

Can we 'drought-proof' Australia?

NATIONAL
MUSEUM OF
AUSTRALIA
CANBERRA

Investigating drought
in Australia – its causes,
impacts and management

In 2002 and 2003 much of Australia went through one of the most severe droughts on record. But what does that mean? What is drought? What are its causes? Is all Australia equally affected? Does it only affect farmers, or does it impact on other Australians? And if so, how? Can drought be managed, or even eliminated? Can Australia be 'drought-proofed' as some commentators have suggested?

What is your idea of drought?

Look at the images of drought on this page, and use them and your own knowledge to create a list of words and ideas associated with it. Some examples have been done in the 'Drought Brainstorm' box to help you.



27/08 2002-596 © John Ditchburn

I love a sunburnt country,
A land of sweeping plains,
Of ragged mountain ranges,
Of droughts and flooding rains.

I love her far horizons,
I love her jewel sea,
Her beauty and her terror –
The wide brown land for me!

Extract from Dorothea McKellar, 'My Country'

Environment as agent

Drought also shaped Australian sheep. In the 1899–1902 drought, 240 000 sheep died on one Queensland station alone. Only the toughest animals survived the long walk from the muddy waterhole to the last brittle grasses.

Caption for Nation Museum of Australia display on drought in the Tangled Destinies gallery



Parched bottom of a dam in drought

Curriculum Guide: Student Learning Outcomes

By the end of this article students will be better able to achieve these learning outcomes that are common to most states' and territories' Society and Environment Key Learning Area:

Time, continuity and change (History)

- Understand the role of drought in Australian history.
- Identify some key forces for change and continuity over time.
- Describe and explain lasting and changing aspects of Australian society and environments.

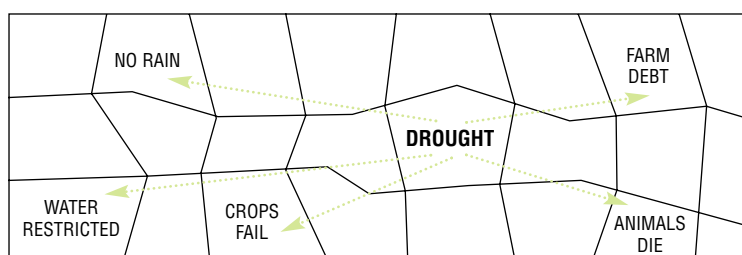
Place and space (Geography)

- Analyse attitudes to and impacts of natural forces on the environment.
- Explain and predict variations in places over time by referring to processes that may affect natural features.
- Explain consequences of human modifications of natural features of places.
- Analyse patterns and processes to describe spatial variations of features on the earth's surface.
- Analyse natural resource management practices.

Resources (Economics)

- Analyse relationships among resource use, economic growth, living standards and ecological sustainability.
- Analyse environmental impact assessments from a variety of perspectives and justify a position on future options.

Drought Brainstorm



The National Museum of Australia opened in March 2001 as part of the celebrations for the Centenary of Federation. The Museum employs a fresh and exciting approach to Australian history, culture and environment. Each National Museum unit of work in *STUDIES* asks students to consider the stories and concepts behind Museum themes, objects and images, and can be used with students in Society and Environment, History, Geography and English.

What is drought?

Drought is an acute water shortage. It is associated with sustained periods of serious or severe rainfall deficiency. It exists when there is far less water in a particular area over a period of time compared to what is normal for that area for that same period of the year.

Water shortages may occur because of losses in stored water – in dams, creeks, rivers, in the soil, artesian basins – due to low run-off, evaporation, or wasteful usage. But the main and most basic reason is that there is a lack of rainfall.

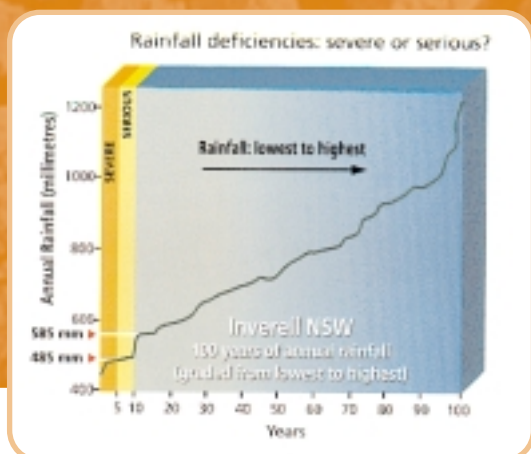
There is a general rule that is applied to decide if an area is in **serious or severe drought**, related to rainfall deficiency:

- There is **serious rainfall deficiency** (leading to serious drought) when for three or more months the rainfall is between the lowest five and ten per cent recorded in that area for that period over time.
- There is **severe rainfall deficiency** (leading to severe drought) when for three months or more the rainfall is among the lowest five per cent of recorded rainfalls in that area for that time of year.

Records of rainfall have been kept in Australia since the 1860s. Today the National Climate Centre in the Bureau of Meteorology monitors rainfall data from about 800 individual stations nationally. From 1860 to today there have been nine major droughts in Australia, with the 2002/3 drought ranked as one of the worst. There have also been many other more localised and less severe droughts over this time.

Look at the graph below, illustrating rainfall at Inverell over 100 years, and answer these questions.

- 1 What is the approximate variation in rainfall over the 100 year period?
- 2 What range of rainfall (in millimetres) would classify as a serious rainfall deficiency for Inverell?
- 3 If Inverell received 420 millimetres in a year how would that be rated?



(www.bom.gov.au/climate/drought/livedrought.shtml)

Major droughts in Australia over time

Look at this information on all the **major droughts** in Australia over time, and answer the questions that follow.

1864–66 (and 1868) The little data available indicate that this drought period was rather severe in Victoria, South Australia, New South Wales, Queensland and Western Australia.

