

Mathematics Level 7

Chapter 3 — Environmental change and management

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When people change the environment: impacts on places and environmental functions

Curriculum focus — Victorian Curriculum 2.0 Geography (Levels 9–10 band)

VC2HG10K10

This section also draws on the elaborations:

- VC2HG10K10.E01
- VC2HG10K10.E02
- VC2HG10K10.E03
- VC2HG10K10.E04

Theory

Part 1 — What does the environment do for us?

Every place on Earth — a city street, a wheat paddock, a coral reef — depends on the environment doing four jobs. Geographers call these the **four functions of the environment**.

The environment's four functions

1. SOURCE

Supplies materials and energy:
food, timber, water, minerals, fuels

Victorian example: wheat and wool from the Wimmera; water from the Thomson River system for Melbourne

2. SERVICES

Life-support processes: clean air and water, pollination, flood control, nutrient cycling (ecosystem services)

Victorian example: wetlands around Port Phillip Bay filter run-off before it reaches the bay

3. SINK

Receives and breaks down our wastes:
sewage, smoke, plastics, heat

Victorian example: stormwater carries litter and oil from Melbourne's streets into Port Phillip Bay

4. SPIRITUAL

Holds meaning, identity and peace of mind for people

Victorian example: many people find calm and belonging in the Dandenong Ranges or at a favourite beach

Figure 3A.1 The environment's four functions: source, services, sink and spiritual.

Four tiles showing the environment's four functions — source, services, sink and spiritual — each with a short definition and a Victorian example.

Figure 3A.1 The environment's four functions.

- **Source.** The environment supplies the materials and energy we live on: food, timber, water, minerals and fuels. Wheat and wool from the Wimmera, and water from the Thomson River system for Melbourne, are the source function at work.
- **Services.** Living systems run life-support processes for free: clean air and water, pollination of crops, flood control, and the cycling of nutrients. These free life-support processes are called **ecosystem services**. Wetlands around Port Phillip Bay that filter run-off before it reaches the bay are performing an ecosystem service.
- **Sink.** The environment receives and breaks down our wastes: sewage, smoke, plastics, heat. A sink only works while wastes arrive no faster than they can be absorbed. Stormwater carrying litter and oil from Melbourne's streets into Port Phillip Bay is the sink function being used — and stretched.
- **Spiritual.** Places hold meaning, identity and peace of mind for people. Many Victorians find calm and belonging in the Dandenong Ranges or at a favourite beach. That value is real, even though it is not bought or sold.

Key idea: **the same place usually performs several functions at once.** Port Phillip Bay is a source (fish), a sink (stormwater), a service provider (wetlands filtering run-off) and a spiritual place (swimming, boating, a view people love). When one function is pushed hard, the others can suffer.

Part 2 — From functions to sustainability criteria

Sustainability is a contested term — people define it differently depending on what they value. The most widely used definition comes from the World Commission on Environment and Development's 1987 report (known as the *Brundtland* report): using what we need today in a way that leaves future generations able to meet their needs too. Other definitions put more weight on jobs and economic growth, or on protecting nature for its own sake. In this section we use the Brundtland definition as our starting point, and we give the other views proper weight in Part 4.

The four functions give us a practical test. Each function translates into a **criterion** — a question a change must pass to count as sustainable.

From functions to criteria: how is a change judged?

Function	Sustainability criterion	A sign the criterion is being broken
Source	Renewable supplies are used no faster than they regrow or refill; non-renewables are used only where there is a substitute	A forest is logged faster than it regrows; groundwater is drawn down faster than rain refills it
Services	Ecosystem services - clean water, pollination, flood control, nutrient cycling - are kept working	Blooms of tiny water plants cloud a lake; wetlands are filled in, so floods reach homes they once absorbed
Sink	Wastes are released no faster than the environment can absorb and break them down	Plastics build up in bays; greenhouse gases build up faster than natural sinks absorb them
Spiritual	Places people find meaning, identity and calm in are protected	A loved beach, forest or riverbank is degraded before its value to people is weighed up

Figure 3A.2 Each environmental function translates into a test a change must pass to count as sustainable.

Table turning each of the four functions into a sustainability criterion, with a sign that each criterion is being broken.

Figure 3A.2 From functions to criteria: how is a change judged?

Read the table this way: if a use of the environment breaks one of these criteria, it is borrowing from the future — which is exactly what sustainability says not to do.

Part 3 — Human-induced environmental changes

“Human-induced” means caused by human activity. The changes group into four families.

The four families of human-induced environmental change

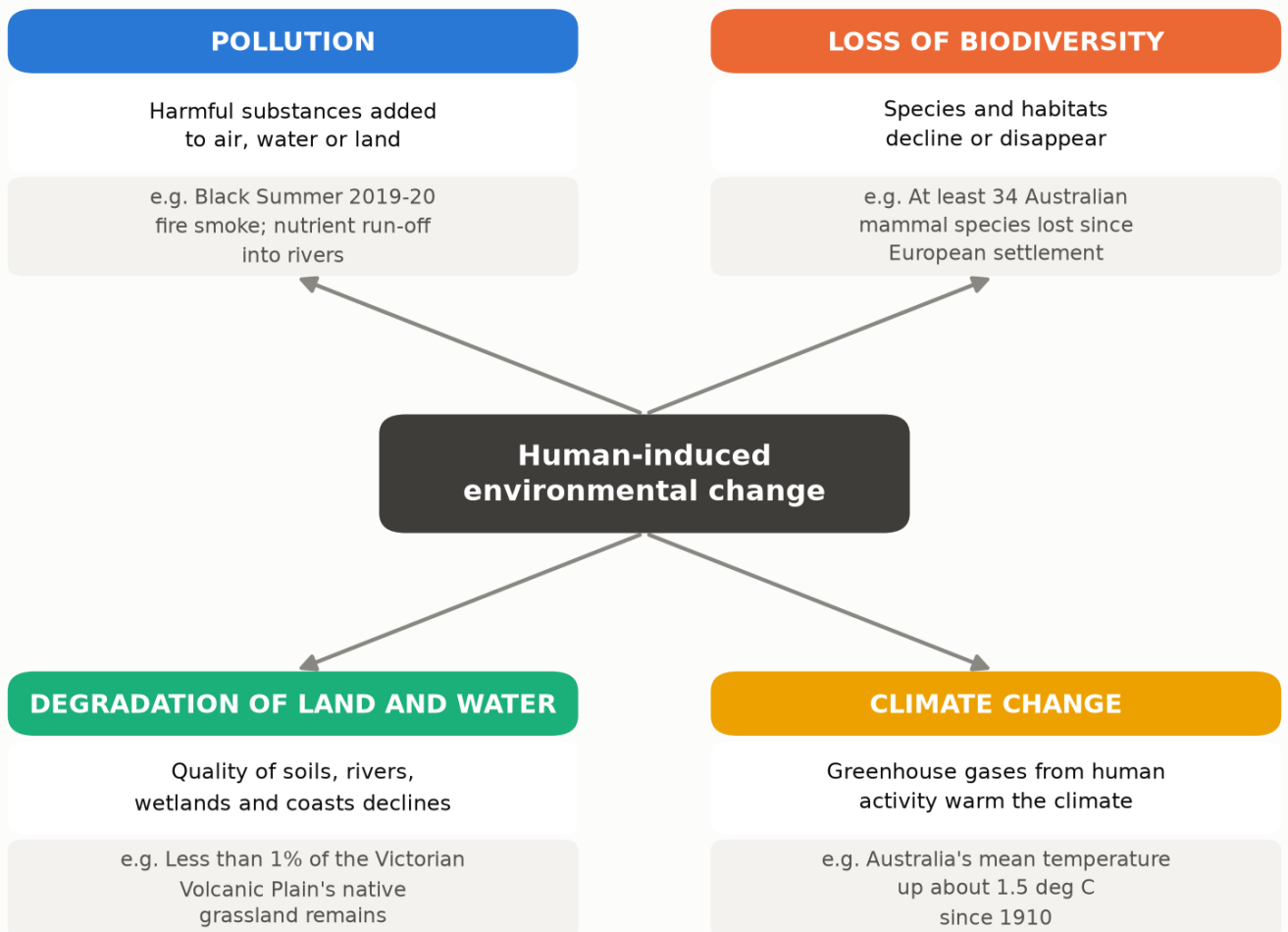


Figure 3A.3 Four families of change, each with a real Australian example.

Concept map with human-induced environmental change at the centre and four branches — pollution, loss of biodiversity, degradation of land and water, and climate change — each with a definition and a real Australian example.

Figure 3A.3 The four families of human-induced environmental change.

Climate change. Australia’s climate has warmed by about 1.51 ± 0.23 °C since 1910, and the recent warming tracks the greenhouse gases added by human activity.

Australia is warming: change in mean temperature since records began in 1910

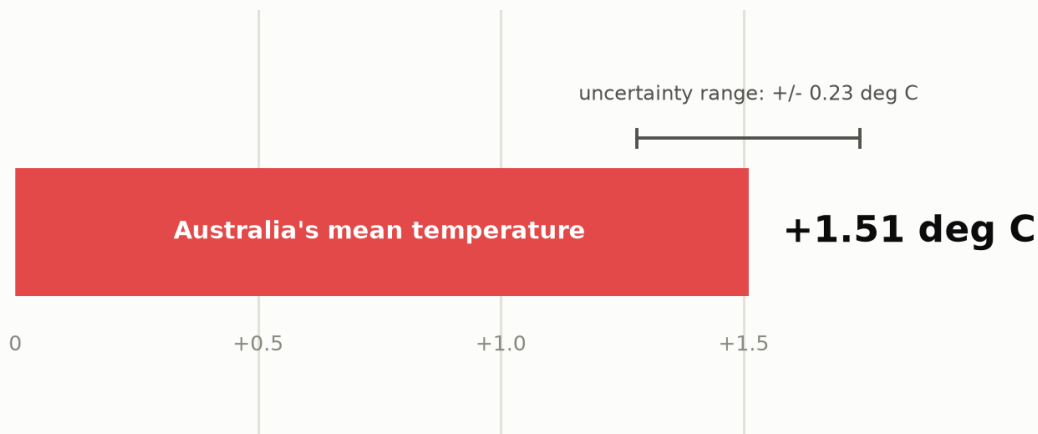


Figure 3A.4 Source: Bureau of Meteorology and CSIRO, *State of the Climate 2024* (retrieved 25 August 2026).

Bar showing Australia's mean temperature has risen by 1.51 degrees Celsius since 1910, with an uncertainty range of plus or minus 0.23 degrees.

Figure 3A.4 Australia is warming. Source: Bureau of Meteorology and CSIRO, *State of the Climate 2024* (retrieved 25 August 2026).

Where do those gases come from? Figure 3A.5 shows the approximate share of each sector of the economy.

