earth as "a shining blue pearl spinning in space".

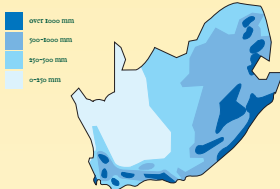
The blue colour is, in fact, the amount of water that is present on the surface. 70% of the earth's surface is covered with water but of this, approximately 97% is salt water, with the remaining 3% being fresh water. Of this 3%, less than 1% is available for life on earth, whilst the rest is in the form of ice at the poles. But where does water come from?



The water that we have on earth is very old. The water that we are using now was used by the dinosaurs millions of years ago. This is because the earth recycles its water, i.e. it reuses its water. This recycling of water is called the water cycle. Water exists on earth as water droplets and is found in oceans, rivers, lakes, dams, swimming pools, the soil, etc. Heat from the sun causes some of these water droplets to change from a liquid to a gas, called water vapour. This is called evaporation. The water vapour then rises into the atmosphere. As the water vapour rises it cools down and changes from a gas to a liquid, and thus back into water droplets. This is called condensation. When these water droplets are in the atmosphere they join together and form clouds. When these droplets get too heavy to stay in the atmosphere they fall to the earth as either rain, hail, snow, etc. This is called precipitation. Some of these water droplets fall into oceans, some into rivers and streams, some into lakes and dams, and some onto the land where it either seeps into the ground or runs off the surface into rivers, lakes, dams or the ocean. Water knows no boundaries and as it flows over the earth's surface it is used by communities of plants, animals and humans in order to survive. These water droplets can then be reheated by the sun and the whole cycle repeats itself.

The amount of water on earth is constant and cannot be increased or decreased, but it is unevenly distributed across the earth. South Africa receives an annual rainfall of 492 millimetres whereas the rest of the earth receives 985 millimetres. This is nearly half the earth's average. Thus South Africa is classified as a water-stressed country.

Distribution of the Mean Annual Rainfall in South Africa



There is also uneven distribution of rainfall across South Africa. The eastern half of the country is much wetter than the western half due to the nature of the weather conditions. South Africa also experiences alternating periods of droughts and floods which affects the amount of water across South Africa. In addition, hot dry conditions result in a high evaporation rate. Scientists predict that with global warming, South Africa will experience much wetter wet seasons and much drier dry seasons, resulting in an increase in floods and droughts.



Presently there are a large number of dams all over South Africa that store this precious water. There are also a number of water transfer schemes that move water from one catchment via pumps, pipes and canals into another catchment. Gauteng is supplied with water from the Vaal Dam catchment, which includes the Vaal River, Wilge River and all their tributaries. There are two water transfer schemes that feed into the Vaal Dam catchment, namely the Lesotho Highlands Water Project, which obtains water from the mountains of Lesotho, and the Thukela-Vaal Water Transfer Scheme, which obtains water from Kwa-Zulu Natal and is released into the Vaal Dam catchment when needed. According to the Department of Water and Environmental Affairs, the demand for water will outstrip supply in Gauteng by 2013, and in the whole of South Africa by 2025. South Africa cannot afford to build more dams and water transfer schemes as they cost large amounts of money. Thus water in South Africa is in great demand, and as the human population increases with its increasing needs for survival, the greater is the demand for water.

Water Use in South Africa

Agricultural Use (including irrigation)	60%
Environmental Use	18%
Urban & Domestic Use	11.5%
Mining & Industrial Use	10.5%

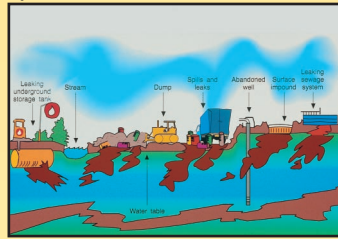
(Source: Nature Divided Land Degradation in South Africa, Ashwell, A & Hoffman, T, 2000)

Water Use in Households

	Low Income	Mid - High Income
Toilets	77%	37%
Baths & Showers	19%	35%
Washing Machine	NA	17%
Other (eg. cooking, washing dishes & clothes, drinking, etc.)	8%	14%
Households with Gardens		
Gardening	46%	
Other	54%	

(Source: Water - How it is used at home; HE Jacobs, LC Geusens and BF Louber, 2003)

A further problem adding to this demand is water quality. Water quality is defined as water which is safe, drinkable and appealing to all life on earth. In South Africa the scarce fresh water is decreasing in quality because of an increase in pollution and the destruction of river catchments, caused by urbanisation, deforestation, damming of rivers, destruction of wetlands, industry, mining, agriculture, energy use and accidental water pollution. This is a real long-term threat to the country's water security. As the human population increases, there is an increase in pollution and catchment destruction.



CAUSES OF WATER POLLUTION

URBANISATION

As more and more people move into cities and towns, a number of factors cause pollution:

- the physical disturbance of land due to construction of houses, industries, roads, etc.;
- chemical pollution from industries, mines, etc.;
- inadequate sewage collection and treatment;
- increase in fertilisers to grow more food. This results in an increase in nutrients (nitrates and phosphates) in the water which causes enhanced plant growth (algal blooms). When this plant material dies and decays the bacteria uses the oxygen in the water. This lowering of oxygen levels results in the death of other water life that needs oxygen to survive, eg. fish, etc. This process is called eutrophication;
- litter, which causes disease and has a negative visual impact.



