WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced

CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch

445/01-A

GEOGRAPHY GG5

SUSTAINABLE DEVELOPMENT

A.M. FRIDAY, 18 June 2004

(3 hours to include one half hour reading time)

This pack to be given out to candidates **one half hour before** the question paper.

RESOURCE FOLDER

Candidates may make notes on rough paper during the half hour reading time.

SUSTAINABILITY ISSUES IN THE MURRAY-DARLING BASIN [MDB]

The questions on the paper direct candidates to evaluate methods of addressing the problems of sustainable water use in the Murray Darling Basin.

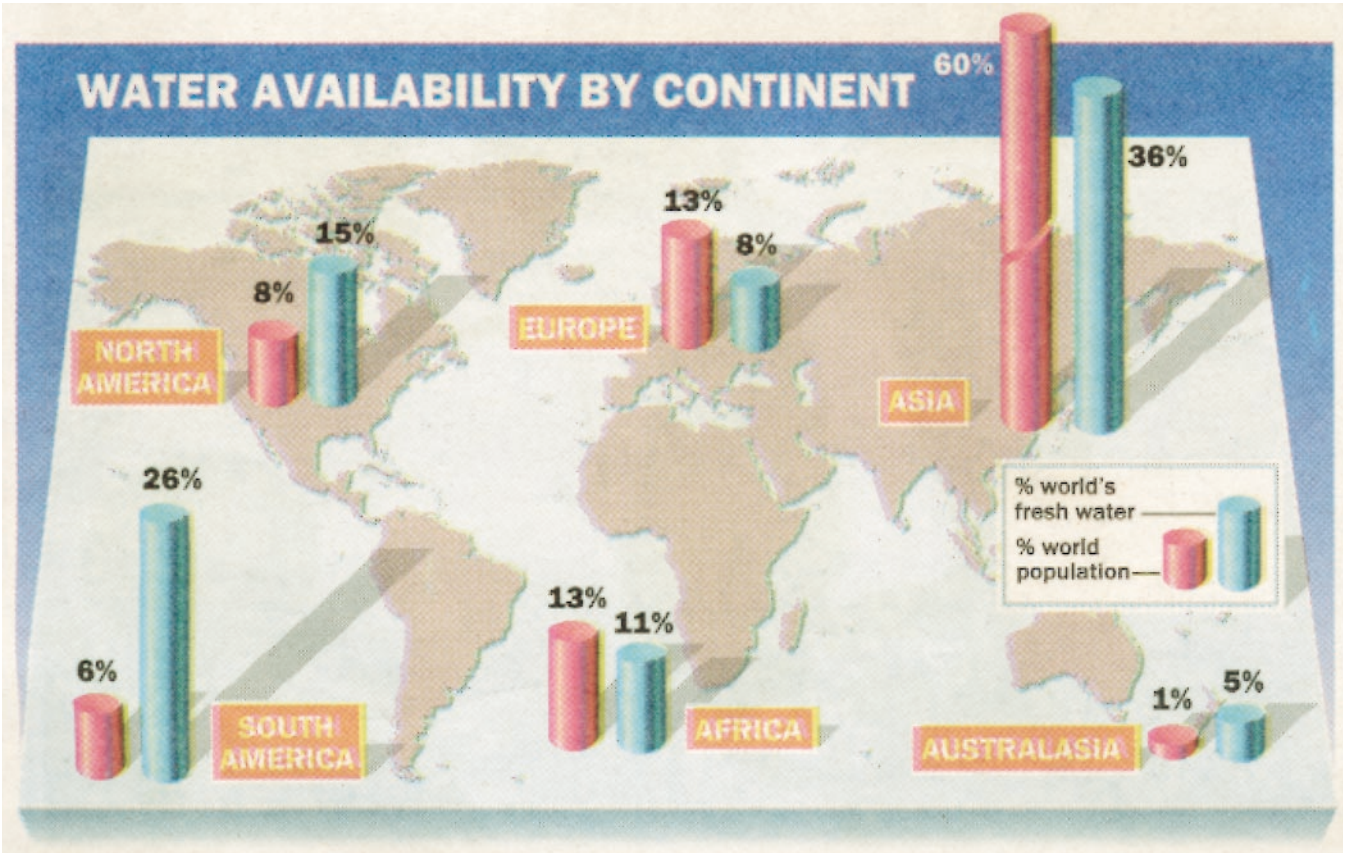
The WJEC Resource Atlas **(Second Edition)** must be available for use throughout this examination.