1880–86 Victoria (northern areas and Gippsland); New South Wales (north-east area and south coast); Queensland (1881–86, in south-east with breaks – otherwise mainly in coastal areas, the central highlands and central interior in 1883–86); and South Australia (1884–86) mainly in far south, and south-east).

1888 Victoria (northern areas and Gippsland); Tasmania (1887–89 in the south); New South Wales; Queensland (1888–89); South Australia and Western Australia (central part of the south-east corner).

1895–1903 Practically the whole of Australia was affected but most persistently the coast of Queensland, inland areas of New South Wales, South Australia, and central Australia. This was probably Australia's worst drought to date in terms of severity and area. Sheep numbers, which had reached more than 100 million, were reduced by approximately half and cattle numbers by more than 40 per cent.

1911–16 Victoria (1913–15 in north and west); Tasmania (1913–15); New South Wales, particularly inland areas; Queensland; Northern Territory (mainly in the Tennant Creek-Alexandria Downs area); South Australia (some breaks in agricultural areas in the far south and south-east); and Western Australia (1910–14).

1918–20 Queensland, New South Wales, South Australia, Northern Territory (Darwin-Daly Waters area and central Australia), Western Australia (Fortescue area), Victoria, and Tasmania.

1939–45 New South Wales (severe on the coast), South Australia (persistent in central pastoral areas), Queensland and Tasmania; also (more particularly in 1940 and 1944–45) in Western Australia, Victoria, and central Australia; Tennant Creek-Alexandria Downs area in 1943–45.

1958–68 This drought was most widespread and probably second to the 1895–1903 drought in severity. For more than a decade from 1957, drought was consistently prominent and frequently made news headlines from 1964 onwards. This was treated as one major drought period, but could be subdivided into two which overlapped, both in time and space. Central Australia and vast areas of adjacent Queensland, South Australia, Western Australia, New South Wales, and northern Australia were affected, with varying intensity, 1957–66; and south eastern Australia experienced a severe drought, 1964–68.

continued over page >>

1982–83 This extensive drought affected nearly all of eastern Australia, and was particularly severe in south-eastern Australia. Lowest ever 11 month rainfall occurred over most of Victoria and much of inland New South Wales and central and southern Queensland; and lowest ever 10 month rainfall occurred in much of South Australia and northern Queensland. Total losses were estimated in excess of \$3,000 million.

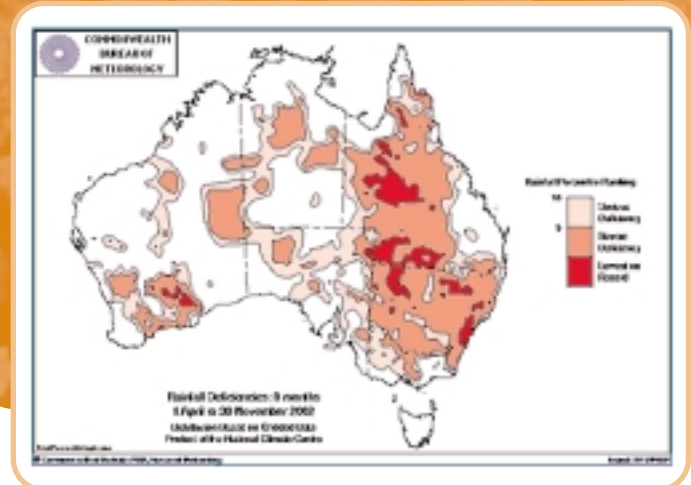
1991–95 Intense, persistent drought over central and southern Queensland, and northern New South Wales, extending at times to other parts of the Australian continent.

By late 1991/92, very dry conditions were developing over parts of eastern Australia, though the southeast had some very wet spells and flooding in the winter of 1991 and summer of 1991/92. The 1991/92 Wet season failed over most of northern Australia – it was the driest Wet season on record in the Northern Territory. Generally dry conditions persisted through the first half of 1992. But between late 1992 and late 1993, there was heavy rain and flooding over southeastern Australia. Over Queensland, however, the drought continued unabated through this period, and extended south over eastern New South Wales, setting the scene for disastrous bushfires in January 1994.

Good rains fell in the drought-hit areas of Queensland in February and March 1994, but from mid-March dry conditions set in again. This time the whole country was affected. Overall, the 1994/95 drought was estimated to have cut agricultural production by nearly \$2 billion (or 8 percent) compared with 10 percent in the ruinous 1982/83 drought.

2002–2003

- 1 Create a series of overlays on a map of Australia to show the extent of each of these droughts. Each group might create one overlay, then put all these over a base map. (A useful set of reference maps can be found in the current *Commonwealth Year Book* in the chapter on Agriculture.)
- 2 Describe the result. What would you say about the physical extent, duration and frequency of major droughts in Australia over the last 140 years? (You can also find more information about some of these droughts at <http://bom.gov.au>)
- 3 2002 was the hottest year on record in Australia, and one of the driest. Use this information and the rainfall deficiency map below to create your own description of the 2002–03 drought in the blank box.



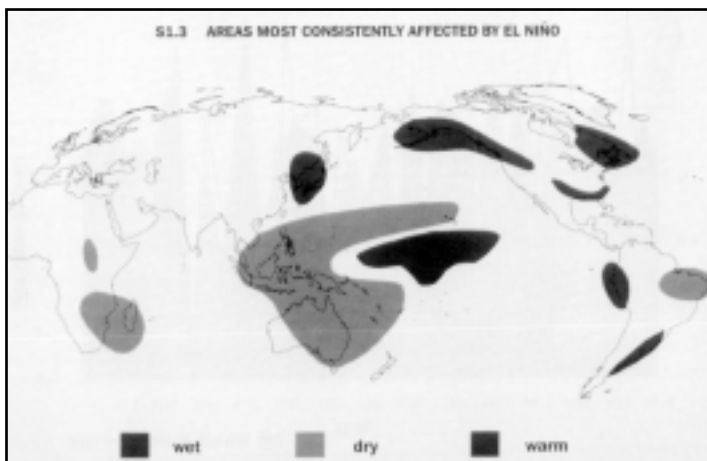
(<http://www.bom.gov.au/climate/drought/drought.shtml>)

What causes drought in Australia?

