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## The BLUE Revolution: Using water sustainably

### Women and water

As the education of women is positively associated with smaller families, an increase in status, bargaining power and female independence, a lack of schooling for girls perpetuates the poverty cycle.

With water shortages comes longer walks to fetch it, higher prices to buy it, greater food insecurity, inadequate sanitation, increased water-borne diseases and nearby ecosystem damage, and it is the poor who suffer most.

Encouragingly, South Africa has been singled out by the United Nations for its pro-poor policies of providing free basic services to its entire population.

It has done this progressively, starting with those already within reach of infrastructure, while simultaneously moving on to farm dwellers and people in rural areas. This has resulted in one million more South Africans on average being served with water each year.

### More crop per drop

The United Nation's Millennium Development Goals pledged to eradicate extreme hunger by 2015.

However, as it takes at least 2 000 litres of water to produce enough food for one person for one day, with irrigation accounting for 70% of all water withdrawals worldwide and some countries already using more than 40% of their renewable water resources for irrigation, this may not be feasible as it has been estimated that by 2030 the world will require 55% more food.

Apart from significantly increasing our percentage of the Earth's net primary Productivity (total terrestrial food supply) – which means there will be less space for plants, the food producers, to grow – increased food production to feed a burgeoning human population will mean a near doubling in water consumption from the 7 200km<sup>3</sup> used in crop production today, to 13 000km<sup>3</sup> by the middle of this century.

This at a time when the average per person supply of water worldwide is expected to drop by a third.

Compounding this food/water conundrum, is a preference for a Western-style diet that is driven by

urbanisation and economic growth, which results not only in a higher per capita food intake but a richer, more varied diet as in terms of water, food is not created equal.

It takes seven kilograms of grain to beef up cattle by one kilogram, four kilograms of grain to add one kilogram of live weight to pork and two kilograms of grain to feed up fish and poultry by one kilogram, while one kilogram of cheese represents an investment of three kilograms of grain.

In India, each person consumes approximately 200kg of grain a year and this is mainly eaten directly. In Italy, a pasta-rich diet translates into approximately 400kg of grain a person yearly, while in the US with some people eating as much as double their body weight in meat each year, this figure jumps to a per person grain consumption rate of approximately 800kg yearly, mainly eaten indirectly in the form of beef, mutton, pork, poultry, milk, cheese, yoghurt, ice cream and eggs.

As it requires more water to produce meat, milk, sugar and oils than to produce vegetables, grains and cereals, with for example, one kilogram of beef requiring 13 000 litres of water, one kilogram of rice needing 1 400 litres of water, and a kilogram of wheat and potatoes requiring 1 000 litres and 100 litres of water respectively to produce them, we could well be eating ourselves into a thirsty future.

Although there is the development of creative mechanisms such as virtual water, an artificial construct whereby the amount of water embedded in food during its production is traded between countries, there is a long way to go before the food/water equation comes close to meeting the needs of the majority of world citizens.

In the meantime, a simpler, more realistic solution would be to moderate our diets, thereby helping to relieve pressure on precious water resources while making water available for other purposes.

### Water quality and health

Considering the importance of fresh water to the sustainability of life for billions of people, it would be logical for us

to safeguard this essential resource with all the care that we are capable of.

Yet, sadly, this is not the case, as water quality is deteriorating all over the globe, with an estimated two million tons of waste being dumped into rivers, lakes and streams every day.

This has resulted in an estimated 12 000km<sup>3</sup> of polluted water worldwide, which is more than the total volume of water contained in the world's 10 largest river basins.

And, if pollution from pollutants such as raw sewage, eroded soil, industrial poisons, acid emissions, toxic sludge, heavy metals, pesticides, herbicides, insecticides, fungicides, fertilisers, nitrates and solvents keeps pace with population growth, the world will effectively lose 18 000km<sup>3</sup> of freshwater by 2050.

To put this into perspective, this loss of water represents nine times the total amount of water currently used for irrigation each year by all the countries of the world.

The UN recommends that people need a minimum of 50 litres of water a day for drinking, washing, cooking and sanitation, however, despite the fact that over the last 20 years, two billion people have gained access to a water supply, more than a billion people around the world still do not have safe drinking water and 2.6 billion people (40% of the world's population) do not have adequate water-borne sanitation.

For these people water represents a painful paradox.

It is the liquid of life without which they would certainly die, and yet to

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It is a lose-lose situation in which water-borne diseases such as diarrhoea,

amoebic dysentery, cholera, polio, infectious hepatitis, typhoid, malaria and yellow fever are responsible for millions of deaths each year.

### Urbanisation and sanitation

More than half of the world's population will be living in urban areas within a few years, with this figure rising to 60% by the year 2025.

In all developing countries, especially sub-Saharan Africa which has the highest population growth rate worldwide, population increases in urban areas are outstripping the capacity of these nations to provide for basic needs such as shelter, water and sanitation.

The result is that there are more people without adequate services in Africa today than there were in 1990.

With rapid urbanisation and population increases putting severe strains on existing water supplies and sanitation services, some cities in developing countries are only treating about 10% of their sewage.