RESOURCE 1

Summary of Progress at the Johannesburg Summit on Sustainable Development 2002

Source: The Times, 4 Sept 2002

RESOURCE 2

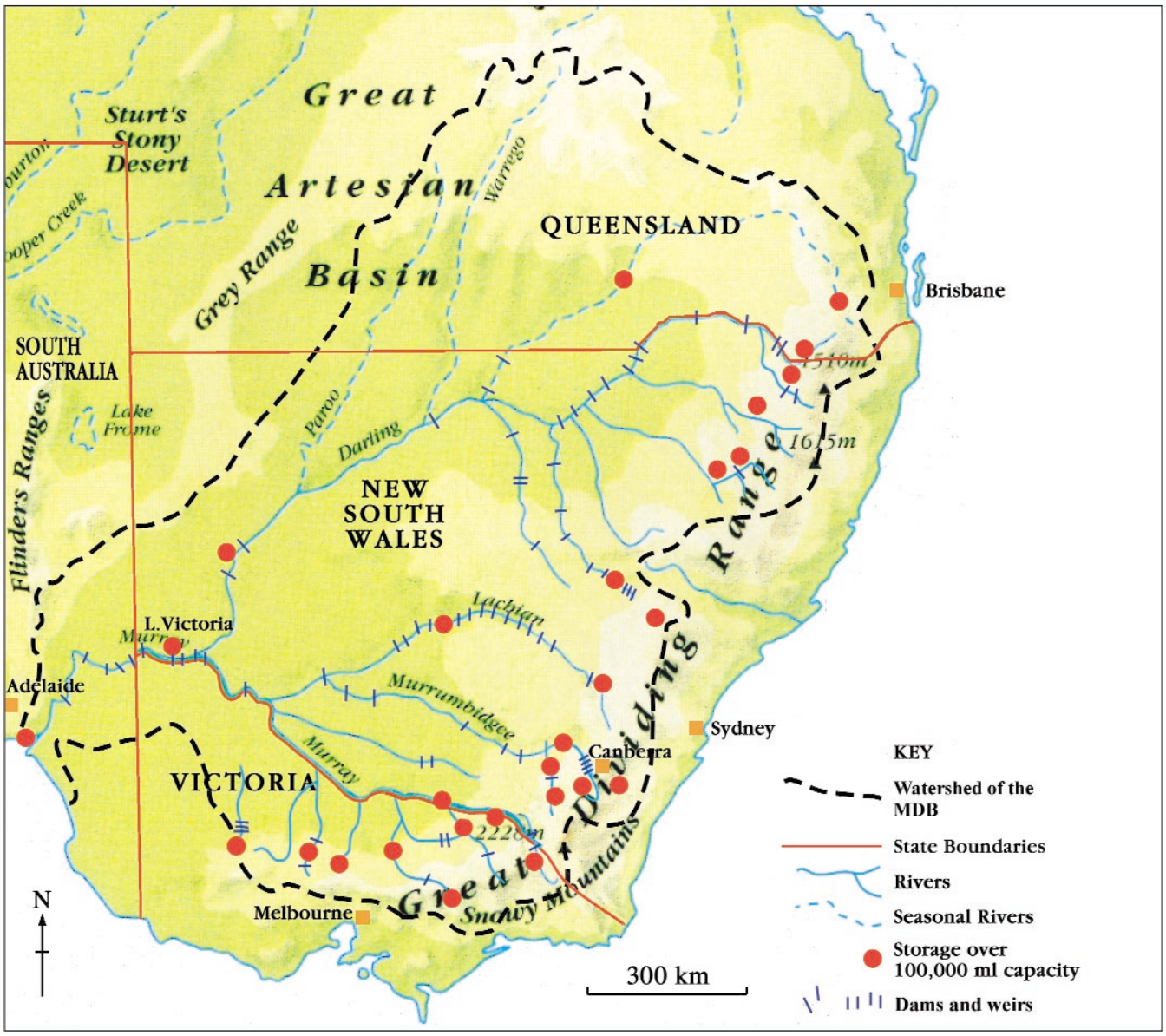


Source: The Times, T2 31 July 2003

Turn over.