The world's climate system as a whole is an extremely complex mix of different sub-systems all interacting with each other on a wide range of time and space scales – the atmosphere, oceans, ice masses and the biosphere. The potential for variability from year to year is very high as there are several other contributing factors, such as sunspots and phases of the moon.

Many scientists believe that human activities associated with the generation of 'greenhouse gases' are causing climate change. (See *STUDIES* 2/2000.) This, however, does not cause drought as it has been experienced in Australia over thousands of years. Natural climate change in Australia is caused by two major elements – the changes in the pressure of air in the atmosphere circulating between Tahiti and Darwin (measured by the **Southern Oscillation Index – SOI**); and the temperature of currents moving across the equator from South America to the area to the north of Australia (known as the El Niño effect).

(Year Book Australia 1998 and
<http://www.bom.gov.au/lam/climate/levelthree/c20thc/drought.htm>)



(Year Book Australia 1998)

Look at the explanations and illustrations of this process below.
Australia's climate is influenced by:

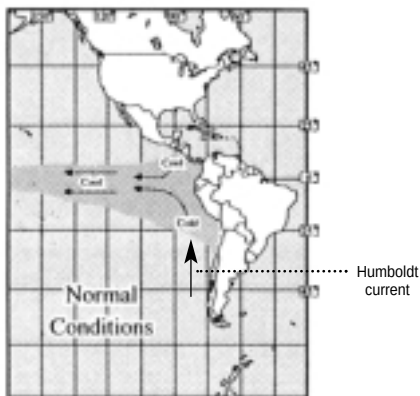
CURRENTS

and

ATMOSPHERE

Normal Conditions

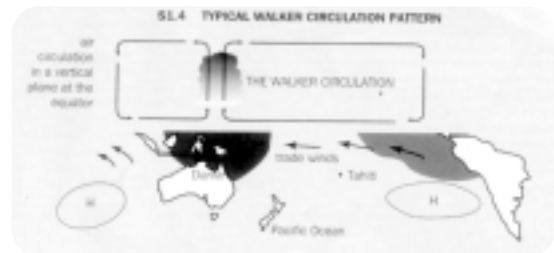
In most years the cold Humboldt Current brings relatively cold water north along the west coast of South America, an effect increased by the upwelling of cold waters along the Peruvian coast. The cold water then flows westward along the equator, and is heated by the tropical sun. These normal conditions make the western Pacific about 3°C to 8°C warmer than the eastern Pacific. This water is acted on by the Walker Circulation, described opposite.



(<http://www.geo.appstate/gin/htm>)

A major air circulation pattern that affects Australian climate is called the Walker Circulation.

In normal conditions the eastern trade winds bring moist air towards the north of Australia. As the air reaches the normally very warm seas at the western edge of the Pacific, moist air rises to high levels in the atmosphere. The air then travels eastward before sinking over the eastern Pacific Ocean. The rising air is associated with a region of low air pressure, towering cumulonimbus clouds and rain. High pressure and dry conditions accompany the sinking air.

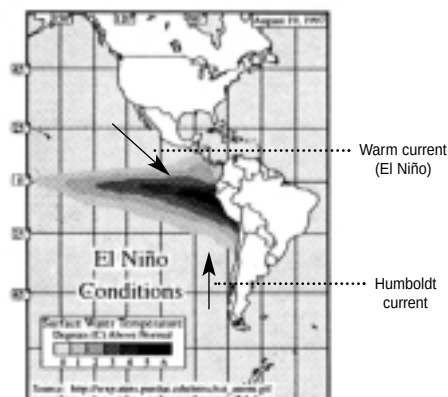


The Walker Circulation pattern is not always consistent, and the Southern Oscillation Index has been developed to measure those changes (positive or negative compared to the norm.) Negative changes are associated with an El Niño event, and positive ones with La Niña, the 'girl-child'. (See chart on page 8).

(Year Book Australia 1998)

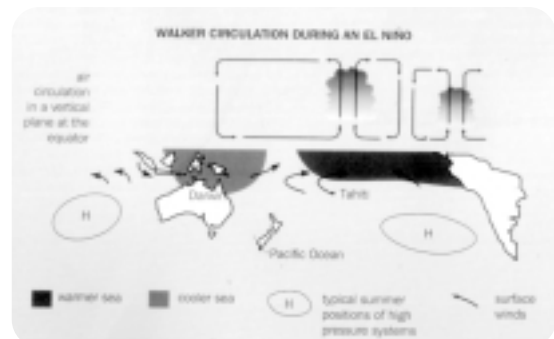
Abnormal Conditions

In these years there is an El Niño or warm ocean current. El Niño means 'the boy-child', and was named by Peruvian anchovy fishermen who observed that it appeared at about Christmas time. Normally the cold Humboldt current brings nutrient-rich water from the deeper ocean, producing abundant plankton which is fed on by anchovies. However, during an El Niño event, warmer waters prevail, the water is less nutrient-rich and contains less plankton, and the anchovy harvest is poor. This also means that the water in the eastern Pacific is as warm as the western Pacific, and this has an impact on the Walker Circulation.



