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NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Scholarship 2011
Geography

2.00 pm Saturday 26 November 2011

RESOURCE BOOKLET

Refer to this booklet to answer the questions for Scholarship Geography 93401.

Check that this booklet has pages 2–23 in the correct order and that none of these pages is blank.

YOU MAY KEEP THIS BOOKLET AT THE END OF THE EXAMINATION.

CONTENTS

PART A: "ENOUGH IS NOT ENOUGH": THE CAUSES OF WATER SCARCITY

Why is water scarce? …

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… One billion people already go to sleep hungry each night, partly from lack of water to grow food.

Where water comes from

- Fresh water is continually recycled through the hydrological cycle (**see Figure 1 below**) …

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- … On top of that, water is needed for cooking, washing, cleaning, and sanitation.

Figure 1: The hydrological cycle

Figure 2: Global freshwater resources

Changes to water availability

More than one-sixth of the world's population (80 per cent of whom live in rural areas) do not have access to safe drinking water, and 39 per cent of the world's population have access to only primitive sanitation. …

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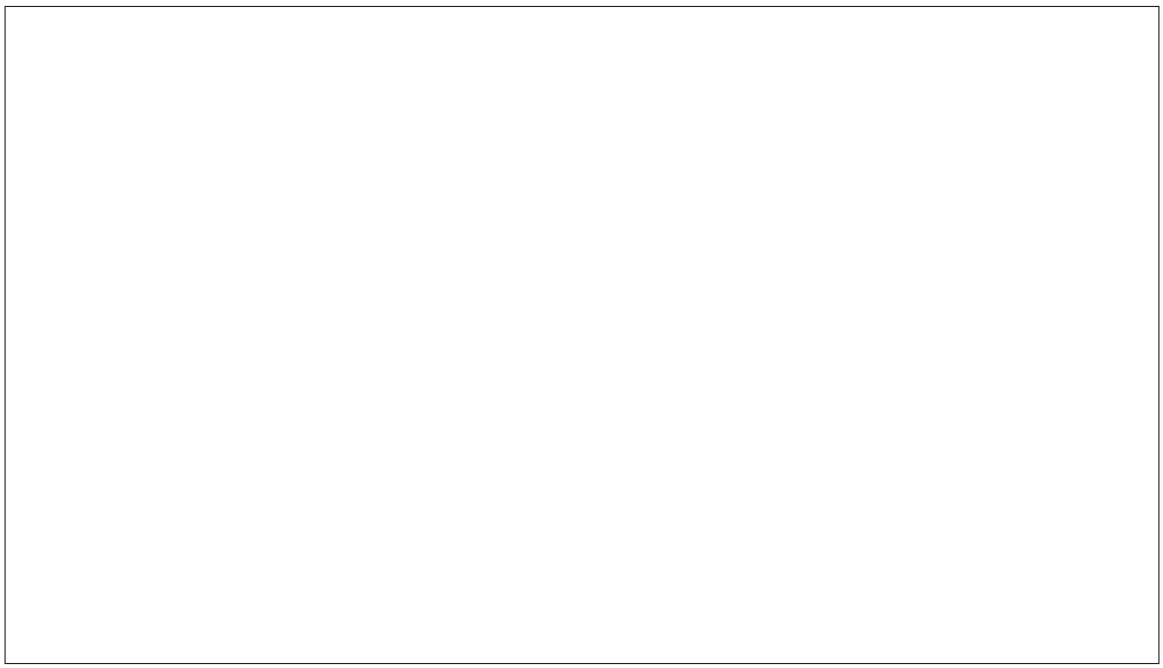

Figure 3: Predicted changes in water availability

… As a result, up to 4 million more people could face food shortages.

Wasted water

Although the world's population has grown rapidly and is predicted to reach 9.3 billion by 2050, the availability of water will not increase (**see Figure 4**). …

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… A similar situation of poorly maintained irrigation systems and pipes, exists in the Central Asian republics of **Kazakhstan**, **Turkmenistan**, and **Uzbekistan**, where agriculture uses 90 per cent of its water.