RESOURCE 3a

Dams and Major Storage Areas of the Murray-Darling Basin [MDB], Australia



The MDB is administered by:
The Commonwealth
5 State Governments
200+ Local Governments who manage the natural resources of the Basin in partnership with catchment bodies, land care groups and other community organisations.

State	% of the area of MDB
New South Wales	56·6
Victoria	12·3
Queensland	24·5
South Australia	6·4
Australian Capital Territory [Canberra]	0·2
Totals	100·0

There are 30 big dams and 3,500 weirs in the MDB. The dams are capable of storing 3 times the annual average flow of the Murray river.

Population changes in the MD Basin 1986 - 1996

State	Population 1986	Population 1996
New South Wales	745,023	771,060
Victoria	513,823	563,266
Queensland	188,573	215,402
South Australia	96,339	107,794
Adelaide C T	249,407	299,243
Total Murray-Darling Basin	1,793,165	1,956,765

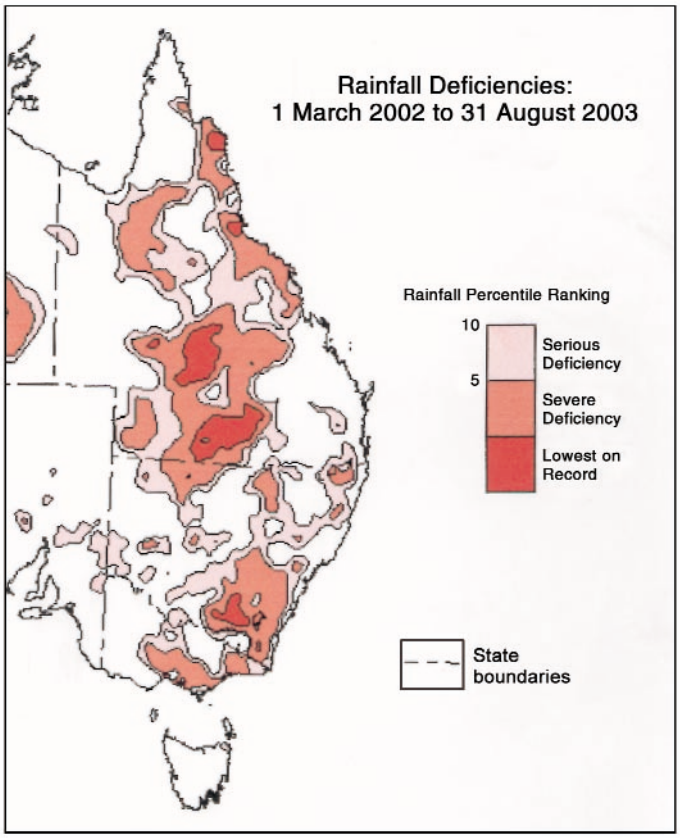
RESOURCE 3a (continued)

RELIEF

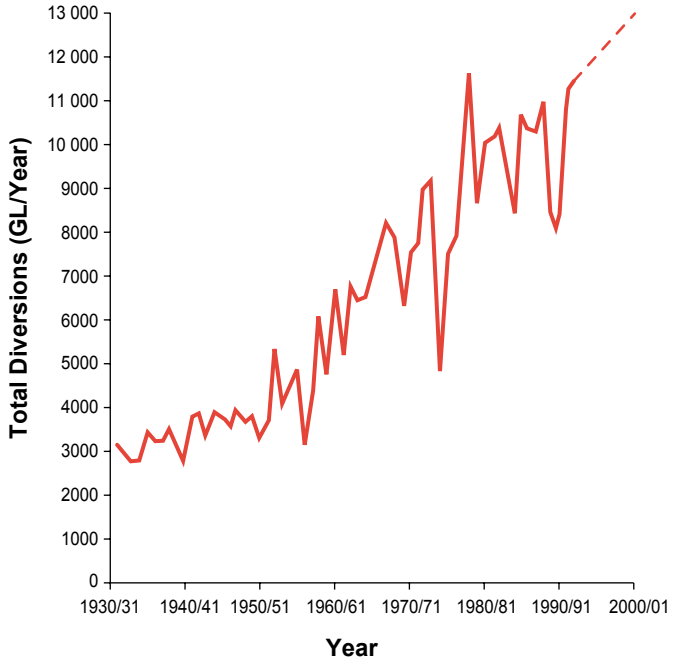
Most of the Basin is extensive plains and low undulating areas, mostly below 200 metres above sea level. Of greatest extent are the vast plains, the Darling Plain in the north, and the river plain to the south, drained by the Murray.