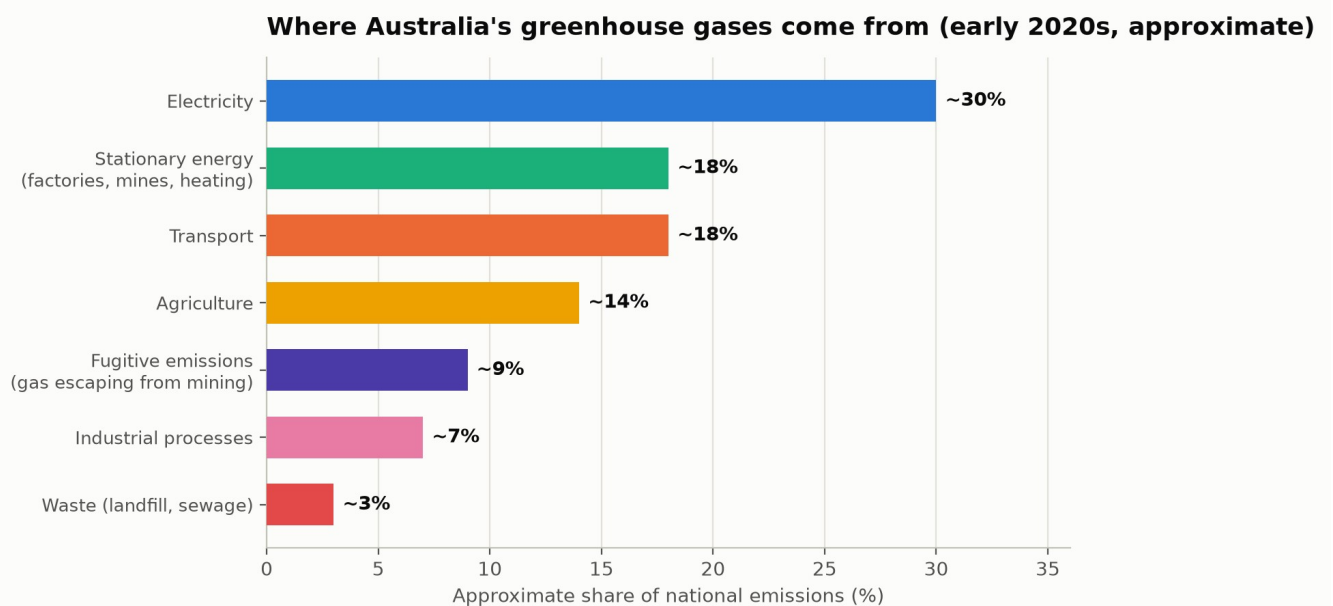


Figure 3A.5 Shares rounded; electricity is the single largest source. Source: Australian National Greenhouse Accounts, Australian Government (retrieved 25 August 2026).

Horizontal bar chart of Australia's greenhouse gas emissions by sector in the early 2020s: electricity about 30 per cent, stationary energy about 18 per cent, transport about 18 per cent, agriculture about 14 per cent, fugitive emissions about 9 per cent, industrial processes about 7 per cent, and waste about 3 per cent.

Figure 3A.5 Where Australia's greenhouse gases come from (early 2020s, approximate). Source: Australian National Greenhouse Accounts, Australian Government (retrieved 25 August 2026).

One clear impact of that warming is on the Great Barrier Reef. Warmer sea water stresses corals, which turn white (“bleach”) and can die. Mass bleaching was first recorded in 1998; since 2016 it has struck far more often.

Coral bleaching on the Great Barrier Reef is becoming more frequent



Figure 3A.6 Warmer sea water stresses corals, which bleach and can die. Source: Great Barrier Reef Marine Park Authority and Australian Institute of Marine Science monitoring reports (retrieved 25 August 2026).

Timeline of mass coral bleaching events on the Great Barrier Reef— 1998, 2002, 2016, 2017, 2020, 2022 and 2024 — with callouts noting that the back-to-back 2016-17 events killed about half of the reef’s shallow-water corals and that 2024 was the most widespread event on record.

Figure 3A.6 Coral bleaching on the Great Barrier Reef is becoming more frequent. Source: Great Barrier Reef Marine Park Authority and Australian Institute of Marine Science monitoring reports (retrieved 25 August 2026).

Pollution. Pollution is the sink function overloaded. In the Black Summer fires of 2019–20, about 24 million hectares burnt across Australia, and smoke pushed Canberra’s air quality among the worst levels recorded for any major city in the world on 1 January 2020. An estimate commissioned by WWF put the number of animals killed or displaced at about 3 billion.

Black Summer 2019-20: when fire became air pollution



Figure 3A.7 Source: Royal Commission into National Natural Disaster Arrangements, *Final Report* (2021); WWF-commissioned estimate (2020) (retrieved 25 August 2026).

Three stat tiles for the Black Summer of 2019-20: about 24 million hectares burnt, an area about the size of Victoria; smoke that pushed Canberra's air among the worst levels recorded for any major city; and about 3 billion animals killed or driven from their habitat.

Figure 3A.7 Black Summer 2019–20: when fire became air pollution. Source: Royal Commission into National Natural Disaster Arrangements, *Final Report* (2021); WWF-commissioned estimate (2020) (retrieved 25 August 2026).

Water pollution can set off a chain reaction, as the fish kills at Menindee on the Darling River (NSW) show. Three major fish kills struck between December 2018 and February 2019, and large kills returned in 2022 and 2023.

How nutrient pollution can end in a fish kill

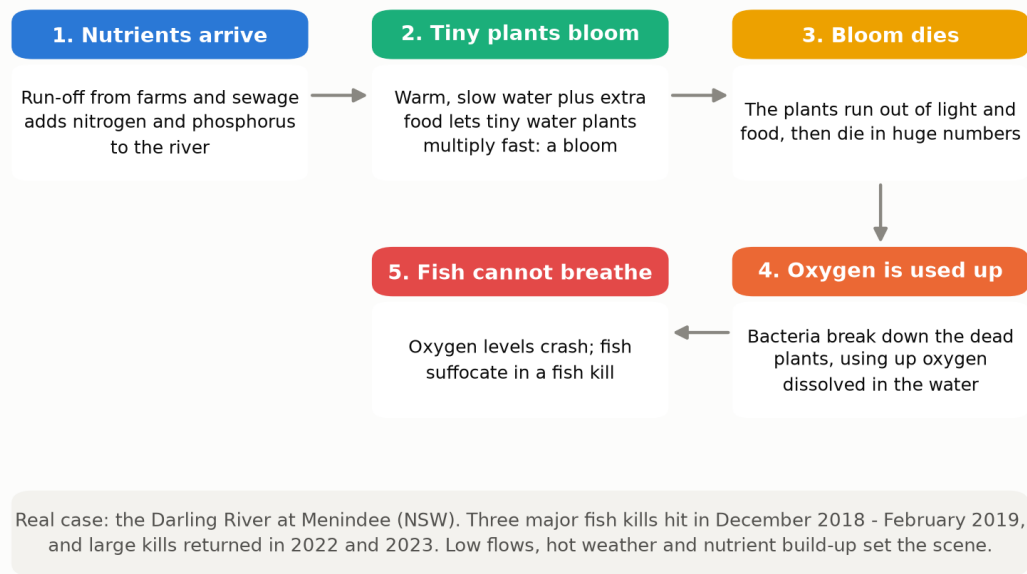


Figure 3A.9 A chain of small changes adds up to a big one. Fish kills also hit the environment's source, services and spiritual functions: river food, fishing, and a place people love.

Five-step flow chart of a fish kill: nutrients arrive; tiny water plants bloom; the bloom dies; oxygen is used up; fish cannot breathe. A strip below records the real case of the Darling River at Menindee, with major fish kills in December 2018 to February 2019 and again in 2022 and 2023.

Figure 3A.9 How nutrient pollution can end in a fish kill. *Nutrients* are plant-food chemicals such as nitrogen and phosphorus; a *bloom* is a sudden, dense growth of tiny water plants.

Loss of biodiversity. *Biodiversity* is the variety of life in a place. Australia has lost at least 34 mammal species since European settlement — the worst modern record of mammal extinctions of any country (Woinarski, Burbidge & Harrison, *PNAS*, 2015; retrieved 25 August 2026). In Victoria, less than 1% of the Natural Temperate Grassland of the Victorian Volcanic Plain remains; it is listed as a threatened community under Victoria's *Flora and Fauna Guarantee Act 1988*.

Each square = 1% of the original native grassland
Natural Temperate Grassland of the Victorian Volcanic Plain

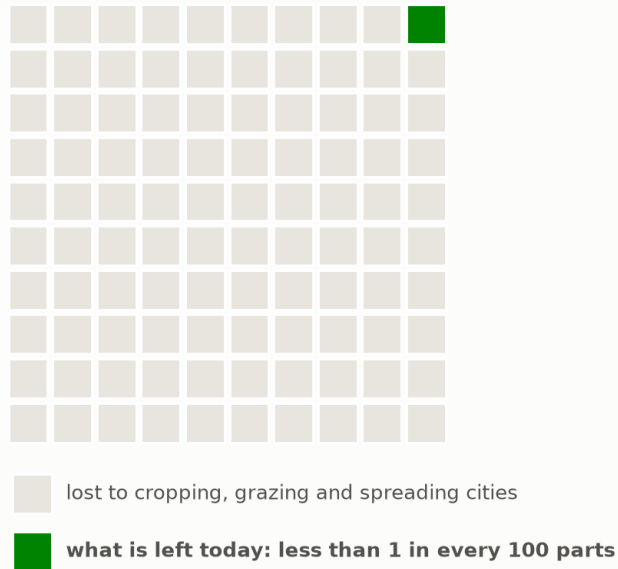


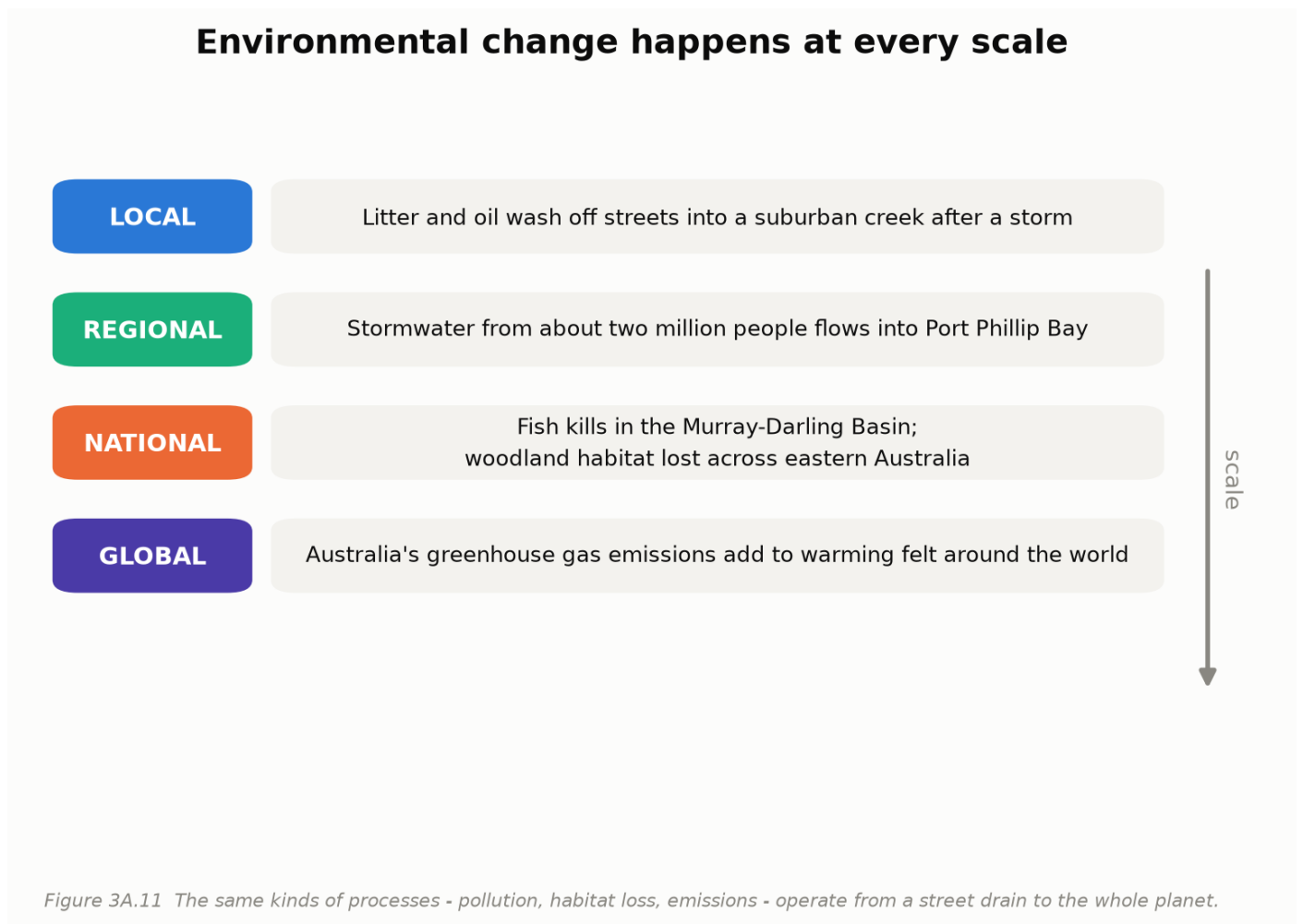
Figure 3A.8 A threatened ecological community listed under Victoria's Flora and Fauna Guarantee Act 1988. Source: Victorian Government conservation listings (retrieved 25 August 2026).