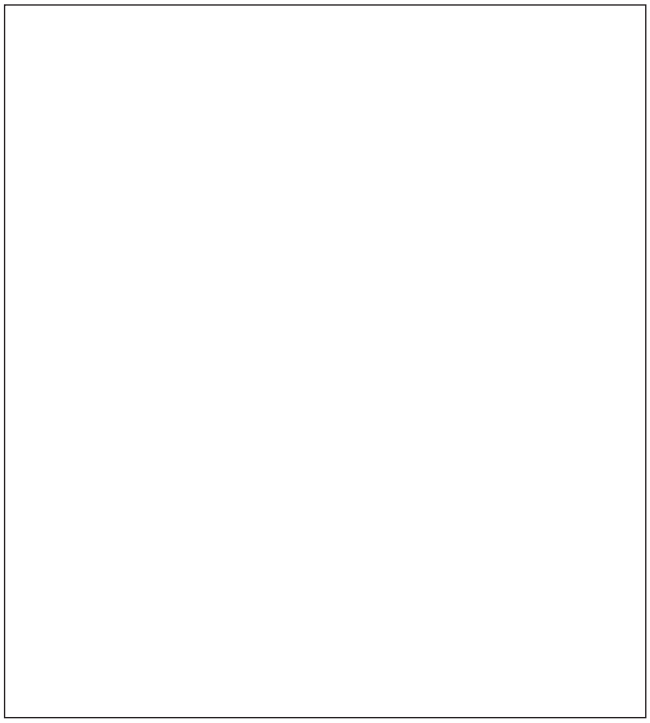

Figure 4: Population increase and water resources

Settlement locations

Many towns and cities have been built in locations that receive little rainfall. …

Table One: Average annual rainfall for selected cities	
City	**Rainfall (mm)**

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… This high water use is mainly because of the hot, dry summers that encourage high garden watering and air conditioner use.

Alice Springs' public water supply is sourced almost entirely from rock aquifers. …

Figure 5: Alice Springs: Average household water demand 700 kL/household/year

… Pumping water from deep underground aquifers is expensive because the deeper they are, the more it costs, and they also use fossil fuels, which contribute to carbon emission.

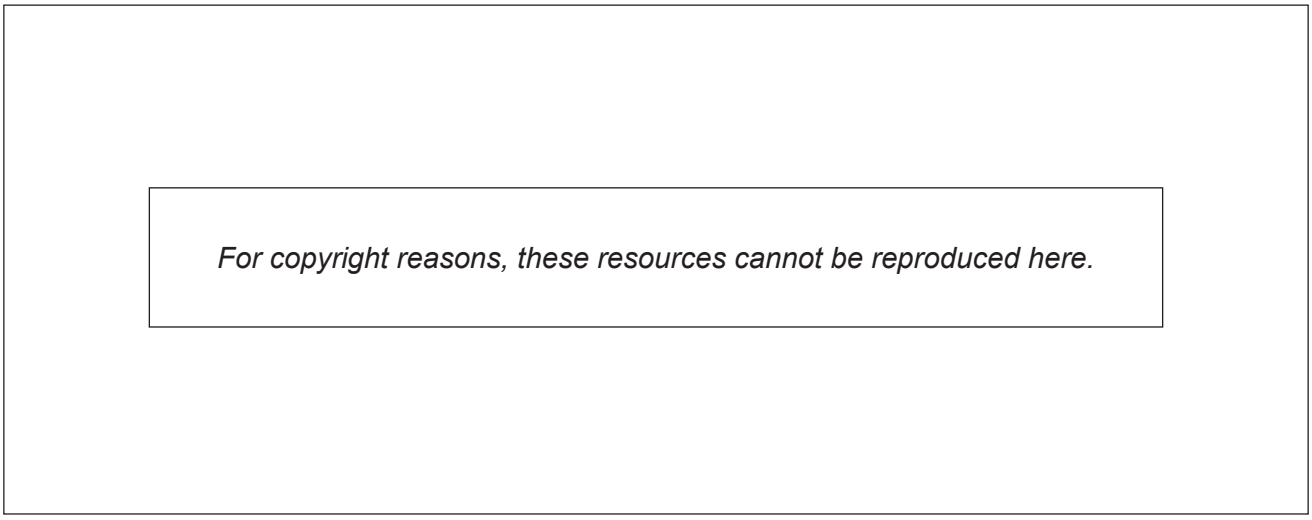

Figure 6: World mean annual precipitation

As **Figure 6 above** shows precipitation is not evenly distributed across the world. About three-quarters of the annual rainfall occurs in areas that in total contain less than one-third of the world's population (**see Figure 7 below**).

Figure 7: Global population distribution

PART B: IMPACTS OF WATER SCARCITY

Rising populations, improving lifestyles, and changes to the global climate are all increasing the pressure on the planet's water resources. The impacts on all areas of society are significant and of much global concern.