CLIMATE

An important consequence of the extent of the Murray-Darling Basin is the great range of climatic conditions and natural environments, from the rainforests of the cool and humid eastern uplands, the temperate country of the south east, the sub-tropical areas of the north east, to the hot, dry semi-arid lands of the west plains.
During the year 1 Sept 2002 to 31 August 2003, the region had an annual temperature anomaly of +1·5°C in the Great Dividing Range and +0·5°C in the western plains. The rainfall pattern compared to the average during a similar period is shown on the map opposite.



Total diversions from the MDB 1930-1991. Projection to 2000



Changes to river flow in the MDB since the dams were completed.

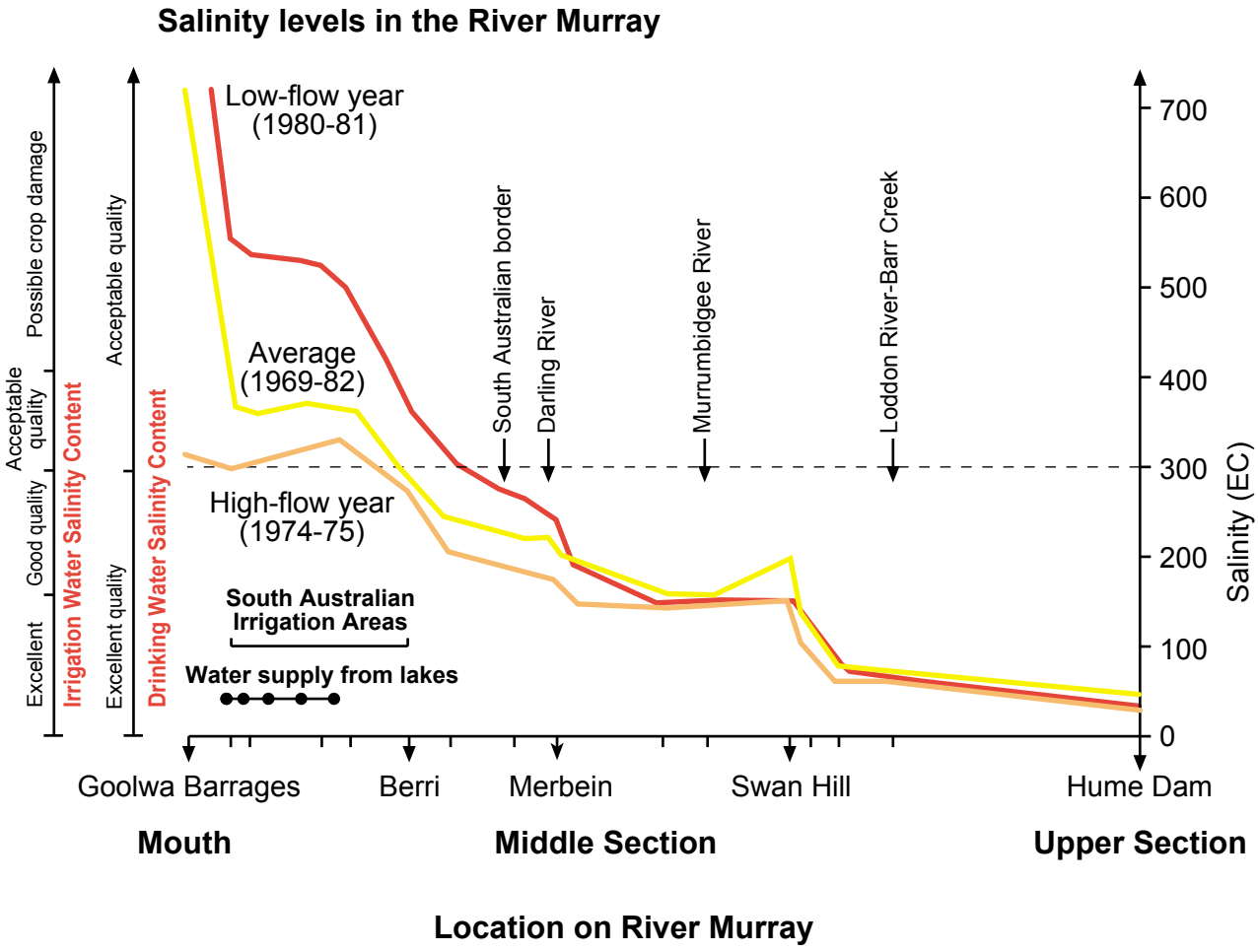
	Natural conditions	Regulated conditions
Median Flow [flow that is exceeded in 50% of years]		
Darling	1,746 GL/Year	1,053 GL/Year
Murray	11,883 GL/Year	2,539 GL/Year
'State of drought' [defined by river levels]	5 years every 100	61 years every 100
Regime	Steady variation in mid-range flows	Dominance of very low flows with occasional high flood event
No flow at the mouth	1 year in 20	1 year in 2