(<http://www.geo.appstate/gin/htm>)

During an El Niño event off Peru the trade winds change direction, and the SOI registers a negative change. Negative values of the SOI are associated with weaker winds, the seas around Australia cool, and less moisture is fed into the Australian area. There is a high probability that eastern and northern Australia will be drier than usual.



Positive changes to the SOI are associated with stronger winds and warmer sea temperatures to the north of Australia. These means that there is a higher than normal probability of increased rainfall. This is called the opposite of El Niño, or La Niña.

(Year Book Australia 1998)

- 1 Here are two statements. Decide which is a summary of NORMAL weather patterns for Australia, and which is a summary of ABNORMAL patterns.

Warm currents off Peru	+	Eastern and western Pacific waters at similar temperatures	+	Weak trade Winds	+	Less moisture reaches Australia
Cool currents off Peru	+	Eastern Pacific warmer than western Pacific	+	Strong trade winds	+	Moisture falls over Australia

- 2 Decide which of these describes an El Niño event, and which describes La Niña.

Less rain, greater chance of drought

More rain, greater chance of floods

INKCINCT

Government definition of drought...



With a growing international awareness of the social and economic impacts of climate variability, including drought, the World Meteorological Organization (WMO) in the late 1970s instituted a World Climate Program (WCP) to complement its long established World Weather Watch Program. The WCP is the formal framework for international co-operation in climate data exchange, climate monitoring, applications of climate data, climate research and the impacts of climate variability on people and the environment.

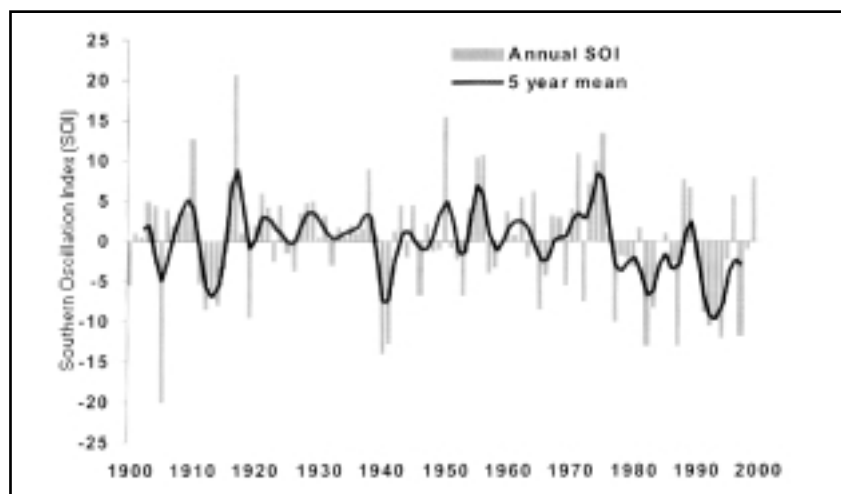
Australia's Bureau of Meteorology plays a key role in international data exchange and analysis by operating in Melbourne one of the three World Meteorological Centres (WMC), the other two centres being in Washington and Moscow. The Melbourne WMC and a Regional Meteorological Centre in Darwin, also operated by the Bureau, collect and process weather and climate data for the southern hemisphere. These Centres issue daily weather analyses and forecasts for the southern hemisphere, eastern Asia and the western equatorial Pacific.

The National Climate Centre (NCC), in addition to its monitoring of fluctuations in Australia's climate, carries out analyses of monthly and seasonal variations of atmospheric pressure, temperature and wind over the southern hemisphere as a whole. Information is regularly exchanged between similar climate centres operating in other countries.

The Bureau of Meteorology Research Centre has also instituted a program of research into the problems of forecasting climate fluctuations on monthly and seasonal time scales. Any improvements in this regard would have far reaching implications for our ability to cope with drought. Already there are signs of some skill in using the new found knowledge of the Southern Oscillation/El-Niño phenomenon to assess the likelihood of major anomalies in winter/spring rainfall over eastern Australia several months in advance.

(<http://www.bom.gov.au>)

Look at this chart showing the Southern Oscillation Index for 1997–2002.



(<http://www.bom.gov.au/climate/current/soi2.shtml>)

- 2 In which years would you expect that Australia was most likely to experience:
 - El Niño drought effect?
 - La Niña flood effect?
- 3 Design a symbol to represent El Niño, and one to represent La Niña. Draw them in the appropriate halves of the chart.



What impacts does drought have on Australia?

Look at the illustration on the back cover of this edition of STUDIES, showing an imaginary community in Australia.

- 1 Identify those places or activities in the illustration that might be affected by drought. For example, you might mark the dam, because you would expect the dam to dry up during a drought. You might also mark a cultivated field, because you would expect the crop to be non-existent during a drought time. And so on.
- 2 Then complete a table like the one below, briefly explaining your ideas. One example has been done for you. You will also get some ideas and information from the sources included later.
- 3 Discuss which of these are long-term, and which are short-term impacts – and therefore which natural and human aspects of the environment are likely to recover more quickly.

Aspect	Likely impact	Reason/Explanation
Agricultural products	Crops may be reduced	Not enough water to grow the new crop
Breeding stock		
Bushfires		
Cost of living		
Country towns		
Debt – personal		
Debt – national		
Dust storms		
Erosion		
Exports		
Family life		
Farm animals		
Farm incomes		
Gardens and parks		
Government expenditure		
Government income		
Government services		
Local environments		
Native animals		
Recreation		
Soil quality		
Water quality		
Other (specify)		

- 4 Here are a number of sources of information about the impacts of the current drought. Read through these, and add any ideas and information to the table you have started above.

Source

one

Drought disrupts cropping programs, reduces breeding stock, and threatens permanent erosion of the capital and resource base of farming enterprises. Declining productivity affects rural Australia and the national economy.