Waffle chart of 100 squares, each equal to 1 per cent of the original native grassland: 99 grey squares lost to cropping, grazing and spreading cities, and one green square for what is left today — less than 1 in every 100 parts.

Figure 3A.8 What remains of the Victorian Volcanic Plain's native grassland. Source: Victorian Government conservation listings under the *Flora and Fauna Guarantee Act 1988* (retrieved 25 August 2026).

Degradation of land and water environments. *Degradation* means the quality of a place declining: soils worn out or salted, rivers slowed and warmed, wetlands drained. The grassland waffle (Figure 3A.8) is degradation as well as biodiversity loss; the Darling at Menindee (Figure 3A.9) is degradation as well as pollution. Most real cases sit in more than one family — that is a feature of the real world, not a fault in the catalogue.

Every scale at once. The same processes run from a street drain to the whole planet.



Four rows from local to global: litter and oil washing into a suburban creek; stormwater from about two million people flowing into Port Phillip Bay; fish kills in the Murray-Darling Basin and woodland habitat lost across eastern Australia; and Australia's emissions adding to warming felt around the world.

Figure 3A.11 Environmental change happens at every scale.

Part 4 — Tensions: who decides what sustainable means?

Even when people agree on the facts, they can disagree about what to do, because they hold different **perspectives**. A perspective is a point of view shaped by what a person or group needs, fears and values. The end of native forest logging in Victoria shows the tensions clearly. The Victorian Government announced in May 2023 that native forest logging would end on 1 January 2024.

One decision, four perspectives: Victoria ends native forest logging

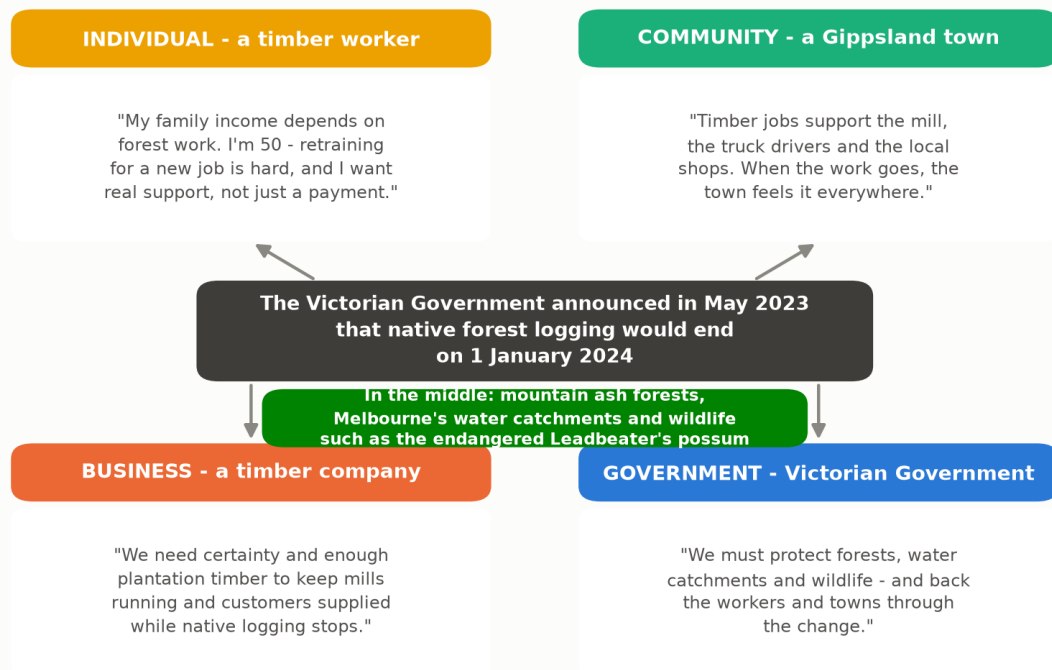


Figure 3A.10 The quotes illustrate typical concerns for each position; they are not real quotations. Tensions like this one are examined in 3A (source: Victorian Government announcement, May 2023; retrieved 25 August 2026).

Diagram of one decision seen from four perspectives — an individual timber worker, a Gippsland community, a timber business and the Victorian Government — with the environment in the middle: mountain ash forests, Melbourne's water catchments and wildlife such as the endangered Leadbeater's possum.

Figure 3A.10 One decision, four perspectives. The quotes illustrate typical concerns for each position; they are not real quotations. Source: Victorian Government announcement, May 2023 (retrieved 25 August 2026).

Notice that **no position in Figure 3A.10 is silly or selfish**. The worker is not anti-forest; the government is not anti-jobs. Each side is protecting something real: an income, a town, a business, a water supply, a species, a forest. That is what makes it a *tension* rather than a fight between right and wrong. When you discuss tensions like this one, three habits matter:

1. **Steelman the other side.** State the opposing view as strongly and evenly as you can — the version its best supporters would agree with — before you respond to it.
2. **Treat like cases alike.** Apply the same test to the side you agree with and the side you don't. If "jobs matter" for one group, they matter for every group.
3. **Reasoning, not conclusion.** In this subject you are marked on the quality of your reasoning — the evidence you use and how evenly you weigh the views — not on which side you end up on.

Sustainability questions are almost always like this: the four functions give us criteria, but people disagree about how much weight each criterion deserves. That disagreement is part of the geography.

Worked examples

Example 1 — Testing a real case against the four functions (scaffolded)

Apply the four sustainability criteria (Figure 3A.2) to the Menindee fish kills (Figure 3A.9).

Working	Comment
Source. The Darling at Menindee is a source: fish to eat and sell, and a river that draws tourists and anglers to the town. A fish kill shuts this function down almost at once.	Source criterion: <i>renewable supplies used no faster than they regrow or refill</i> . A river whose fish die in their millions is not being used within its capacity to recover. Broken.
Services. A healthy river cleans water, cycles nutrients and supports wetlands. During a bloom and kill, the service runs backwards: the water fouls and the wetland food web is damaged.	Services criterion: <i>ecosystem services kept working</i> . Here the service flipped into a disservice. Broken.
Sink. The chain in Figure 3A.9 starts with nutrients washing in from farms and sewage. In low, warm flows the river could not absorb them.	Sink criterion: <i>wastes released no faster than the environment can absorb them</i> . The classic sink failure — the clue is in step 1 of the flow chart. Broken.
Spiritual. A river people swim in, fish in and love became a place of dead fish and bad smells; residents described grief and anger.	Spiritual criterion: <i>places people find meaning in are protected</i> . The harm here is real even though no money changes hands. Broken.

Conclusion: the Menindee fish kills break all four criteria at once — which is why a single event can be pollution, degradation and biodiversity loss in the same story. Note the habit from Part 4: a resident, a farmer upstream and a government water manager would **weigh** these breaks differently, and all three weighings deserve a fair hearing.

Example 2 — Mapping a tension (scaffolded)

Map the four perspectives on Victoria ending native forest logging (Figure 3A.10), then steelman the opposite side.

Perspective	What they most want to protect	Their strongest point	A strong point they must answer from the other side
Individual — timber worker	Income and dignity at age 50	Retaining is far harder for an older worker than for a graduate; the cost falls on a few people, not on the whole state.	Forests store carbon and protect water for millions; the state cannot keep every job unchanged forever.
Community — Gippsland town	The town's whole economy and identity	When the mill goes, the truckies, the shops and the school feel it; a town is more than the sum of its jobs.	The forest also earns money through tourism and water supply, and those jobs grow while logging shrinks.
Business — timber company	Certainty and supply for mills and customers	Mills and contracts cannot switch quickly; without plantation supply, customers buy imported timber with worse footprints.	Native forest logging had been losing money and the forests were already stressed by fire and a warming climate.
Government — Victorian Government	Water, wildlife and a managed transition	Melbourne's catchments and species such as Leadbeater's possum cannot be replaced; the state must also fund retraining and town support.	A transition is only as good as its follow-through; promises in 2023 must still be kept in the towns years later.

Conclusion: every column is defensible and every column has a debt to another. A strong answer about this decision would not declare a winner; it would show the trade-offs (jobs now vs. forest services later; a few towns vs. a whole city's water) and judge how **evenly** each was weighed.

Practice questions

Scaffolded

Q1. Look at Figure 3A.1. Match each job (a)–(d) to the correct function. (*Scaffold: the functions are source, services, sink, spiritual.*) (a) Water stored in the Thomson River system supplies Melbourne. (b) Wetlands around Port Phillip Bay filter run-off before it reaches the bay. (c) Stormwater carries litter and oil from Melbourne's streets into the bay. (d) Many people find calm and belonging in the Dandenong Ranges.

Q2. Figure 3A.2 turns each function into a sustainability criterion. (a) Write the sink criterion in your own words. (b) Give one sign from the table that the sink criterion is being broken.

Q3. Use Figure 3A.4. (a) By how much has Australia's mean temperature changed since 1910? (b) What is the uncertainty range shown? (c) (*Scaffold: no measurement is perfect.*) Why do scientists report a range as well as a single number?

Q4. Use Figure 3A.6. (a) List the years of the mass bleaching events shown. (b) How many of them fall in 2016–2024? (c) Describe the trend in one sentence.

Q5. Sort each statement below into the four families of Figure 3A.3. (*Scaffold: the families are pollution; loss of biodiversity; degradation of land and water; climate change. One statement fits two families — say which and explain.*) (a) Smoke from bushfires blankets a capital city for weeks. (b) A native grassland is ploughed under for crops. (c) A river slows and warms until tiny water plants bloom. (d) Burning coal adds carbon dioxide to the atmosphere. (e) A mammal species disappears from the wild.