Child health

In many countries, water quality is so poor that children become ill with diseases such as diarrhoea.

- Each year, children lose 272 million school days due to diarrhoea. …

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- … Globally, childhood mortality could be reduced by nearly one-third, by collectively fixing the world's basic water and sanitation problems.

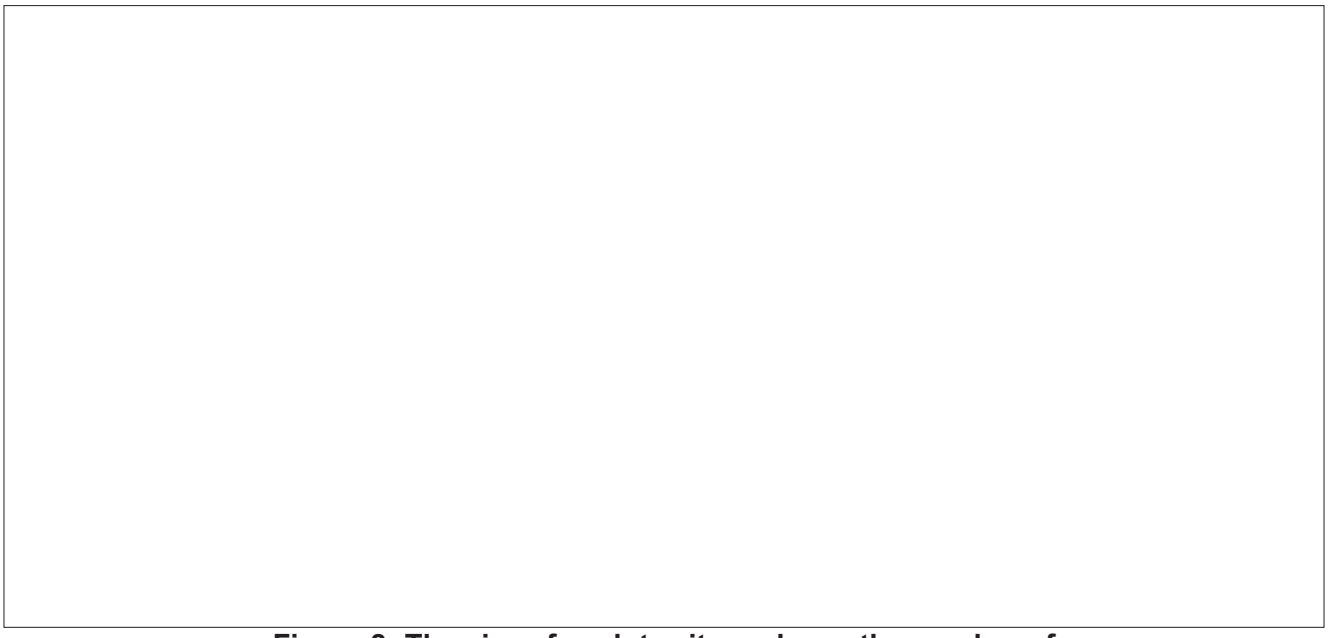

Figure 8: The size of each territory shows the number of cases of diarrhoea in children

Sanitation

In 2002, water was declared a human right, and in 2005, the United Nations Decade for Action on Water began with a focus on putting water and sanitation at the forefront of achieving the Millennium Development Goals. …

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… Pollutants flowing into the river include the waste of the cities situated along its bank, making this water unsafe for drinking, creating severe issues with sanitation for the people in this region.

Gender inequality

With a lack of access to safe drinking water and basic sanitation, women and girls are at a greater disadvantage compared to men and boys, perpetuating already existing gender inequalities. …