(Bureau of Meteorology, <http://www.bom.gov.au/climate/drought/livedrought.shtml>)

Source

two

On 9 December 2002, the Commonwealth government announced a one-off additional drought assistance package for farmers and small businesses in severely drought-affected areas.

Farmers in areas experiencing the impact of a one in 20 year rainfall deficiency from March 2002 to November 2002 are now eligible to apply for interim income support and interest rate relief, while small businesses in declared areas are also now eligible for interest rate relief from the Federal government.

(<http://www.affa.gov.au>)

Source

three

Australian Government Envirofund targets drought recovery

The Commonwealth Government is inviting community groups and individuals to apply for funding for drought-related environmental works under a special \$10 million Drought Recovery Round of the Australian Government Envirofund.

The Drought Recovery Round of the Envirofund is one of a series of new measures acknowledging the effect the drought is having on industry, the environment and communities around Australia.

Projects funded may include waterway protection, erosion control, or fencing to protect habitat of endangered animals and vegetation. Funding may also be available to relocate watering points to prevent stock damage to fragile river frontage, and to control feral animals to reduce grazing pressure or protect native plant and animal life.

(<http://www.affa.gov.au>)

Source

four

The Victorian Department of Human Services is assisting the Department of Natural Resources and Environment support rural communities to manage the current dry conditions. The DNRE website has a range of information that may be useful to those people affected by the drought. The following information may also be of use to you.

- Family and crisis
- Children and crisis
- Teenagers and crisis
- Stress after emergencies
- Providing psychological support

(<http://www.dhs.vic.gov.au/emergency/events/drought.htm>)

Source

five

The worst dry spell in a century has ripped 80 per cent from farm production in a year and cut the nation's sheep flock to the lowest levels since the 1920s.

Farm production income would fall 78.6% – the average broadacre farm which operated at a profit of \$51 800 last financial year is expected to record a loss this year of \$54 000.

Agriculture makes up 3 per cent of the Australian economy, but accounts for 25 per cent of exports.

Many farms had cut livestock numbers and stocks of grain, fodder and wool, diminishing their capacity to generate cash when the drought ends.

(*Australian* 17 December 2002)

Source

seven

Impact of drought

Agnote DAI-206, first edition, October 2000

Bill McKiernan, Technical Specialist Beef Grazing Systems, Orange (NSW)

Pasture and paddock welfare

Overgrazing by livestock during drought can seriously degrade pastures and soil, costing thousands of dollars to repair.

Animal welfare

Animals are the more obvious casualties of drought. If decisions are based purely on poor animal condition, drought strategies will be implemented too late for economic recovery and too late for pasture and soil sustainability.

Personal and financial welfare

Don't underestimate the social/psychological effect of a drought – watching the slow devastation of a farm and a business is hard on the producer but often harder on the rest of the family.

Financial planning must be done before and during the drought.

(<http://www.agric.nsw.gov.au/reader/4865>)

Source

six

Honey prices soar as bees do it hard

Honey prices have jumped by more than 50 per cent in the past year, due to low production and the need to import honey from Argentina to keep supplies available.

Bees convert nectar to honey but in a drought many plants do not blossom. During this time, beekeepers need to feed bees sugar as a nectar substitute to keep the bees alive. Some beekeepers who did not order sugar in have lost their hives.

(*The Age* 8 January 2003)

eight

The risk of serious environmental damage [by drought], particularly through vegetation loss and soil erosion, has long term implications for the sustainability of our agricultural industries. Water quality suffers, and toxic algae outbreaks may occur; plants and animals are also threatened. Bushfires and dust storms often increase during dry times.

(<http://www.bom.gov.au/climate/drought/livedrought.shtml>)

twelve

Introduced animals can compete with native animals for food. For example, one study found a large overlap in the diet of the rabbit and the rare yellow-footed rock wallaby, so rabbits are competing with the wallabies for food. Competition is particularly severe during drought when food and water are scarce for all animals.

(<http://www.animalliberation.org.au/feralint.html>)

nine

Towns and cities around Australia are having to adopt drought-induced water restrictions. This particularly affects the watering of private and public gardens, sports grounds and recreational areas.

(*Australian* 5 December 2002)

ten

Farmers on the Darling River at Menindee claim too much water has been allowed to flow down to South Australia.

Irrigators now fear their industry will not survive.

"It really is down to the point where we can't salvage all the pockets of water that are left then we will run out," Paul Dettorre, Food, Fibre and Business Association, said.

(<http://www.abc.net.au/landline/stories/s727044.htm>)

thirteen

As I write this, the area in which my family and I live is experiencing the fourth consecutive year of drought. We live on a sheep property in the rangelands of South Australia where we normally run a flock of 8,000 sheep. At the moment we have under 6,000 sheep due to the lack of water and food. This impacts on our livelihood, our ability to employ workers, and eventually the possibility of having to leave the property. Our lives are dominated by the lack of rain: it affects our relationships – with each other, our extended family, our friends and our neighbours ...

Five weeks ago, we had [some] rain! It filled some of the dams, the house dam especially, and then, five days later, we had a dust storm! Oh, the joy of living in the rangelands – a land of contrasts. When we have good rains, then the landscape is transformed. The plants and animals respond and so do the people who live in this wonderful area. I would not choose to live anywhere else – it is part of God's wonderful creation.

(<http://www.anglicancommunion.org/iafn/christmas1999/australia.html>)

eleven

Hungry emus eye crops

Huge flocks of emus, driven south as drought grips the wheatbelt, are threatening to wipe out valuable crops. The invasion by thousands of the big birds is a double blow to farmers already struggling to grow crops in parched soil.

The birds, most in poor condition, are destroying crops and breaking fences in a desperate search for food. Rotting carcasses litter the track alongside the emu barrier, built originally as the rabbit proof fence.