Q6. Use the fish-kill chain in Figure 3A.9. (a) Which step removes the oxygen from the water? (b) Name the two conditions in step 2 that let the tiny water plants multiply. (c) Explain in one sentence why a fish kill is a sink problem.

Unscaffolded

Q7. The Black Summer fires of 2019–20 are usually told as a wildlife story. Using Figure 3A.7 and the four functions, explain how the fires and their smoke were also (a) a sink failure and (b) a hit to the services function.

Q8. Figure 3A.8 shows the Natural Temperate Grassland of the Victorian Volcanic Plain. (a) Describe what the waffle chart shows. (b) Argue that this loss fails **two different** sustainability criteria from Figure 3A.2. Name each criterion you use.

Q9. Figure 3A.10 maps four perspectives on Victoria ending native forest logging on 1 January 2024. (a) Explain why the timber worker's view and the government's view are in tension. (b) Steelman both sides: give the strongest point you can for each. (c) Which perspective do you find most persuasive, and why? (*You are marked on your reasoning, not your conclusion.*)

Q10. Choose one family of change from Figure 3A.3. Using Figure 3A.11, show how your family operates at **two different scales**, and for one of those scales name the environmental function it harms and the criterion (Figure 3A.2) that is broken.

Inquiry task

Q11. Figure 3A.5 shows where Australia's greenhouse gases come from (Australian National Greenhouse Accounts). (a) Name the two largest sources. (b) For each, propose one practical action that would cut it, and state which environmental function your action protects. (c) For each action, name one group that might oppose it and give their strongest reason (think Figure 3A.10). (d) Source check: choose one factual claim in this section, find its named source, and record the source and the date you retrieved it. Why does the date matter?

Answers

Q1. (a) Source. (b) Services. (c) Sink. (d) Spiritual.

Q2. (a) Any fair paraphrase, e.g. “Wastes may only be put into the environment as fast as it can absorb and break them down.” (b) Any one from the table, e.g. plastics building up in bays, or greenhouse gases building up faster than natural sinks absorb them.

Q3. (a) About +1.51 °C (a rise of 1.51 °C since 1910). (b) ± 0.23 °C (about 1.28 °C to about 1.74 °C). (c) Because the single number is an estimate from imperfect records; the range honestly shows the margin of error.

Q4. (a) 1998, 2002, 2016, 2017, 2020, 2022, 2024. (b) Five. (c) Mass bleaching has become more frequent — five events in the nine years from 2016, against two in the eighteen years before it.

Q5. (a) Pollution (and climate change: the fires burned in a warmer, drier climate and released carbon — the two-family statement). (b) Loss of biodiversity *and* degradation — the better two-family answer; accept either with reasons. (c) Degradation of land and water (also pollution). (d) Climate change. (e) Loss of biodiversity.

Q6. (a) Step 4 — bacteria breaking down the dead plants use up the dissolved oxygen. (b) Warm, slow water and extra nutrient food. (c) The river was used as a sink for nutrients faster than it could absorb them in low, warm flows.

Q7. (a) The smoke overloaded the atmosphere’s sink function — Canberra’s air on 1 January 2020 was among the worst recorded for any major city. (b) Services were hit too: clean air failed for weeks, and habitats that filter water and store carbon were burnt, with about 3 billion animals killed or displaced.

Q8. (a) Of 100 equal parts of the original grassland, 99 are lost to cropping, grazing and spreading cities; less than 1 part in 100 remains. (b) Any two criteria correctly applied, e.g. services (nutrient cycling, habitat and flood control lost with the grassland) and source/spiritual (a native place with value to people degraded before its worth was weighed up).

Q9. (a) The worker needs income now from forest work; the government must protect catchments and species for the long term — both claims are real and they cannot both be fully met at once. (b) Worker: the costs of transition fall on a few older workers while the benefits spread across millions; retraining at 50 is hard. Government: water for Melbourne and species such as Leadbeater’s possum cannot be replaced once lost. (c) Any conclusion, marked on fair weighing of both sides.

Q10. Example shape: pollution — local scale: litter and oil wash off streets into a suburban creek (sink harmed; sink criterion broken); regional scale: stormwater from about two million people loads Port Phillip Bay (services and sink harmed).

Q11. (a) Electricity (about 30%) and, tied next, stationary energy and transport (about 18% each). (b) E.g. replace coal-fired electricity with renewables (protects the sink and services functions by slowing climate change and cleaning air); shift freight and trips to public and electric transport (same). (c) E.g. coal-region workers and towns — a fast closure concentrates job losses on them while benefits spread widely; car-dependent outer-suburb families — costs fall on people with no alternative transport. (d) Any claim with its named source and retrieval date; the date matters because figures like emissions shares are updated, so a reader must be able to check the version you used.

Fully-worked solutions

Q7 — fully worked. Step 1, name the functions at stake: sink (the air receiving smoke) and services (clean air, healthy habitats). Step 2, sink: a sink fails when waste arrives faster than it can be absorbed. About 24 million hectares burnt, and on 1 January 2020 Canberra’s air was among the worst recorded for any major city in the world — the atmosphere’s sink capacity was exceeded for weeks, far from the fires. Step 3, services: clean air is an ecosystem service; it failed for millions of people. Habitats that cycle nutrients, filter water and store carbon were burnt, and the WWF-commissioned estimate of about 3 billion animals killed or displaced shows the service-providers themselves were lost. Step 4, conclude: one event, two functions harmed — which is why the fires belong in both the pollution family and the biodiversity family of Figure 3A.3.

Q8 — fully worked. Step 1, read the chart: each square is 1% of the original grassland; 99 grey squares are lost, one green square (less than 1%) remains. Step 2, first criterion — services: native grassland cycles nutrients, holds soil, absorbs floods and shelters pollinators. Ploughing 99% removes those services almost entirely. **Services criterion broken.** Step 3, second criterion — spiritual: the plain is a real place that people value; a threatened community listed under the *Flora and Fauna Guarantee Act 1988* was degraded before its value to people was fully weighed. **Spiritual criterion broken.** (Source or sink arguments also acceptable if the criterion is named and applied.) Step 4, conclude: the loss fails at least two of the four sustainability tests, so on the Brundtland definition it is not sustainable — it borrows from future generations who can never see the grassland restored.

Q9 — fully worked. Step 1, state the tension plainly: the worker's income depends on work the government has decided must end to protect water catchments and wildlife; both needs are real and one decision cannot fully satisfy both at once. Step 2, steelman the worker: the change concentrates its cost on a few older workers while spreading its benefit across millions; asking a 50-year-old to retrain is asking the most for the people with the least time left to recover it. Step 3, steelman the government: mountain ash forests and Melbourne's water catchments cannot be rebuilt once logged or burnt, and species such as Leadbeater's possum cannot be replaced at all; the state also owes support to the workers and towns through the change. Step 4, weigh and conclude: a strong response says which scale of harm it weighs more — a deep harm to a few now, or an irreversible harm to many later — and explains that weighing. Either conclusion earns full marks with fair, even-handed reasoning.

Q10 — fully worked (model using climate change). Step 1, local scale: heatwaves stress suburban creeks and street trees; local councils respond with shade and water rules. Function harmed: services (urban cooling, clean air). Step 2, national scale: Australia has warmed about 1.51 ± 0.23 °C since 1910; bleaching has hit the Great Barrier Reef in 1998, 2002 and five times in 2016–2024. Function harmed: services and source (reef tourism and fisheries). Step 3, criterion broken: the sink criterion — greenhouse gases have been released faster than natural sinks absorb them, so they accumulate and warm the climate at every scale at once. Step 4, conclude: the same family of change at two scales shows why Figure 3A.11 matters — a street-level decision (planting, drainage, power use) and a national one (emissions policy) are linked parts of one system.

Q11 — marking guide. Full marks requires: both largest sources named from Figure 3A.5; two actions, each linked to a named function; two opposing groups with steelmanned reasons (not caricatures); and a source check with a retrieval date, with the date justified (data are revised; readers must be able to find the version used).

Studying one environmental issue: causes and consequences

Theory

The selected issue, and what “environmental issue” means here

The Victorian Curriculum uses the term *environmental issue* but does not define it. Whether a change in the environment counts as an “issue” is a judgement people can reasonably disagree about, so this section states the definition it uses: here, an **environmental issue** is a change in the environment that harms, or threatens to harm, the environment’s ability to keep supporting life and human living. Every question in this section is answerable on that definition alone.

The issue selected for this section — and held for Section 3E — is **salinity** in northern Victoria. **Salinity** means the amount of salt in soil, groundwater or river water, and a salinity problem means salt has built up where it causes harm. By nature, much of Australia is salty underground; the problem is that human actions have moved that salt around and brought it to the surface.

Geographers do not just list facts about an issue like this. They use a set of concepts as lenses, a model for causes, and a test for consequences. That is the “geographical approach” of the title.

A geographical approach: seven concepts as lenses

Seven geographical concepts act as lenses. Each lens is a question you ask about the issue, and a complete explanation uses all of them.

Seven lenses for an environmental issue

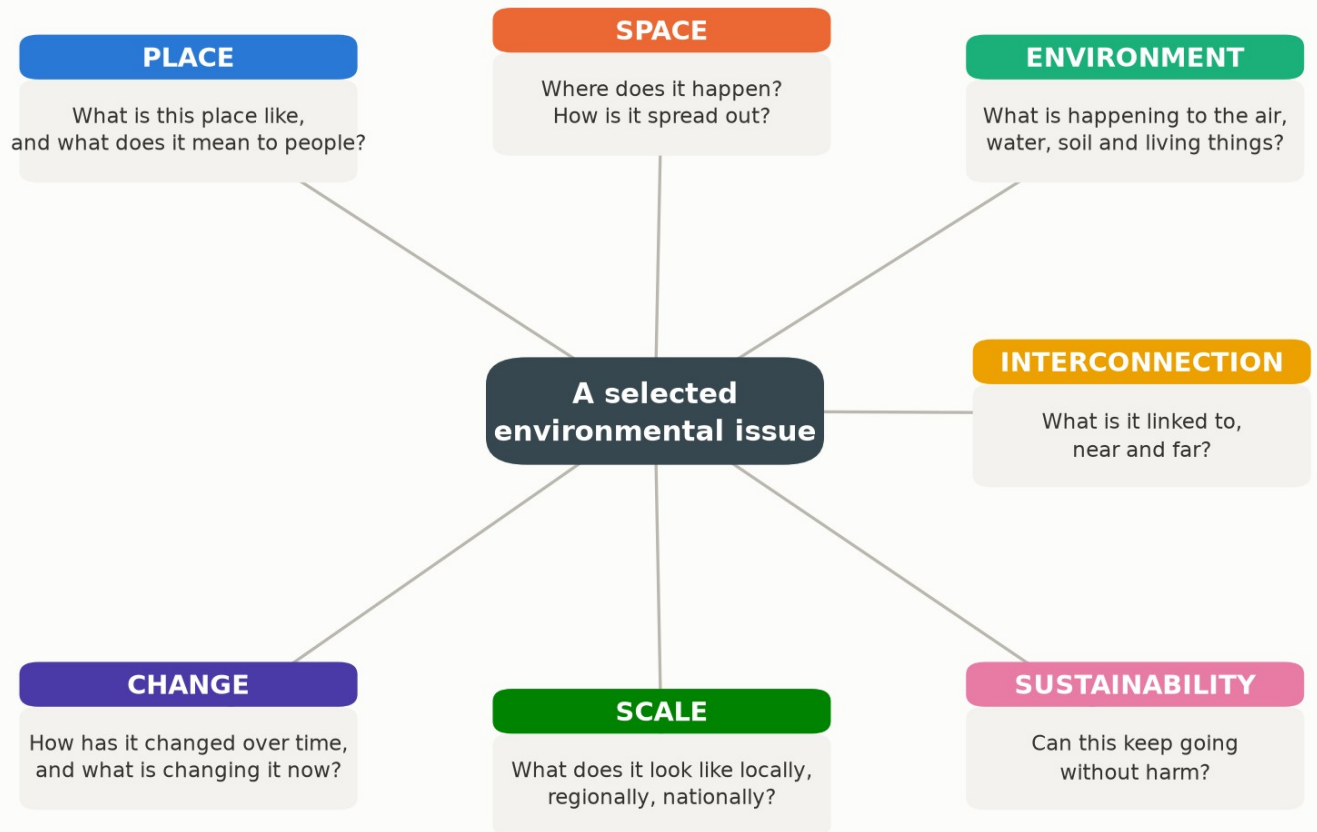


Figure 1 The seven geographical concepts applied as lenses. Each one asks a different question about the same issue.