GL – gigalitres. A gigalitre is the equivalent to around 500 Olympic swimming pools

Turn over.

RESOURCE 3b

The MDB is geologically and climatically prone to concentrating salt in the landscape. This gets washed into the river system and is affected by the flow patterns of the river.



RESOURCE 3c

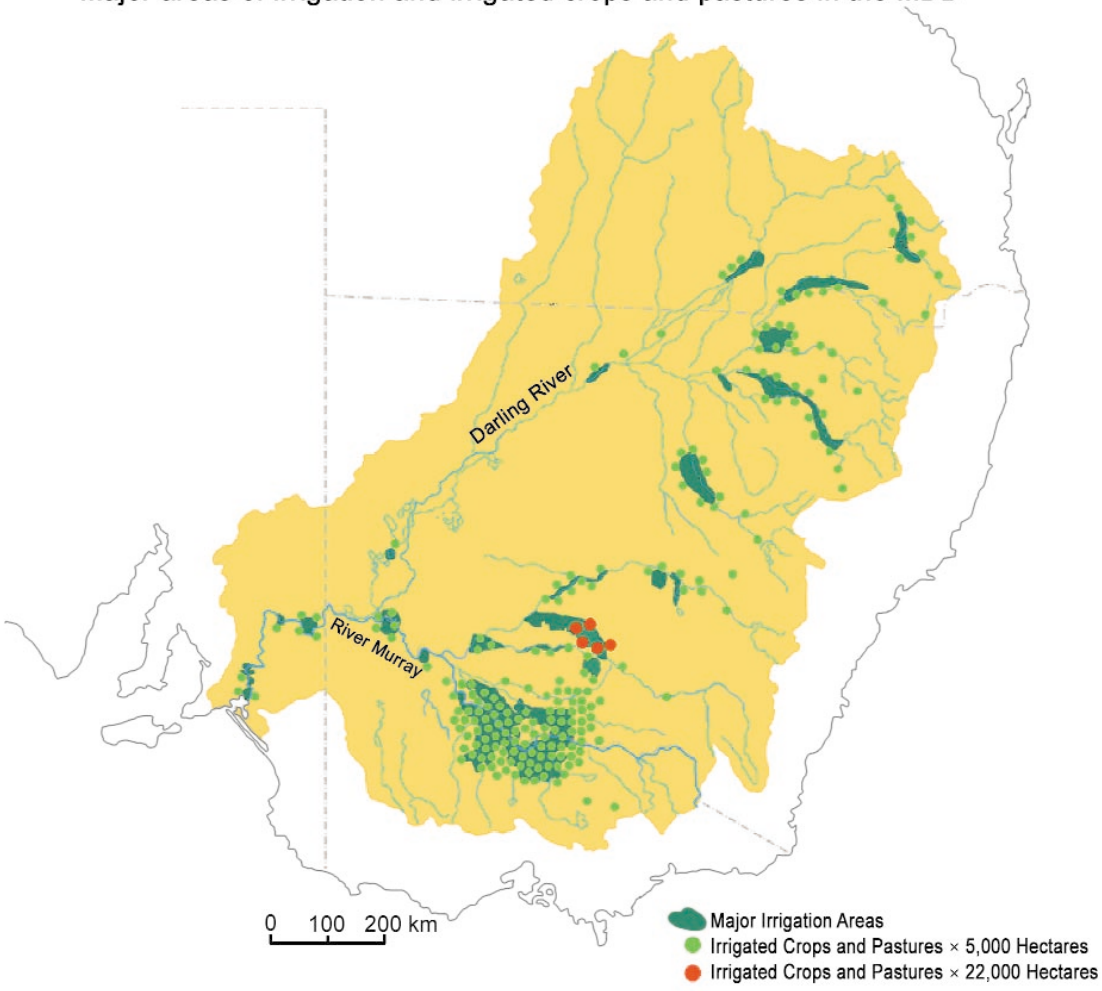
IRRIGATION

- Australia is the highest user of water per capita in the world despite being the driest inhabited continent.
- Crops produced on irrigated land account for 25-30% of Australia's Gross National Value of agricultural output.
- 70% of all water used for agriculture in Australia is used by irrigation in the MDB.
- The MDB has 71·1% of the total area of irrigated crops in Australia.
- The MDB is the most important agricultural region in Australia – 41% of the value of agricultural production but only 1·7% of the total area of farms in Australia.
- 95% of water abstracted in the MDB is used for irrigation on dairying, rice, cotton, horticulture, viticulture.
- 28·5% of the farms in the MDB use irrigation
- When the watertable rises to within 1 metre of the surface, waterlogging and salinisation occur causing substantial productivity losses.

ENDANGERED SPECIES

- There are more than 30,000 wetland areas in the MDB, 50% severely damaged or destroyed.
- Floodplain habitats are threatened because of the change in river regime.
- The MDB has at least 35 endangered birds and 16 endangered mammals with 20 mammal species having become extinct.