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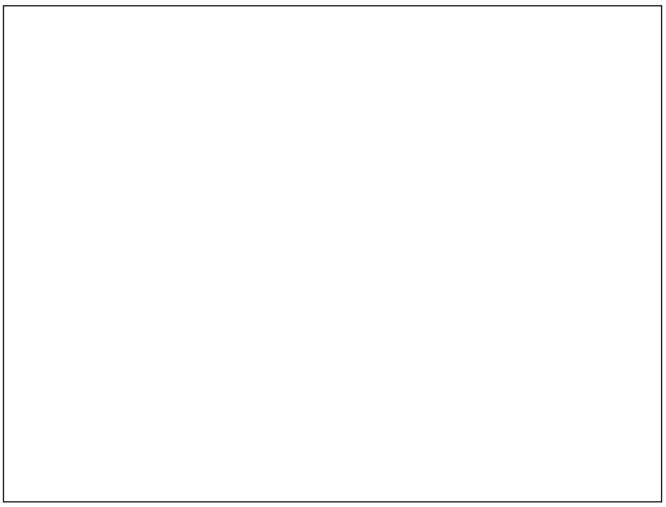
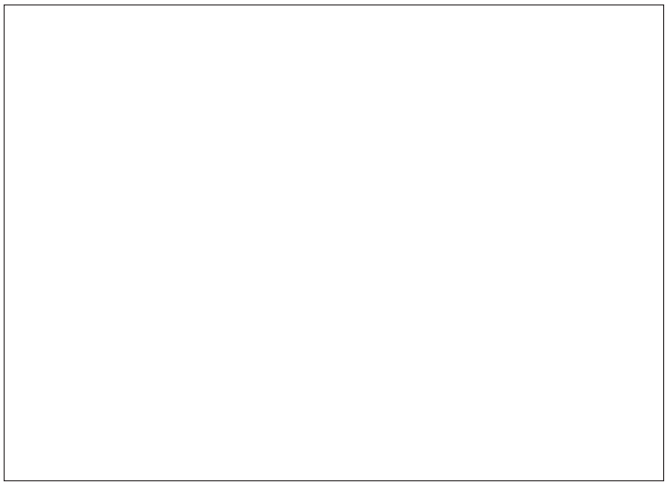


Figure 9: Young women in Kenya carrying water for their families – taking time out of school is affecting their education.

… She washes her own body only occasionally.

Agriculture



Rural areas across both LEDC and the more economically developed countries (MEDC) have also been affected by water scarcity. …

Figure 10: Tea growers in India's north-eastern region

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… And in a later news report, "Crop production has fallen sharply, as the worst drought in six decades shows no sign of letting up" (**see Figure 11 below**).

Figure 11: A farmer carries pails to transport water from a partially dried-up pond at the outskirts of Yingtan, Jiangxi Province, February 2011

River systems

The Murray-Darling Basin is very important for rural communities and **Australia's** economy. …

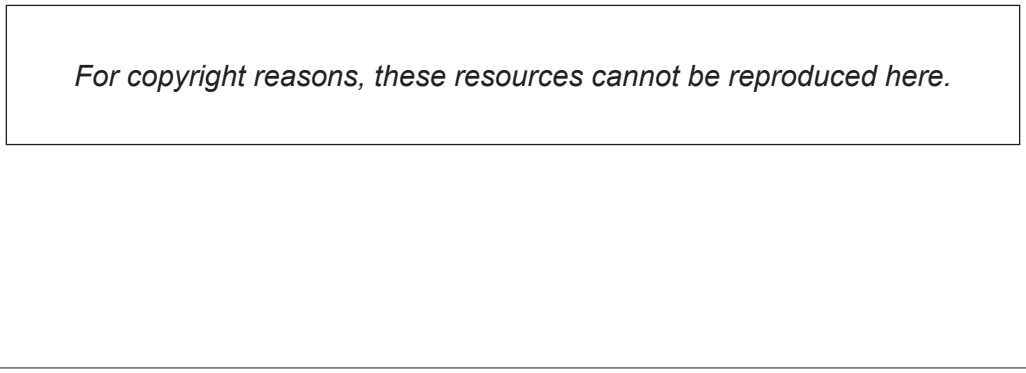

Figure 12: Starved of water from the drought-stricken Murray-Darling river system, the Umberumberka reservoir in south-east Australia virtually dried up

… The river makes farming possible by supplying water for irrigation, but once again, over-allocation of water resources has resulted in the river running low much of the year.

Wetlands destroyed

Half the world's wetlands have disappeared in the last century. …

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… Nationwide, wetland cover has drastically reduced from about 37 575 square kilometres in 1994, to 26 308 square kilometres in 2008, representing a loss of about 25 per cent of the total wetland coverage.

Change in land use

In the Mackenzie Basin in the South Island of **New Zealand**, land use is changing from extensive pastoralism to more intensive operations, such as dairying. …

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… This water is then not available for other uses and is threatening local ecosystems (**see Figure 13 below**).

Figure 13: Massive water irrigators turning Mackenzie high country into pasture for dairy cows and production, Twizel, Mackenzie district, Canterbury Region, New Zealand

Demand for trade

In **Kenya**, the demand for foreign exchange has seen significant problems arise in water supply. …

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Figure 14: Workers prepare roses for export in Kenya – the nation's horticulture sector export nearly $1 billion (USD) worth of produce per year to Europe

… The flower farms have taken over land that the pastoralists used, and there is less water.