Farmers along the fence that stretches from the Zuytdorp cliffs north of Kalbarri to Ravensthorpe in the south, have shot thousands of the birds. A further 2000 have been caught in a trap near Ravensthorpe and will be poisoned this week as thousands more move towards the fence.

(Nick Taylor, *The Sunday Times*, (WA) 13 October 2002)

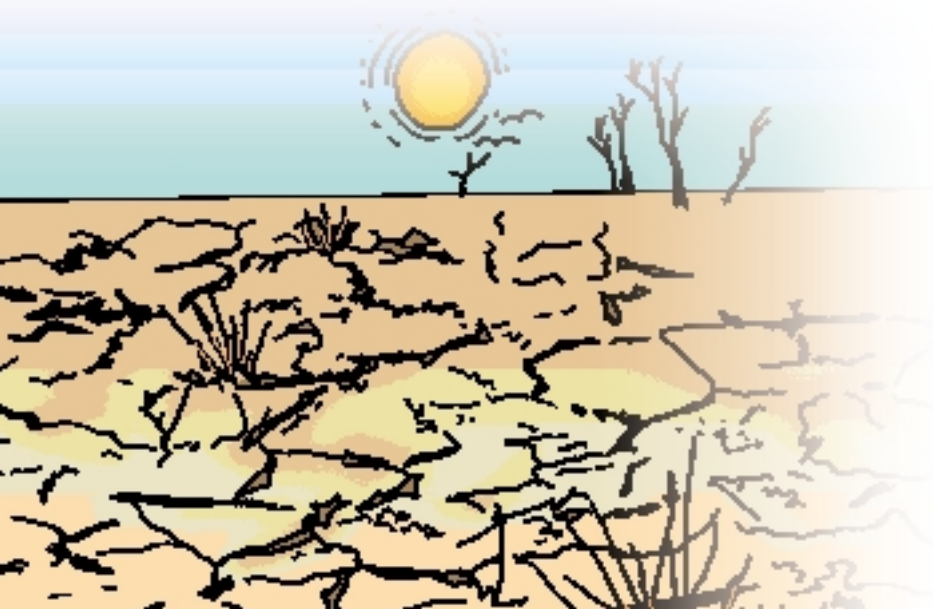
fourteen

The native plants and animals of Australia have adapted to life on an isolated continent over millions of years. Particularly since European settlement our native animals have had to compete with a range of introduced animals for food, shelter and the area they live in. Some of our native species have also had to face new predators. Such rapid change has also had a major effect on our soil and waterways.

Feral animals in Australia are either domestic animals that have gone wild or those that were introduced for pest control or for recreational use. Feral animals causing most public concern include: rabbits, foxes, cats, pigs, goats, donkeys, camels, water buffalo, mosquito fish, the northern Pacific seastar (*Asterias amurens*) and cane toads.

In Australia feral animals have few natural predators or fatal diseases and some have high reproductive rates. As a result, their populations can multiply rapidly if conditions are favourable. Drought is the main factor in controlling their populations. Numbers will drop quickly when food and water are limited.

(http://www.biotechnology.gov.au/biotechnologyOnline/environment/e_PestSpecies.htm)



fifteen

Animals suffering in Australia's big dry

'Across the country, our animals are doing it tough,' Deborah Tabart, Executive Director of the Australian Koala Foundation, told United Press International. From Perth to Sydney, the drought, brought in February by the El Niño weather pattern, is biting hard. Farmers are seeing their dams go dry, their paddocks turn to dust. People in towns are witnessing an influx of outback birds, such as cockatoos, corellas and emus, in search of food and water. 'The trouble is, our (wild animals are) adapted to drought, but we have large areas where the landscape has been changed, where bushland has cleared for farm land. And that makes it a lot harder for the animals to find refuges and survive,' Dr Barry Traill, a wildlife ecologist for the Wilderness Society, told UPI.

The damage is hidden in the good rainfall years, Traill said. 'But our poor land management practices come into sharp focus during drought. That's when you get extinctions of native animals. Right now, it's brown, grassless and bad.'

Traill predicted there will be 'an apocalypse of some (animal) populations. What I'm really worried about are species of small birds, like robins and honeyeaters, and small mammals.'

(Stephen Sheldon, UPI Science News Washington Post 31 August 2002)

sixteen

In October 2002 one of the largest dust storms ever swept across the drought-ravaged rangelands of New South Wales and Queensland, scouring more than 450 000 square kilometres of land. In some cases the land had been exposed by the loss of native plant cover linked to overgrazing and the extremely dry conditions that left the soil bare; in others farmers had not been able to plant crops or sow pastures that would normally protect the land surface. The dust storm is estimated to have stripped about 10 million tonnes of fine soil particles (enough to fill two million semi-trailers) and dumped it into the Tasman Sea.

(Bob Beale, *The Bulletin*, 5 November 2002)

seventeen

We apologise but due to the drought egg prices have risen dramatically.

(Sign in a supermarket)

- 5 Once you have gone through the evidence, complete the summary table on page 8.
- 6 Prepare a series of brief captions that explain various impacts of a drought on Australians. Attach them to the illustration on the back page to create your own poster showing this.

How can drought be managed?

During 2002 a radio commentator promoted the idea that Australia could be 'drought-proofed' by forcing some of its rivers to flow inland. This would provide increased sources of water for irrigating inland areas.

This idea was criticised by expert scientists, who stressed that drought was a permanent feature of Australian life, and we had to learn how to manage that reality, rather than try to change it. As scientist Tim Flannery explained:

“the idea that somehow we could turn the rivers inland and gain benefit from that ... to me is a nineteenth century way of thinking. It's a dangerous way of thinking ... We've got to become Australian. Thinking about turning your rivers inland is a European way of thinking ... That's not going to happen here ... We're the ones that have got to change. We have to become Australian.”