- Unique Red Gum forests are under threat.
- 30% freshwater fish species native to MDB are threatened with extinction.
- Coorong Lake near the Murray mouth has lost over 90% of its migratory water birds due to the lack of water flowing to the sea.

Major areas of irrigation and irrigated crops and pastures in the MDB



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RESOURCE 3c (continued)

Lake Victoria

The Lake as a regulator of water flow in the MDB

Lake Victoria was once a seasonally flooded lake bed but, with the development of the MDB water system, is now the site of a permanent lake with a major water storage capacity [680 gigalitres].

Lake Victoria is downstream of all the major tributaries to the River Murray and is used to store water from these tributaries. The River Murray upstream of the lake supplies the main area of irrigation in the MDB where most of the water of the River Murray is used to supply irrigation, especially in times of drought, the water stored in Lake Victoria is available to ensure that downstream, the state of South Australia receives its entitlement of water.

Aboriginal Values

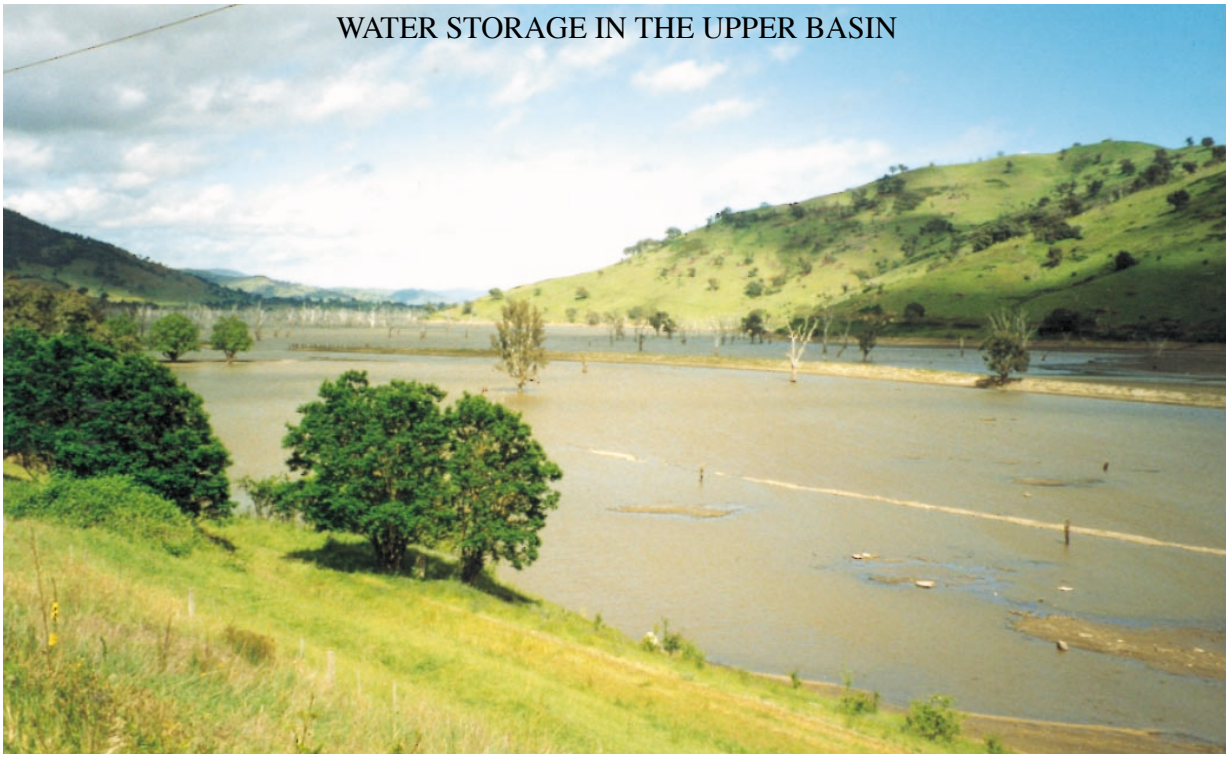
Lake Victoria has exceptional spiritual value to Aboriginal people as it is a place of many burials. For Aborigines the landscape is significant. The burials and other heritage material can only remain important if the environment remains intact.