Seven concept tiles — place, space, environment, interconnection, sustainability, scale and change — set around a hub labelled “a selected environmental issue”, each tile giving the question its lens asks

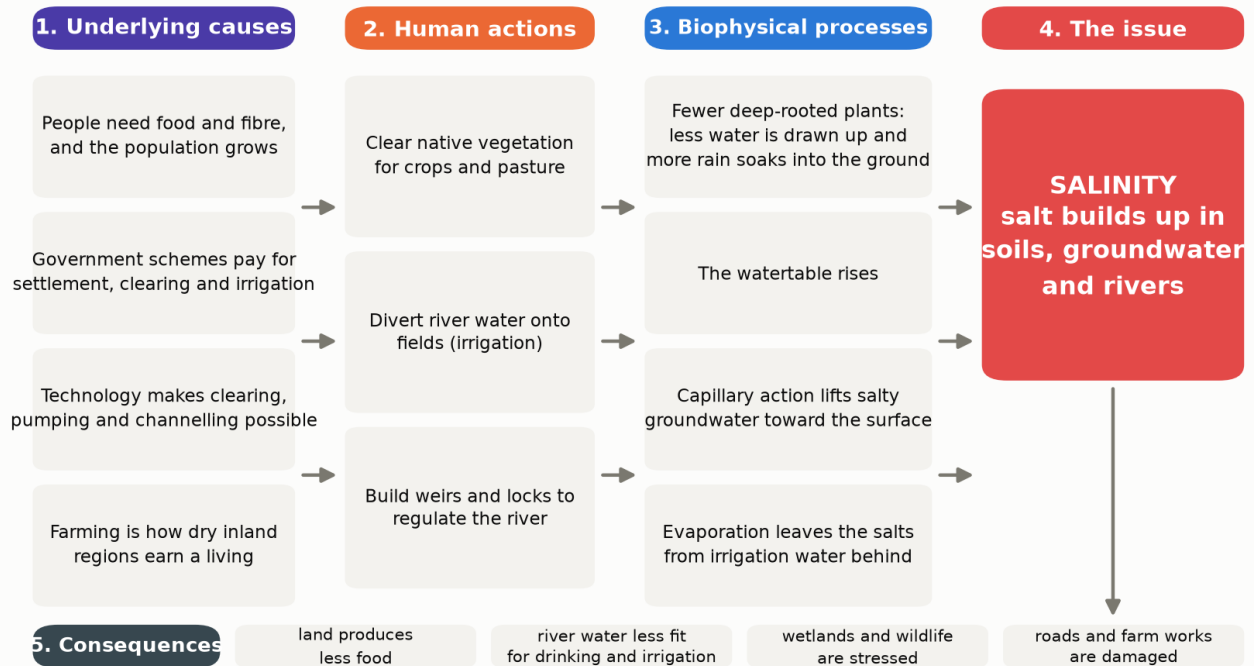
- **Place** asks *what is this place like, and what does it mean to people?* The case-study places are the irrigation towns of the Murray district in northern Victoria.
- **Space** asks *where is it, and how is it arranged?* Salt is not everywhere: it appears in patches, districts and river valleys, and that pattern needs a map.
- **Environment** asks *what is happening in the living and non-living world?* Salt, soil, water, plants and climate all take part.
- **Interconnection** asks *what is joined to what?* Human actions and natural processes push each other, and one paddock’s salt can become a river’s salt two states away.
- **Sustainability** asks *can this keep going?* A function of the environment is sustainable if it can keep working for people now and later.
- **Scale** asks *at what size are we looking?* The same salt looks different in a paddock, a farm, a district, a river basin and a nation.
- **Change** asks *how has it changed over time?* Salinity built up over about a century of clearing and irrigation, and responses have changed too.

The cause-effect web: a model for causes (E01)

Geographers explain an environmental issue by building a **cause-effect web** — a model that joins three kinds of cause to the issue, and the issue to its consequences.

The cause-effect web: how an environmental issue is produced

Read left to right. Underlying causes drive human actions; the actions set biophysical processes in motion; the processes produce the issue.



Impacts spread outward from the place where the salt appears — follow them in Section 3B using the scale lens.

Figure 2 A general cause-effect web (model). Section 3B fills this web with the salinity case study of northern Victoria.

A four-column cause-effect web reading left to right: underlying causes, human actions, biophysical processes, then the issue (salinity), with a consequences band of four short boxes beneath

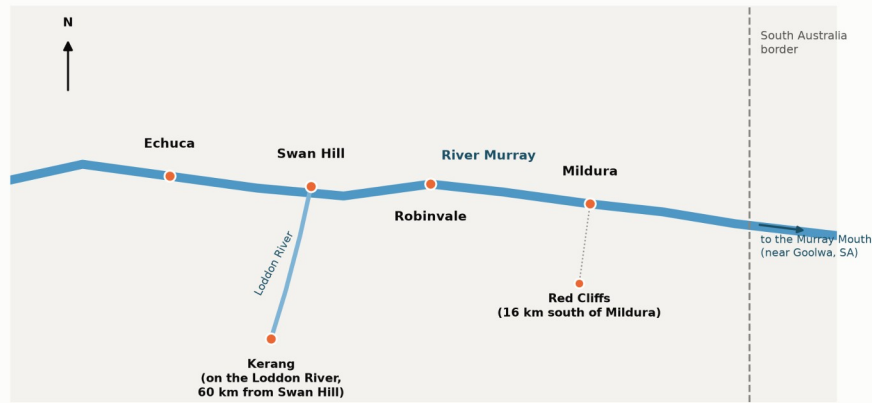
1. **Underlying causes** are the deeper reasons *why* people act: the need for food and fibre, a growing population, government schemes and technology, and the need for dry inland regions to earn a living.
2. **Human actions** are what people actually do: clearing native plants, taking river water onto fields, and building weirs and locks.
3. **Biophysical processes** are the living and non-living workings of the environment that the actions set in motion (*bio* = living; *physical* = soil, water, climate).
4. **The issue** is what gets produced when the processes run — here, salinity.

Applying **interconnected (holistic) thinking** (E01) means reading the web as one joined system, not as separate facts: the underlying causes explain the actions, the actions set off the biophysical processes, and the processes produce the issue. Cut any link and the explanation collapses. The web also points forward to consequences, which Section 3B tests using the environmental functions.

The case study: place and history on the River Murray

The **River Murray** is Australia's longest river (about 2,508 km, from the Australian Alps to the Murray Mouth near Goolwa in South Australia). The case-study places sit along it in northern Victoria.

Case-study country: the River Murray through northern Victoria

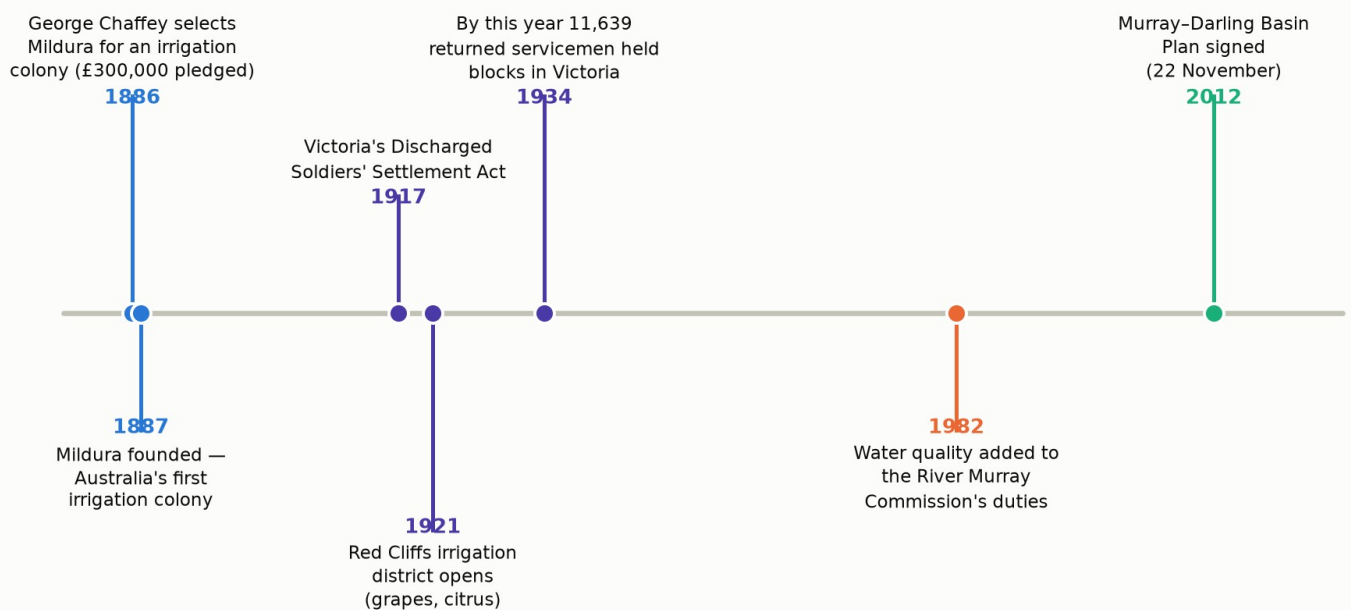


Schematic strip map — positions and spacing are approximate and NOT to scale; distances shown are those given in the sources cited in Section 3B. The River Murray runs about 2,508 km from the Australian Alps to the Murray Mouth near Goolwa (SA).

Schematic strip map of the River Murray through northern Victoria, not to scale, with Echuca, Swan Hill, Robinvale and Mildura on the river, Kerang on the Loddon River 60 km from Swan Hill, Red Cliffs 16 km south of Mildura, and the South Australia border marked

The human side of the web built up over about 130 years.

A timeline for the case study: clearing, irrigation and growing awareness



Sources cited at the end of Section 3B (all retrieved 25 August 2026).