PART C: SOLUTIONS FOR WATER SCARCITY

In some European countries, water has already been through ten sets of kidneys before you drink it.

As the world's population and demand for water increases, different groups and organisations are proposing different solutions to the problem of water scarcity.

Dams

To provide a more secure water supply, dams are built across rivers to control the flow of water and reduce the risk of flooding. …

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… The dams will decrease river flows downstream and will have negative effects on wetland habitats and several endangered species.

Irrigation

In many countries, sufficient water from rainfall is not available all year. …

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Figure 15: Central pivot irrigation in Saudi Arabia

… Problems are caused as aquifers are depleted; groundwater levels are either raised or depleted; salination occurs as salts in the soil move upwards due to capillary action; and evaporation leaves behind a salt crust on the surface.

Altering river courses

India is facing a severe water crisis. …

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Figure 16: Habitats are at risk as land is flooded

… Between 2.5 and 4 million Indians would lose their homes and livelihoods.

Desalination

Last year, the **United Kingdom** opened their first desalination plant, which will provide a much-needed backup supply for use in the event of a drought in a seriously water-stressed London. …

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… It was finally given the go-ahead after operators agreed to run the plant using only energy from renewable sources, such as sustainably produced biodiesel.

Water conservation

Water conservation campaigns are a common method for encouraging the locals in a city or region to take individual responsibility for their water use. Typically, campaigns will ask locals to:

1. Install water-saving devices on all taps and shower heads. …

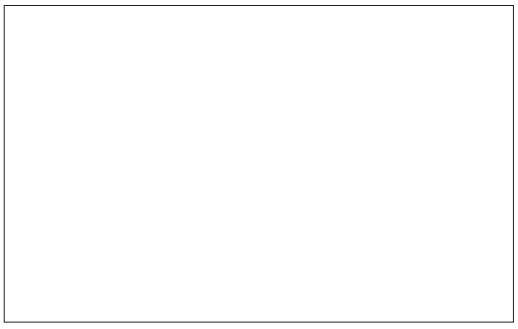

Figure 17: "Oh, that? Just a little loophole I found in the water restrictions"

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… As with other countries where conservation strategies are employed, there are always exceptions to the rules, and many are reluctant to comply with the new regulations (**see Figure 17 above**).

Reservoirs

The **Singapore** Government has recently built a water retention system to ensure water security for its 4.8 million people. …

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… Some overseas environmentalists have been concerned about the impacts on tidal flushing, the build-up of silt in the reservoir, and on the fish communities in the harbour, which now have restricted access, as a result of the barrage's construction.

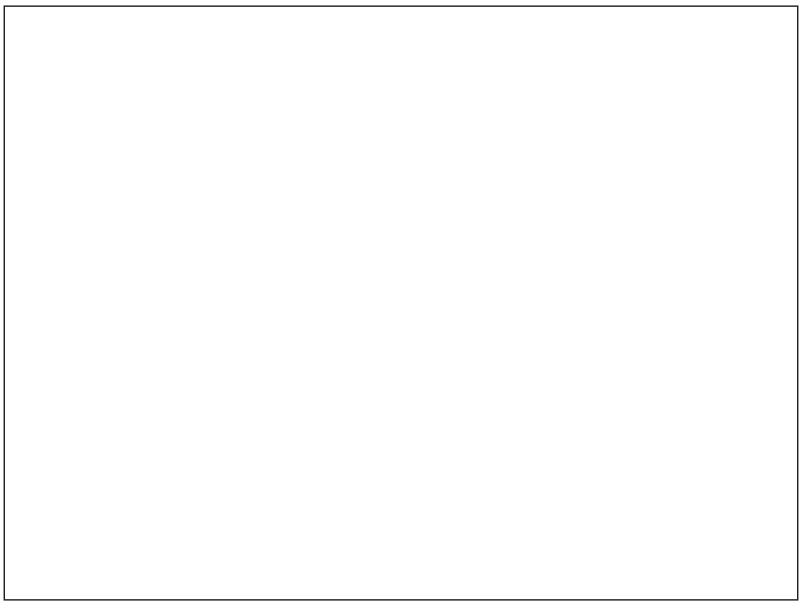

Figure 18: Marina Barrage, Singapore

Rainwater harvesting

Rainwater harvesting is the accumulating and storing of rainwater for reuse. …

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Figure 19: Rainwater harvesting is sustainable and cheap for families to implement no matter their income

… Many have fallen into decay.