Before becoming part of the MDB system, the lake provided Aboriginal people with a rich complex of resources, particularly on the seasonally flooded delta flood plain of the southern lakebed where remnants of extensive settlement exist. These remains are now submerged. The lake bed is the site of the final conflict between Aborigines and Europeans on the Murray – the Rufus River Massacre, 1841.

Natural Heritage

Lake Victoria is the only substantial, ancient lake on the River Murray. It has unique potential for understanding the geological history of the region since it contains complete records of sediments deposited over the past 2 million years.

WATER STORAGE IN THE UPPER BASIN



'They're trying to prevent Queensland from developing its resources because they've "stuffed" things up down there. I think South Australia's being very greedy- not only do they use all their own water, but they take 25 times that from the other States and still say they're short. Queensland uses only 13% of its own run-off. Farmers in my area have already learned to manage their water sustainably because rainfall is so unpredictable. It's a type of opportunistic irrigation – not like down the Murray River where you turn a tap on and it's there. We collect water from overland flows and store it in enormous earth dams which might take 4 years to fill. We're always short, but it's a way of managing the heavy flows of water that we do get. With the use of recirculation drains my water usage is 80-90% efficient.'

Kim Bremmner, Cotton Farmer, Queensland, Spokesman for rural lobby group AgForce

RESOURCE 3d

In 1995 The Ministerial Council of the MDB recognised that increases in the amount of water diverted from the Murray and its tributaries would hasten the decline in the health of the river. It was agreed to place a **'CAP'** on further growth of diversions.
The 'CAP' is a limit on the volume of water which can be diverted from the Basin's rivers for consumptive uses and was set at 'the volume of water that would have been diverted under the 1993/4 levels of development'.
An Independent Audit group conducts a special audit of a valley if diversions exceed an agreed trigger. The State then has to report to the Ministerial Council on the actions it intends to take in that valley to bring it back in line within the 'CAP'.
The Ministerial Council is now considering lowering the 'CAP' levels further to allow more water to flow through the river system. Since 2002 Community Consultations have been set up to ascertain the levels of 'CAP' reduction communities would prefer. Three options have been given:

5% reduction in the 'CAP', i.e. restore 350 gigalitres to the annual flow
10% reduction in the 'CAP', i.e. restore 750 gigalitres to the annual flow
20% reduction in the 'CAP', i.e. restore 1500 gigalitres to the annual flow

A decision is expected in 2004.

Ways to save water in your Home

1. *Install an efficient shower head.*
2. *In the garden install micro-irrigation equipment to be used between 6 00am and 8 00 am. Sweep patios and paths rather than hosing them.*
3. *Check the tap doesn't leak.*
4. *Spread mulch over the garden to reduce evaporation loss.*

waterwise

From Waterwise, a project to encourage householders to reduce the amount of water used.

The Integrated Catchment Management Policy 2001
A framework for Natural Resources management of the MDB 2001-2010

Gives a timeframe for **setting targets** for the Basin for: water quality; water sharing; river ecosystem health; terrestrial biodiversity
Strengthens **whole catchment** approaches to planning
Gives **clear roles** for: MDB Council; all levels of Government; regional organisations; land holders/managers
Is **developing individual strategies** for:

- reducing basin salinity
- management of floodplains and wet lands
- fish management
- cultural heritage
- allocation of the limited water to the different demands
- improvements in the river's water flow
- interstate water trading