Timeline with dated events: 1886 Chaffey selects Mildura; 1887 Mildura founded as the first irrigation colony; 1917 Victoria's Discharged Soldiers' Settlement Act; 1921 Red Cliffs irrigation district opens; 1934 11,639 returned servicemen hold blocks in Victoria; 1982 water quality added to the River Murray Commission's duties; 2012 Murray–Darling Basin Plan signed on 22 November

In **1886** the engineer George Chaffey selected Mildura for an **irrigation** colony — taking river water and putting it onto fields through channels — and in **1887** Mildura became Australia's first irrigation colony. After the First World War, government **soldier settlement** schemes pushed clearing further: Victoria's *Discharged Soldiers' Settlement Act* of **1917** allotted blocks to returned servicemen, the Red Cliffs irrigation district (16 km south of Mildura) opened in

1921 with more than 700 soldier settlers, and by **1934** some 11,639 returned servicemen held blocks in Victoria. The schemes converted huge areas of native land to farming, as the state totals below show.

Land allotted to soldier settlement schemes by state, as at 30 June 1924

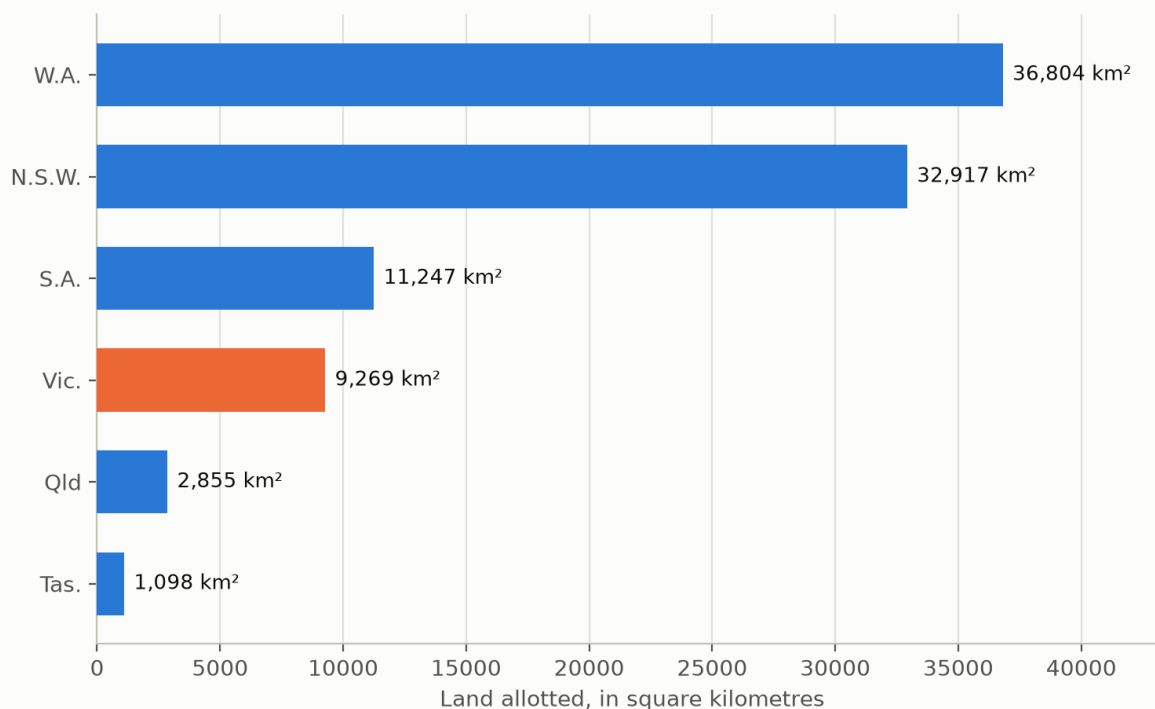


Figure 5 Government settlement schemes converted very large areas of land to farming. Victoria's share (highlighted) included dryland blocks and irrigated blocks. Source: Wikipedia, 'Soldier settlement (Australia)', table of state scheme totals as at 30 June 1924, retrieved 25 August 2026.

Bar chart of land allotted to soldier settlement schemes by state as at 30 June 1924: W.A. 36,804 square kilometres; N.S.W. 32,917; S.A. 11,247; Victoria 9,269 (highlighted); Qld 2,855; Tas. 1,098

Awareness changed more slowly than the land. Only in **1982** was water quality added to the River Murray Commission's duties, and the **Murray–Darling Basin Plan** — a basin-wide set of rules covering the river's 1,061,469 km² **catchment** (the whole area of land that drains into the river) — was signed on **22 November 2012**. That is the change lens: the issue and the response both unfold over time.

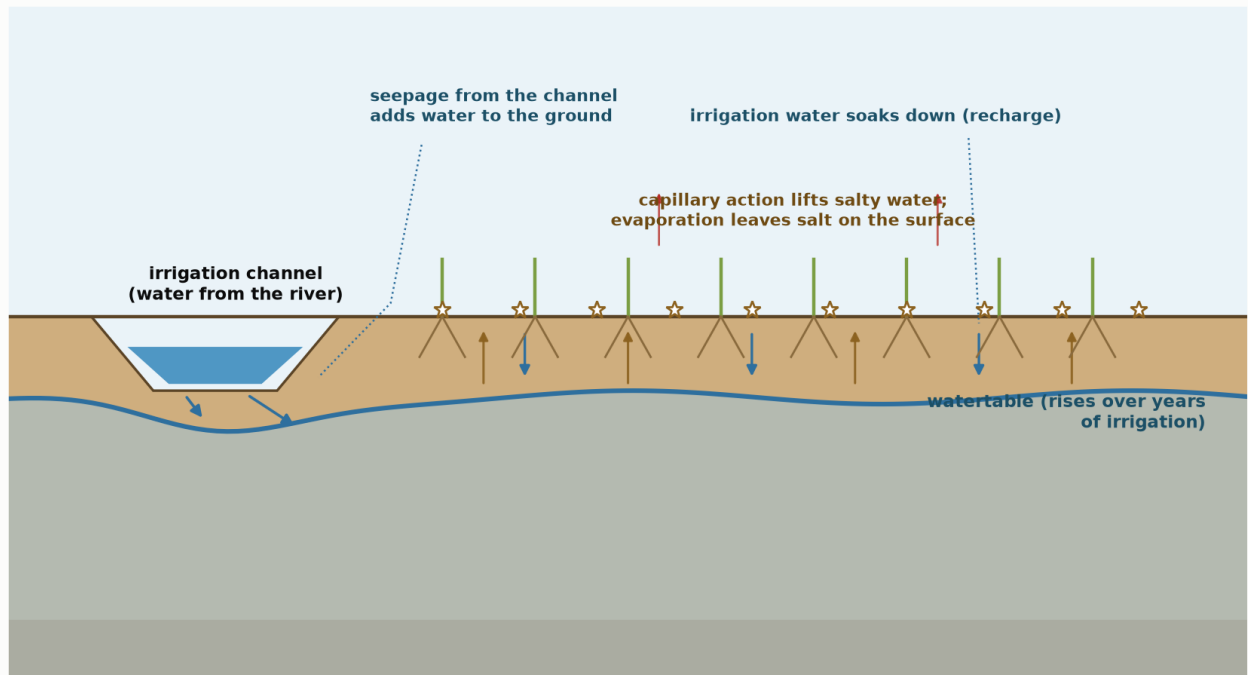
The biophysical side: how salt reaches the surface

Most Australian soils and **groundwater** (water stored underground in soil and rock) already contain salt. According to the FAO/UNESCO Soil Map of the World, Australia has about 84.7 million hectares of salt-affected soils even without human action. The salt is mostly harmless while it stays deep and the watertable stays low. The problem begins when the **watertable** — the level below which the ground is soaked with water — rises.

Under native trees and shrubs, deep roots (some to 6 m) draw water up and release it to the air, so little rain soaks past the roots. **Transpiration** is that release of water from plants to the air; together with evaporation it is called **evapotranspiration**. Crops and pasture have shallow roots (about 1 m), so after clearing, more water soaks down past the roots. That soaking-down is **recharge**. With less evapotranspiration and more recharge, the watertable rises — research on dryland salinity shows clearing as little as 25% of a **catchment** can start the process, and a watertable within 2–3 m of the surface is enough to bring salt up.

As the watertable rises, **capillary action** — the way water creeps up through tiny gaps in soil, like water climbing a paper towel — lifts the salty groundwater toward the surface. Evaporation then leaves the salt behind as a white crust. That pathway is **dryland salinity** (clearing-driven). A second pathway, **irrigation salinity**, adds water directly: channels seep, extra irrigation water recharges the groundwater, and the same rising-watertable and capillary processes follow. Soil salinity affects about 50,000 km² of Australia, mostly through land clearing, and river salinity in the Murray–Darling Basin affects New South Wales, Victoria and South Australia alike.

How irrigation can add to salinity



Salt occurs naturally in many Australian soils and in groundwater. Irrigation adds water — and a little more salt — and lifts the stored salt toward the surface.
Schematic cross-section drawn for this section; processes as described in the sources cited at the end of Section 3B.

Schematic labelled cross-section of irrigation salinity: an irrigation channel seeps into the ground; irrigation water soaks down as recharge; the watertable rises; capillary action lifts salty water and evaporation leaves salt stars at the surface among shallow-rooted crops

Read against the cause-effect web, the biophysical column is now full: fewer deep-rooted plants and added irrigation water → more recharge → a rising watertable → capillary rise → evaporation leaving salt at the surface. Interconnected thinking joins this to the human column: none of these processes runs at this speed without the clearing and the water.

Underlying causes: why people cleared and irrigated (E01)

E01 also asks for the **underlying causes of the actions** — why clearing and irrigating seemed like the right thing to do. In the case study: people need food and fibre and the population grows; government schemes (like soldier settlement) paid for clearing, pumping and channelling; technology made large-scale clearing and irrigation possible; and farming was how dry inland regions earned a living. Chaffey's £300,000 pledge and the soldier settlement Acts were governments betting on irrigation to build a living from a dry place. At the time, the rising watertable was not known or not weighed up. Holistic thinking means holding all of this at once: the issue was produced by choices that made sense to the people making them, working through biophysical processes they did not fully foresee.

Consequences: can the environment keep doing its jobs? (E02)

Section 3A defined four **environmental functions** — the jobs the environment does: a **source** of materials and energy (food, fibre, water); **services**, the life-support processes that keep places working (including **ecosystem services** — the free work of ecosystems, such as cleaning water, providing habitat and buffering floods); a **sink** that receives, stores and dilutes wastes; and a **spiritual** function, holding meaning and enjoyment for people. E02 tests the issue against those jobs: what the chosen issue does to the **sustainability** of each function — that is, whether each function can keep working, now and later.

Salinity and the four environmental functions

Function	What the function means	How salinity threatens it in northern Victoria
SOURCE	Provides materials and energy: food, fibre, water and minerals	Saline soil grows less: crops and pasture die off and land can be forced out of production; less fresh water is available for farms and towns.
SERVICES	Life-support processes (ecosystem services): clean water, habitat, flood buffering	Rivers and streams carry more salt, so water quality falls for people and for ecosystems; wetlands such as the Ramsar-listed wetlands near Kerang are stressed as salty groundwater moves.
SINK	Receives, stores and dilutes wastes and by-products	Groundwater, rivers and soils receive more salt than they can store or flush away; the sink is overloaded, so salt builds up instead of being carried off.
SPIRITUAL	Holds meaning, identity and enjoyment for people	Scalded land, dying trees and a sick river hurt places people love; fishing, birdwatching and time on the river are all diminished.