(AM 11 October 2002)

What can we do so that we are more effectively managing inevitable and periodical drought conditions and live in a sustainable system?

Here are some extracts providing a wide range of ideas about what Australia can do to manage drought more effectively. Often, these ideas are controversial, and even in some cases contradictory.

- 1 Identify the different suggestions, and comment on their likely advantages and disadvantages, using a table like the one below to summarise your ideas.

Suggested management strategy	Advantages	Disadvantages

one

The idea that we put Australia's irrigation system into pipes ... is a really good one and something we need to look at seriously ... I think the costs of it are fairly high, but they need to be borne, both by the individual producers and by the society at large that will benefit from putting those extra flows in the rivers.

(Tim Flannery, *AM* 11 October 2002)

two

Well I think landscapes that had a lot more native vegetation in them ... the native pastures, naturally grassy woodlands, respond much better to recovery from drought. They've been here for millions of years. Some of the systems we try and replace them with are not as resilient. So I consider that retaining as much native vegetation as possible, really gives you the resilience and robustness to accommodate some, not all of these difficult things.

(Hugh Possingham, *Earthbeat*, 12 October 2002)

three

A lot of the water that's used in agricultural Australia, particularly in the rangelands, is lost in evaporation, and clearly, particularly in the Great Artesian Basin, the more we can cap bores and we can pipe water to troughs, that way we're losing less and we're using water far more efficiently. So I think providing rural communities with assistance to invest in the infrastructure, which in this case is piping and capping [providing taps to turn the flow on and off] that will make their land practices more sustainable, is important.

(Hugh Possingham, *Earthbeat*, 12 October 2002)

four

The idea of some sort of national program to pipe our major open irrigation channels would require an enormous amount of funding, and it's quite clear that most of the Australian public believes that water should remain in public hands. So the challenge is, how do we get the water infrastructure that's required, how do we fund it while keeping it in public hands. And so that means it has to be government funded ... the government would issue special bonds which it would call Water Bonds, that would raise money. They would offer an interest rate that would be guaranteed by the government, say 5% or 6%, and superannuation funds would invest in those bonds. That would release money to the Federal government which could in turn be made available to the various water authorities around the country to carry out efficiency infrastructure type projects.

(Tony Gray, Farnhand Foundation, *Earthbeat*, 12 October 2002)

five

[It] might be possible ... to tap into some of the northern rivers floodwaters when they're in flood and capture a percentage of the flood rivers and store that somewhere, perhaps in underground aquifers.

(Tony Gray, Farnhand Foundation, *Earthbeat*, 12 October 2002)

six

Well what we'd really like to see is ... broadacre clearing of land stopped, or greatly reduced ... We're trying to get government to enforce legislation here regarding land clearing ... to bring about proper land clearing management in New South Wales.

(Robert Purves, World Wide Fund for Nature, *Earthbeat*, 12 October 2002)

seven

Droughts will continue to be a prominent feature of the Australian scene. Improved meteorological drought watch services and hopefully an improved ability to forecast droughts through local research and participation in the WCP will help to mitigate their adverse impacts.

The nature of drought, however, and the way in which the community should deal with it are complex issues incorporating significant variables in fields such as hydrology, agriculture, economics and sociology, as well as in the political realities of the day.

(Commonwealth Year Book Australia 1998)

eight

The impacts of drought are influenced by the resistance of plants to water shortages. Generally native pastures and herbage have evolved to be highly resistant to extended periods of low rainfall. Newer imported ones, especially cereal crops, are less resistant to drought.

(Commonwealth Year Book Australia 1998)

nine

Farmers must be the only for profit industry in the country that passes the hat whenever profits dry slip. If any city businesses tried that, we'd laugh them to scorn. But when Dad and Dave do it, we dig deep. And if we don't, our vote-chasing politicians do it for us.

There's nothing farmers can do to control the weather, but there's much they can do to stop the absence of rain from becoming 'drought' – which is the absence of feed, water, and soil moisture. It's in this sense that farmers influence how much drought we have. The wider point is that we've got to adapt our farming practices to suit the dry Australian landscape. We've got to make Australian farming more peculiarly Australian and stop trying to adapt the landscape to suit alien European farming practices. We've got to cut our coat according to our cloth. It's doubtful, for instance, that we should ever have gotten into cotton and rice growing. They say some parts of the backblocks have been drought-declared almost continuously for 30 years. Why? So they could be continuously eligible for subsidies. But the obvious truth is that such areas are simply unsuitable for farming – and the sooner we face up to it the better.

(Ross Gittens *Sydney Morning Herald* 16 October 2002)

ten

Strategically located farm trees and native vegetation improves agricultural production, protects soils, water and wildlife, and improves the capital value of rural properties. Droughts have the effect of favouring some trees and shrubs while adversely affecting others. Landholders can observe which trees have performed best in their areas, and incorporate good tree management practices into their property management plan and drought-managing strategy.

(<http://www.agric.nsw.gov.au/reader/5937>)

twelve

Some findings of the Committee:

- The price of water in Australian cities is among the lowest in the world
- Its efficient use is still seen as an emergency measure taken only in time of drought, despite the fact that they are fast running out of the resource.
- There must be targets set nationally for recycling effluent, greater infrastructure investment and catchment rehabilitation as part of a national water policy
- There are several examples of effective water recycling systems in existence, resulting in cheaper water and an increase in the amount of water able to be used overall
- But less than 10 per cent of water used in urban areas and by industry is recycled
- The greatest single use of water is for domestic purposes
- The basic water requirement for sanitation, drinking, bathing and cooking is 50 litres per person per day
- Australians consume an average of 350 litres of water per person per day for these domestic purposes.

(Senate Environment, Communications, Information Technology and the Arts Committee Report 2002 *Australia's Urban Water Management*)

eleven

Chris Bath: Is the solution to move away from European farming practises?