This means that vast amounts of faecally-contaminated material pollutes the living environments of people, soils and bodies of water, making these environments, according to the UN, among the most life threatening in the world.

In many cases, even when sewage waste reaches a treatment plant, poor maintenance of sewage reticulation systems and inadequate wastewater treatment works mean that partially-treated sewage effluent is discharged into the sea.

### The Blue Revolution

Finding sustainable solutions for the pressing problem of global water security is an immense challenge for the future. Encouragingly, the trend towards cutting water consumption and increasing purification and recycling is growing around the world, as people are becoming more aware of the need to conserve water.

And just as the agricultural Green Revolution, with its technological innovations kept the sceptre of world hunger at bay for a while, so the water conservation strategies of the Blue Revolution will help to alleviate chronic or recurring

shortages of fresh water as we move further into the 21st Century.

With the Blue Revolution undeniably underway, many industries, for instance, are following intensive water-saving policies as part of their operational procedure, reducing the amount of clean water used and recycling the rest.

A case in point is the coal mining industry in South Africa which is undertaking research to find the most cost-effective method of utilising the huge volumes of gypsiferous water associated with coal mining, thereby enhancing the commercial potential of the coalfields area.

Water purification systems that include micro- and ultra-filtration reverse osmosis are being refined and solar distillation technologies that use solar power as a renewable energy source are being developed as cost-effective, simple-to-use technologies that can be utilised by small rural communities in arid regions of the world to desalinate brackish or seawater for drinking purposes.

Water knowledge is being swapped and shared around the world.

This international transference of knowledge from one stakeholder to another is giving rise to encouraging developments such as waste minimisation clubs, which represent a pooling of information. Participants receive the assistance of experts in the development of technological strategies for specific applications.

Efforts are underway in many countries to clean up polluted groundwater sources in order to improve water quality and initiatives are being developed to protect important wetlands with research projects on water ecosystems in natural environments generating useful information, which is also being shared across international boundaries and between concerned stakeholders.

Conserving water is as much a mindset as anything else.

It is a mindset that looks for water savings in every situation, whether this is by

changing rapid-flow showerheads to low-flow ones and repairing leaky pipes in our homes, to recycling wastewater used in industry and reverting to drip irrigation in agriculture.

**The trend towards cutting water consumption and increasing purification and recycling is growing around the world as people are becoming more aware**

Ultimately, savings in water usage, wherever they can be obtained and however small, will be a key factor in surviving a thirsty future.

### Coming closer to home

Ours is a semi-arid country with the availability of good quality fresh water being limited in almost all areas, a situation that is likely to be compounded by factors such as recurrent droughts, rising temperatures, uneven rainfall distribution patterns and economic growth which will place increasing pressure on water resources in the future.

Although South Africa's reservoirs store about 746m<sup>3</sup> water a person, which is higher than that for the rest of Africa, our average annual rate of rainfall of approximately 502mm yearly is far below the world yearly average of 860mm.

Rainfall is also unevenly distributed throughout the country, with 65% of South Africa receiving less than 500mm yearly and 21% getting less than 200mm yearly.

With climate change expected to have a direct impact on rainfall variability and the deteriorating quality of our water, it is predicted that by 2030 we will reach the limits of our economically usable, land-based fresh water resources.

There are only two ways that we can meet South Africa's growing need for clean, fresh water.

On the one hand we can increase our supplies through efficient water harvest-

ing and catchment management and on the other, we can use the water that we have more efficiently.

For the present, with good rainfalls during the 2007/2008 summer rainfall season over the largest part of the country resulting in good runoff, water storages in all the provinces are well above the average storage capacity, with enough water in our rivers, dams and underground aquifers to supply water for socio-economic growth and development.

However, with every major river system in South Africa being exploited, many catchments experiencing a demand that exceeds the supply and high levels of Escherichia coli (E.coli), a faecal coliform or indicator organism that determines levels of faecal pollution in water, being present in many of our rivers, there is no room for complacency – especially since pollution from factors such as poor municipal infrastructure, industrial activities, informal settlements that establish themselves alongside rivers and agricultural activities, is likely to further exacerbate water stress.



With the National Water Resources Strategy (NWRS), which is a blueprint for the use and protection of water, the Department of Water Affairs and Forestry (DWAF) is doing much to keep our taps turned on and the quality of our water on par with international standards.

However, water security is partly up to us.

Much like energy, there is an urgent synergy between water and us, with what we save now determining how much we have in the future, because if water is not used more efficiently shortages will develop and water restrictions will become inevitable.

Hopefully our gains will tip the balance of water availability towards a situation whereby we can proceed into the future confident that if we don't have an abundant supply to generously meet the needs of most of our people, at least we will have enough water and technological expertise to maintain an equitable sharing of this most vital of resources, ensuring SOME FOR ALL, FOREVER!


WHAT YOU CAN DO? – NEXT PAGE

## DO YOUR BIT TO SAVE WATER!


You use up to 9 TIMES less water when using a dishwasher as opposed to hand washing\*

\*Research carried out by Bonn University in Germany



Dishwasher

15 Liters (when using dishwasher)



Hand washing

135 Liters (when hand washing)