Figure 7 Applying the four environmental functions (as defined in Section 3A) to the salinity issue — the test of whether each function can keep working (its sustainability).

Table of the four environmental functions (source, services, sink, spiritual) with a column for what each function means and a column for how salinity threatens it in northern Victoria

Around the case-study towns the threats are concrete: saline soil grows less, so the **source** function shrinks; rivers carry more salt, so the **services** of clean water and habitat weaken and the **sink** is overloaded with more salt than it can store or flush; and scalded paddocks, dying trees and a sick river diminish the **spiritual** function. Whether each function can keep going — its sustainability — is the measure of the consequence.

Scale: the same issue at five scales

Finally, the scale lens. Salt first shows in a paddock, but its causes and consequences, and the power to respond, sit at different scales.

The same issue at five scales

small and close

large and far

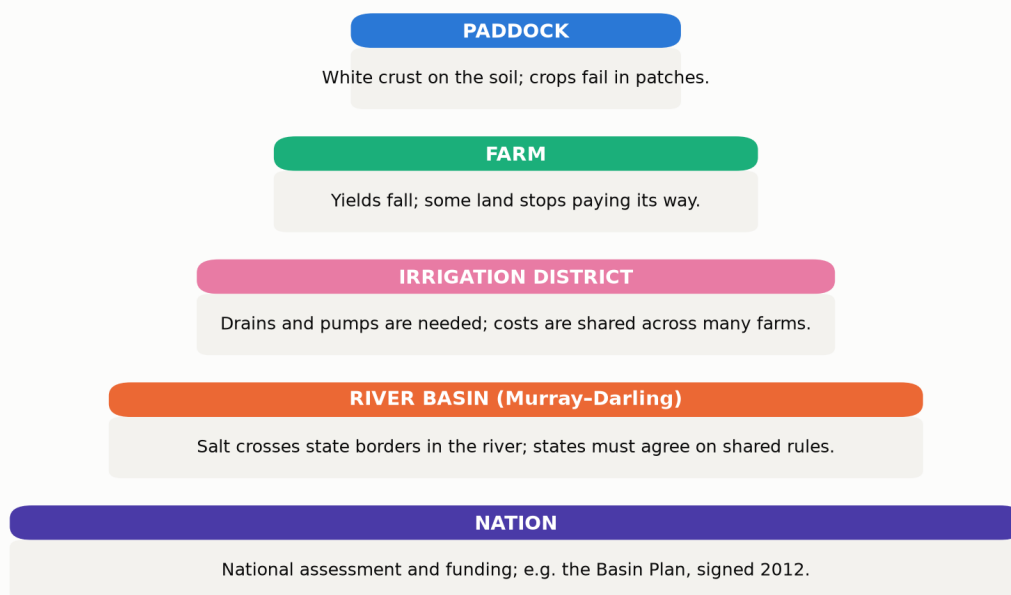


Figure 8 The scale lens: causes and consequences look different at each scale, and different people have the power to respond at each one.

Five nested bands from small to large — paddock, farm, irrigation district, river basin (Murray–Darling), nation — each with a one-line note of what the issue looks like at that scale

A farmer sees a failing paddock; a district shares the cost of drains and pumps; at basin scale, salt crosses state borders in the river, so states must agree on shared rules (the 1982 water-quality duty and the 2012 Basin Plan are basin-scale responses); at national scale, assessment and funding arrive. A geographical explanation names the scale it is working at, because the “right” response at one scale is not enough at another.

Worked examples

Example 1 — scaffolded (causes, E01)

Question: Using the cause-effect web, the map and the timeline, build the web for irrigation salinity around Mildura and Red Cliffs.

Web column	Fill it in for Mildura–Red Cliffs	Evidence (dated)
Underlying causes	A dry region needed a living; government backed irrigation and settlement.	Chaffey’s £300,000 pledge (1886); Victoria’s soldier settlement Act (1917).
Human actions	Clear native plants; take river water onto fields through channels.	Mildura founded as first irrigation colony (1887); Red Cliffs district opened (1921) with 700+ soldier settlers growing grapes and citrus.
Biophysical processes	Channel seepage and extra irrigation water recharge the groundwater; the watertable rises; capillary action lifts salty water; evaporation leaves salt at the surface.	Cross-section figure; native roots to 6 m vs crops about 1 m; watertable within 2–3 m brings salt up.
The issue	Salinity: salt builds up in soils,	River salinity affects NSW, Vic. and

Web column	Fill it in for Mildura–Red Cliffs	Evidence (dated)
	groundwater and the river.	SA; water quality added to the River Murray Commission’s duties in 1982.

Answer: Around Mildura and Red Cliffs, the need for a living in a dry place and government schemes (underlying causes) drove clearing and irrigation (human actions) from 1886–87 and again with soldier settlement after 1917. Those actions added recharge and cut evapotranspiration, so the watertable rose and capillary action brought stored salt to the surface (biophysical processes), producing salinity (the issue). The web holds the whole chain in one connected explanation — that is holistic thinking.

Example 2 — unscaffolded (consequences, E02)

Question: Describe the impacts of salinity on the sustainability of environmental functions around Kerang.

Model answer (what a strong one looks like): Kerang sits on the Loddon River, 60 km from Swan Hill, in an irrigation district of livestock, lucerne and horticulture, and near the Ramsar-listed wetlands of northern Victoria — wetlands that can host around 200,000 ibis in wet years. Salinity presses on several functions at once. As a **source**, saline soil grows less pasture and crop, so the land may not keep producing at the same level. As **services**, the wetlands’ clean water and habitat are stressed when salty groundwater moves through, threatening the bird breeding the wetlands are listed for; that is an ecosystem service weakening. As a **sink**, groundwater and soils receive more salt than they can store or flush, so the sink overloads. And as a **spiritual** function, a town of 3,960 people (2021) that lives beside its lakes and birdlife loses something it values when they sicken. Whether those functions can keep working — their sustainability — is exactly what E02 asks us to describe.

Practice questions

Scaffolded

- Q1.** In your own words, define *salinity* and *watertable* as this section uses them.
- Q2.** Look at the strip map. Name (a) the town 16 km south of Mildura, and (b) the town on the Loddon River, 60 km from Swan Hill.
- Q3.** Look at the soldier-settlement bar chart. (a) Which state had the most land allotted as at 30 June 1924, and how much? (b) How many square kilometres were allotted in Victoria? (c) How many more square kilometres did W.A. receive than Victoria?
- Q4.** Look at the timeline. Give the year of: (a) Chaffey selecting Mildura; (b) the Red Cliffs irrigation district opening; (c) the Basin Plan being signed.
- Q5.** The cross-section shows irrigation salinity. Put these steps in order (step 1 is given): 1 — irrigation water is applied and channels seep; ... (a) capillary action lifts salty water; (b) recharge soaks down past shallow roots; (c) evaporation leaves salt at the surface; (d) the watertable rises.
- Q6.** Match two lenses from the concepts figure to these questions: (a) “Can the river keep supplying clean water later this century?” (b) “Why does salt appear in patches here and not there?”

Unscaffolded

- Q7.** Using the cause-effect web, explain how clearing native vegetation and irrigation *together* produce salinity in northern Victoria. Name the biophysical processes in your chain.
- Q8.** E01 asks for the underlying causes of the human actions. Explain why people cleared and irrigated in the Murray district, using two dated pieces of evidence from this section.
- Q9.** Using the functions table, describe two impacts of salinity around the case-study towns and say for each whether that environmental function can keep working (its sustainability) if salinity continues (E02).

Q10. Using the scales figure, explain why the salinity problem and the response look different at the farm scale and at the river-basin scale.

Inquiry task

Settlement data against the map. Use the soldier-settlement bar chart, the strip map and the sources at the end of this section.

- (a) Rank the six states from most to least land allotted as at 30 June 1924, and calculate Victoria's share of the six-state total as a percentage (round to one decimal place).
 - (b) The Mallee country around Mildura and Red Cliffs was a major soldier-settlement clearing area. On a copy of the strip map, shade the Mildura–Red Cliffs district and the Kerang district, and label each with one dated fact from the timeline.
 - (c) Write a 6–8 line evidence paragraph that uses interconnected (holistic) thinking to link the clearing shown in the 1924 data to dryland salinity in those districts. Your paragraph must name at least one underlying cause, one human action and two biophysical processes, and cite one source by name with its retrieval date.
-

Answers

Q1. Salinity: how much salt is in soil, groundwater or river water; a salinity problem is salt building up where it harms. Watertable: the level below which the ground is soaked with water. **Q2.** (a) Red Cliffs; (b) Kerang. **Q3.** (a) W.A., 36,804 km²; (b) 9,269 km²; (c) 36,804 – 9,269 = 27,535 km². **Q4.** (a) 1886; (b) 1921; (c) 2012. **Q5.** 1, b, d, a, c. **Q6.** (a) Sustainability; (b) Space. **Q7.** Clearing removes deep-rooted native plants (less evapotranspiration, more recharge) and irrigation adds water (seepage and recharge); both lift the watertable; capillary action then lifts salty groundwater and evaporation leaves salt at the surface. **Q8.** Any two dated: the need for a living in a dry region backed by Chaffey's £300,000 pledge (1886); government soldier settlement schemes (1917 Act; Red Cliffs opened 1921; 11,639 servicemen holding blocks by 1934). **Q9.** Any two functions with a sustainability judgement, e.g. source — saline soil grows less, so production cannot keep working at the same level; services — salty water weakens clean-water and habitat services such as the Kerang wetlands' bird breeding. **Q10.** At farm scale the issue is a failing paddock and a private loss; at basin scale salt crosses state borders in the river, so states must agree on shared rules (1982 water-quality duty; 2012 Basin Plan) — the power to respond sits at a bigger scale.

Fully-worked solutions

Q1. Salinity is the amount of salt in soil, groundwater or river water; it becomes an issue when salt builds up where it causes harm. The watertable is the level below which the ground is completely soaked with water; when it rises close to the surface it can bring stored salt with it.

Q2. (a) Red Cliffs, 16 km south of Mildura. (b) Kerang, on the Loddon River, 60 km from Swan Hill.

Q3. (a) Western Australia, with 36,804 km² allotted as at 30 June 1924. (b) Victoria: 9,269 km². (c) 36,804 – 9,269 = 27,535 km² more in W.A. than in Victoria.

Q4. (a) 1886. (b) 1921. (c) 2012 (signed 22 November 2012).

Q5. Order: 1 (water applied, channels seep) → b (recharge soaks down past shallow roots) → d (the watertable rises) → a (capillary action lifts salty water) → c (evaporation leaves salt at the surface).

Q6. (a) The sustainability lens — it asks whether a function can keep going into the future. (b) The space lens — it asks where things are and why the pattern is patchy.

Q7. Clearing and irrigation drive the same biophysical chain from two ends. Clearing replaces deep-rooted native plants (roots to 6 m) with shallow-rooted crops (about 1 m), so less water is drawn up (less evapotranspiration) and more soaks down (more recharge). Irrigation adds water directly, through channel seepage and extra soaking-down. Both lift the watertable; once it comes within 2–3 m of the surface, capillary action lifts the salty groundwater and evaporation leaves the salt behind as a crust. Neither action alone gives the full chain — the web joins them into one connected (holistic) explanation.