DEFORESTATION

Clearing land for agriculture and urban growth often leads to water pollution. When soil is stripped of its protective vegetation it becomes prone to soil erosion. This leads to an increase in the murkiness of the water which can cause the following:

- it can block the gills of fish;
- bottom dwelling plants cannot photosynthesize as the sun's rays cannot reach them;
- there is an increase in disease as bacteria and viruses use the soil particles as a method of transportation.



DAMMING OF RIVERS

Damming of rivers can have an impact on water in the following ways:

- Water flowing out of dams:
 - has reduced suspended material as a large amount settles to the bottom of dams;
 - is depleted of nutrients; and
 - is often more saline with detrimental effects on downstream agriculture and fisheries.
- Enhanced eutrophication may result due to the water spending a longer time in the dam.
- There is also increased evaporation in dams, especially those with a large surface area, such as the Vaal Dam.

DESTRUCTION OF WETLANDS



Wetlands are nature's way of cleaning water as well as damming water (they hold back water in summer and release it in winter).

Destruction of wetlands:

- Destroys the habitat of many birds and fish;
- Removes the natural filters capable of storing and absorbing many pollutants, such as phosphorus and heavy metals;
- Destroys natural dams that hold back the water and causes flooding further downstream.

INDUSTRY

Industries produce waste that can affect the:

- pH of water (whether it is acid, neutral or alkaline);
- colour of water;
- amount of nutrients (increase in nutrients can cause eutrophication);
- temperature (increase or decrease in temperature can have an impact on temperature sensitive organisms living in the water);
- amount of minerals and salts (too much can cause health problems);
- murkiness of water (can block fish gills; bottom dwelling plants cannot photosynthesize as the sun's rays cannot reach them; increase in disease as bacteria and viruses use the soil particles as a method of transportation).



MINING

Mines produce waste that:

- can increase the amount of minerals and salts in the water (too much can cause health problems);
- can affect the pH of the water (whether it is acid, neutral or alkaline);
- can increase the murkiness of the water.

AGRICULTURE

- Increases soil erosion due to the physical disturbance of soil and vegetation due to ploughing, overgrazing, logging and road building. This effects the murkiness and the amount of salts and minerals in water;
- Increases nutrients due to fertilisers and excreta, which contribute worrying amounts of nitrates and phosphates to water supplies (this can cause eutrophication);
- The majority of farms use pesticides that destroy the natural wildlife.



ENERGY USE



As human populations increase, more energy is required for human activities such as cooking, lighting, etc. The majority of our energy in South Africa comes from the burning of coal at power stations and results in greatly increased emissions of sulphur and nitrogen oxides into the atmosphere. These gases are the main cause of acid rain. Also the release of carbon dioxide, from the burning of coal, increases global warming.

ACCIDENTAL WATER POLLUTION



Accidental water pollution can arise from many sources (such as burst pipes and tanks, major leaks, fires and oil spills) and can cause varying degrees of damage, depending on the quantity, toxicity and persistence of the pollutant, and the size and adaptability of the water body.

THE FUTURE

If this is the water situation at present, what of the future? South Africa can build more dams and water transfer schemes; desalinate sea water; source water from neighbouring countries, such as the Zambezi River in Zimbabwe; reuse effluent water; or treat mine wastewater. But all of these solutions are expensive and not affordable for the country. In terms of water quality, South Africans can clean up rivers and impose fines on those people/companies that pollute rivers. But these solutions address the symptoms of the problem. We should be addressing the cause of the problem, i.e. our ATTITUDE towards water.

The future of South Africa lies in OUR hands. We CAN make a difference. We just need to understand the water environment and how we humans fit into it. We all need to become "Water Wise"! But what does it mean to be "Water Wise"?

- To be "Water Wise" means that a person will:
- have the utmost RESPECT for water and all life;
 - use water carefully and not WASTE it;
 - not POLLUTE rivers with liquid and solid waste;
 - PAY for water services;
 - take ACTION to solve any water problems;
 - CONSERVE water, and thereby CONSERVE the natural environment.

South Africa has, in general, a limited supply of water and the quality of this water is being threatened by pollution and the destruction of river catchments. Water is a vital resource and it is up to ALL South Africans to act responsibly in their daily lives and look after the available water resources to ensure that this limited supply is usable by all life on earth. It is very important that everyone becomes "Water Wise".

RAND WATER & WATER WISE

Water Wise is Rand Water's ENVIRONMENTAL brand. It is aimed at inspiring people to become conscious of the value of our water and the need to use it wisely. Rand Water is dedicated to improving the environment, as well as increasing water awareness and environmental action in South Africa.



For further information on the education services that Rand Water's Water Wise Education Team offers please contact 0860 10 10 or visit www.randwater.co.za