Mike Archer: We would be mad if we suggested that we would do this instantly, but I think we've got to start to think about this. Here we have things like kangaroos ... in Australia which have been there ... going back the last 30 million years. These are animals that are quintessentially well-adapted to live with drought. They use 10 per cent of the water that sheep do. They control their own reproductive investments. They're, in every respect, much better suited to being valued on Australian land and hooked into our lifestyle than the cattle and sheep which really are struggling to work in this country.

I think we've got to in some ways start to pull back from our total dependence on cattle and sheep and say, 'In that gap, can we explore ways in which we can value Australian resources, native wildlife', and in the process, get greater conservation for those things, because we depend on them, we value them, and greater conservation of the land, more sustainability?

As people say now when they go into the drought-stricken areas, you see all the cattle and sheep belly-up with their feet in the air and the whole place is over-run with kangaroos. The grazier tends to think about this as a problem. He sees these as a pest competing with cattle and sheep, where in reality, they're an extremely wonderful resource, the finest meat you can eat in the world; 2 per cent fat, all polyunsaturated, no such thing as mad kangaroo disease. These are resilient animals.

That's what we are arguing to graziers and, effectively, they are listening. We are saying, "Look, it's quite possible to make a quid off maintaining natural bush on your property by sustainably harvesting. This isn't farming, this is sustainable wild harvesting.

Chris Bath: You've effectively put your money where your mouth is, for want of a better cliché, and started the FATE project which is the symbiosis between using marsupial farming, I suppose, for want of a better label, and European farming practices. How is it going?

Mike Archer: That's right. The FATE project – it actually stands for the Future of Australia's Threatened Ecosystems – encapsulates the whole notion that through sustainable utilisation of wildlife – that's through a whole range of strategies. That's not just consumptive use, that's also eco-tourism, all kinds of things ... as basically we begin to lose the plot with traditional strategies out there, we've got to look at these other initiatives as ways of increasing the resilience of rural and regional Australia and, from my view, as director of the Australian Museum, I want to see the biota, the native animals and plants, secured into the future. At the moment, if the grazier thinks he's only going to make money off cattle and sheep, or wheat or cotton, there is an incentive to clear more of the native bush in order to plant more of these introduced species, which lead us more into these vulnerability problems.

(<http://www.sundaysunrise.com.au/story.php?story=219>)

thirteen

Increasing numbers of urban residents in Melbourne are installing water tanks to catch rainwater for use on gardens. Others are installing 'grey water' systems, to catch water from showers and washing machines, for use on gardens.

(The Age 9 January 2003)

- 2 Give at least one example of a suggested drought management strategy for each of these scales:

Personal	
Local	
Regional	
National	
International	

- 3 Select one management strategy and research it further. Prepare a PowerPoint or a poster presentation to show why that strategy is desirable. Make sure that in your explanation you address any objections to or arguments against your strategy that others might have.

Conclusion

Look at these comments from one interested observer:

“Droughts are a normal and natural part of the Australian environment. They cause us such great problems now because of the ways we have developed our land use practices over time – agricultural and pastoral uses require an unnatural regularity and certainty of access to water.

The problem is deepened with destructive practices over time such as overstocking. Natural waterholes are stamped out by thousands of hoofed creatures destroying the wetland vegetation of river banks, anabranches and billabongs so that pools that were once more or less permanent will dry out as mud holes as the soil and plant structure is destroyed.

Similarly the introduction of bores has allowed an expansion of the pattern of cattle and sheep

distribution across the country that would otherwise not be possible. Watering points from bores will allow stock and other creatures to get a drink but with no rainfall they will have little to eat. Drought in that sense is not a lack of drinking water but a lack of sustaining feed.

As a matter of public policy drought relief should be tied to ecologically sustainable production, cessation of land clearing and the national strategic question of the proper demography of inland Australia – rather than just the cash flow crisis of individual and corporate farm businesses. ”

1 This proposal would require a major change in the current nature of agriculture. What might be some of the major impacts of such a change – both positive and negative. You might consider environmental, social and economic impacts.

2 What difficulties might exist in trying to bring about such a change?

3 What strategies could be used to try and help bring about such a change (if it was considered desirable)?

4 Imagine that you have been asked to prepare a museum display on drought in Australia. List ten objects or images that you would use, and the key ideas that you think would be conveyed by these. (If you are in Canberra check out how the National Museum of Australia has done this in the Tangled Destinies gallery.)

Now that you have investigated the issue of drought in Australia, what are your ideas and conclusions about it? Look at this series of statements and decide if you agree (A), disagree (D) or do not know (?) about each.

Statement	A	D	?
Australia can be drought-proofed			
Australians can learn to live with drought			
Better knowledge will lead to better management of droughts			
Drought causes erosion			
Drought helps native animals by reducing introduced species as competitors			
Drought in Australia is caused by the El Nino effect			
Drought in Australia is part of an international system			
Drought increases Australia's national debt			
Drought is a natural part of the environment			
Drought management is primarily the responsibility of farmers			
Droughts affect everyone in Australia			
Droughts only affect rural areas			
Drought will lead to an increase in the price of agricultural products in shops			
Farmers need to look at changing the crops they grow			
Farmers should be supported in time of drought			
Governments should support farmers affected by the drought			
If farmers change their traditional herds and crops Australia may need to import traditional food such as wheat			
Individuals can do something about drought management			
Land-clearing increases the impacts of drought on the environment			
Native plants and pastures are better adapted to drought conditions than imported ones			
Rivers should be re-directed inland			
The agricultural sector is the greatest user of water			
The Southern Oscillation Index can accurately predict drought			
There are few ways for Australians to save water			
There will be droughts in the future in Australia			