Hand pumps

In many parts of **South Africa**, water is drawn from hand pumps, which is hard work. …

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… They are also sustainable, and are expected to have little long-term negative effect on the environment.

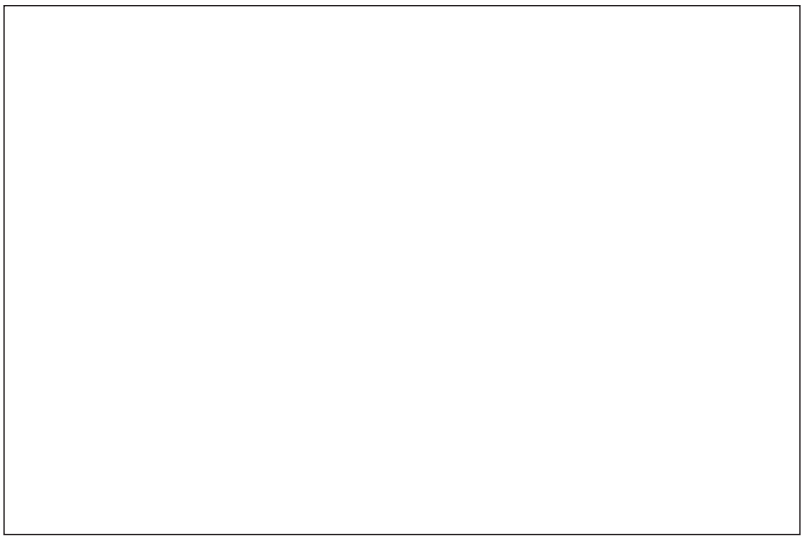

Figure 20: Roundabout water pump at the Thabong nursery school in Davieton

Other strategies

There are many other water management strategies that could be used to solve the global water scarcity crisis.

These include:

- recycling water in industry, agriculture, and recreation …

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… It will be a challenge that the world faces in the future, but one that needs to be addressed before this developing crisis threatens global development.

ACKNOWLEDGEMENTS

Text – information used in this examination was adapted from the following sources:

Page(s)	Source
3	http://maps.grida.no/go/graphic/the-water-cycle
5	http://maps.grida.no/go/graphic/the-contribution-of-climate-change-to-declining-water-availability
6	http://maps.grida.no/go/graphic/population-increase-and-water-resources
7	http://news.bbc.co.uk/2/hi/americas/6412351.stm http://www.nt.gov.au/nreta/water/wise/water.html http://www.nt.gov.au/nreta/water/wise/pdf/howweusewater.pdf
11	D. Dorling, M. Newman and A. Barford, *The Atlas of the Real World: Mapping the Way We Live* (London: Thames & Hudson Ltd, 2010), p 296. http://jaimejacobsenmedia.com/films
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3–21	A. Owen and C. Lancaster, *GCSE Geography for Avery Hill* (London: Hodder Murray, 2007).
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3–21	P. Guinness and G. Nagle, *Advanced Geography: Concepts & Cases Revised Edition* (London: Hodder Education, 2002).

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3–21 P. Guinness and G. Nagle, *IGCSE Geography* (London: Hodder Education, 2009).

3–21 *The Economist* (20 May 2010).

Images – visuals used in this examination came from the following sources:

Figures	Source
1	http://www.grida.no/graphic.aspx?f=series/vg-water2/0102-water-cycle-EN.jpg
2	http://maps.grida.no/go/graphic/global_freshwater_resources_quantity_and_distribution_by_region
3	http://www.grida.no/graphic.aspx?f=series/vg-water2/0407-runoff-scenario-EN.jpg
4	http://maps.grida.no/go/graphic/population-increase-and-water-resources
5	www.nt.gov.au/nreta/water/wise/pdf/howweusewater.pdf
6	http://people.hofstra.edu/geotrans/gotmaps/maps/MAP_World_Precipitation.pdf
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9	http://jaimejacobsenmedia.com/wp-content/uploads/2010/09/MunyanzaGirls.jpg
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17	http://pleadthefirst.com/2007/10/29/cartoon-a-little-loophole/
19	A. Owen and C. Lancaster, *GCSE Geography for Avery Hill* (London: Hodder Murray, 2007), p 90.
20	Ibid., p 91.