Q8. The underlying causes are the reasons behind the actions: a dry inland region needed a living, people needed food and fibre, and governments backed the bet — Chaffey's £300,000 pledge for the Mildura irrigation colony (1886) and the soldier settlement program (Victoria's 1917 Act; Red Cliffs opened 1921; 11,639 returned servicemen held blocks by 1934) paid for clearing, pumping and channelling. Technology made it possible. So the clearing and irrigating were not random: they came from settlement policy and the need to earn a living, and those actions set the biophysical processes in motion.

Q9. Source: saline soil grows less crop and pasture, and land can be forced out of production, so the source function cannot keep working at its old level if salinity continues — its sustainability falls. Services: as rivers and groundwater carry more salt, clean-water and habitat services weaken; the Ramsar-listed wetlands near Kerang are stressed by moving salty groundwater, threatening the bird breeding they are listed for — an ecosystem service that may not sustain. (Sink and spiritual equally acceptable: the sink overloads with more salt than it can store or flush; scalded land and a sick river diminish a place people value.)

Q10. At the farm scale, salinity is a white crust in a paddock and a private loss of yield, and the response is what one farm can afford (fencing off scalds, planting salt-tolerant pasture). At the river-basin scale, salt enters the river and crosses state borders, so no single farm or state can fix it; the response must be shared rules — water quality joining the River Murray Commission's duties in 1982 and the Basin Plan signed in 2012. The scale lens shows that causes and consequences, and the power to respond, change as the scale changes.

Inquiry task (a). Order: W.A. (36,804), N.S.W. (32,917), S.A. (11,247), Vic. (9,269), Qld (2,855), Tas. (1,098). Total = 94,190 km²; Victoria's share = $9,269 \div 94,190 \approx 9.8\%$.

Sources (real, checkable referents; all retrieved 25 August 2026): Wikipedia, 'Dryland salinity' (clearing as little as 25% of a catchment; native roots to 6 m vs crops about 1 m; watertable within 2–3 m; capillary rise); Wikipedia, 'Soil salinity' (Australia about 84.7 million hectares of salt-affected soils per the FAO/UNESCO Soil Map of the World); Wikipedia, 'Environmental issues in Australia' (soil salinity about 50,000 km², mostly from land clearing; Murray–Darling river salinity affecting NSW, Vic. and SA); Wikipedia, 'Mildura' (Chaffey selection 1886 with £300,000 pledged; settlement 1887; first irrigation colony); Wikipedia, 'Red Cliffs' (700+ soldier settlers; district opened 1921; 16 km south of Mildura; 2021 population 6,138); Wikipedia, 'Soldier settlement (Australia)' (Vic. Act 1917; 9,269 km² and 8,640 farms in Vic.; 11,639 returned servicemen holding blocks by 1934; state scheme totals as at 30 June 1924 used in Figure 5); Wikipedia, 'Kerang' (on the Loddon, 60 km from Swan Hill; 2021 population 3,960; Ramsar-listed wetlands; ibis numbers around 200,000); Wikipedia, 'River Murray' and 'Murray–Darling Basin' (2,508 km; mouth near Goolwa; catchment 1,061,469 km²; water quality added to River Murray Commission duties 1982; Basin Plan signed 22 November 2012). All figures are original diagrams drawn for this section; schematic map is not to scale.

Custodial responsibility and approaches to environmental management

Where this section comes from (curriculum): VC2HG10K12. This content description is framed in its entirety around First Nations peoples, and all four of its elaborations — VC2HG10K12.E01, .E02, .E03, .E04 — are First Nations content, so they are set aside in this series (Content Policy Rule 1; see the notice at the front of the book). The section therefore teaches the description’s transferable, neutral conceptual core — **custodial responsibility as an approach to environmental management** — through neutral Victorian examples of values-based care and management programs: community land stewardship (the Landcare movement), government park management (Parks Victoria), a conservation management program (the helmeted honeyeater recovery) and private land protection (Trust for Nature covenants). The excluded elaboration ids are retained as linkage keys only. This is the third section of Chapter 3, *Environmental change and management*: 3A set out what the environment **does** for people and how people change it; 3B applied interconnected thinking to the causes and consequences of one selected environmental issue; this section asks **who takes responsibility for caring for the environment, and through what approaches**; 3D asks how worldviews shape support for that care; 3E returns to the same issue for management.

Key ideas

1. “Custodial” is a contested word — so this section defines it before using it. A **contested** word is a word with competing meanings, where the meaning you pick can change the conclusion. In public discussion, *custodial* is used in several ways, and in Australia it is often tied to First Nations peoples; in this series that content is set aside (see the notice at the front of the book), so this section fixes one neutral meaning and says so openly: **custodial responsibility is the responsibility to care for a place or part of the environment, keep it healthy, and pass it on to future generations**. A **custodian**, then, is a carer — someone who looks after something that is not only theirs to use, because it also belongs to other people now and to people in the future (Figure 1). Three steps follow from the definition, and every case in this section is read through them: the place or species is **held in trust**; the custodian owes it a **duty of care**; and it is **protected and passed on** to the future. Because the meaning depends on *whose* responsibility we mean, every claim in this section also names the custodian (who) and the place or species (what) — for example, Parks Victoria manages more than 4 million hectares of parks and reserves **on behalf of all Victorians**.

Custodial responsibility: the term this section is built on

The curriculum uses this term but does not define it, so this section fixes one meaning first

A contested term - we fix a definition

The Victorian Curriculum uses the term custodial responsibility but does not define it. It is a contested term: people use it in slightly different ways, so this section states the frame it uses.

Definition used in this section:

the responsibility to care for a place or part of the environment, keep it healthy, and pass it on to future generations.

A custodian is a carer

A custodian is someone who looks after something that is not only theirs to use. It also belongs to other people now, and to people in the future.

1. A place or species is held in trust



2. The custodian owes it a duty of care



3. It is protected and passed on to the future

How to read every claim in this section

Because the meaning depends on whose responsibility we mean, every claim in this section names the custodian (who) and the place or species (what).

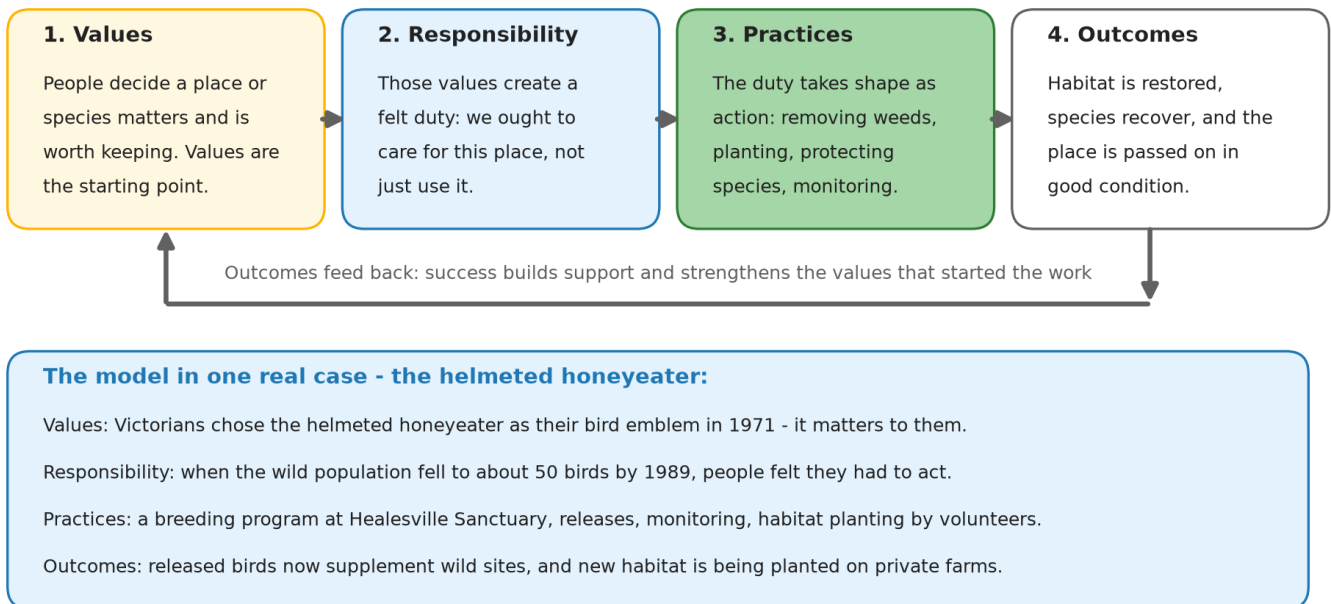
Example: 'Parks Victoria manages more than 4 million hectares of parks and reserves on behalf of all Victorians.'

Diagram defining custodial responsibility as the responsibility to care for a place or part of the environment, keep it healthy and pass it on to future generations, with the three steps - held in trust, duty of care, protected and passed on - and a rule for reading every claim by naming the custodian and the place or species

2. Values lead to responsibility, responsibility to practices, practices to outcomes — and outcomes feed values back. Custodial responsibility is a values-based approach, and it runs as a four-step chain (Figure 2): what people **value** decides what they feel they must do; that felt duty becomes **responsibility**; responsibility takes shape as **practices** (the on-ground work); and practices produce **outcomes**. The chain is a loop, not a line: outcomes feed back, because success builds support and strengthens the values that started the work. The helmeted honeyeater (Key ideas 6–7) is this section's worked test of the loop: a valued emblem bird, a crash to about 50 wild birds, a recovery that has run since 1989, and counts that still drive the work today.

How values become management

Custodial responsibility is a values-based approach: what people value decides what they feel they must do



Four-step flow chart of how values become management - values, responsibility, practices, outcomes - with outcomes feeding back to strengthen the values that started the work, and the helmeted honeyeater shown as the worked case

3. Five care practices keep appearing across the approaches. Read across the Victorian cases, the same five families of practice appear (Figure 3): **cleaning up land** (taking out what harms a place — weeds, litter, pest plants and pest animals); **restoring and planting habitat** (rebuilding the home a species needs — growing local plants, replanting, linking patches of bush); **protecting threatened species** (direct help for species close to loss — breeding in care, releasing, fencing off habitat); **monitoring and counting** (watching to see whether the care is working — surveys, counts, tracking released animals); and **building community capacity** (helping more people take part — training, grants, education, welcoming new volunteers). When you meet a new management program, sorting its work into these five practices is the quickest way to see what it actually does. Figure 3 also names the real Victorian example this section uses for each practice.

What the duty of care looks like

Care practices are the actions a custodial approach turns into - each one matched to a real Victorian example

Cleaning up land; removing weeds and rubbish

Means: taking out what harms a place - weeds, litter, pest plants and pest animals.

Example in this section: Landcare groups across Victoria run working bees to clear weeds and rubbish from creeks and bushland.

Restoring and planting habitat

Means: rebuilding the home a species needs - growing local plants, replanting, linking patches of bush.

Example in this section: the Friends of the Helmeted Honeyeater run a native plant nursery and plant habitat; Beyond Yellingbo works on about 85 farms.

Protecting threatened species

Means: direct help for species close to loss - breeding in care, releasing, fencing off habitat.

Example in this section: a conservation breeding program at Healesville Sanctuary breeds and releases helmeted honeyeaters.

Monitoring and counting

Means: watching to see whether the care is working - surveys, counts, tracking released animals.

Example in this section: Zoos Victoria monitors how released helmeted honeyeaters survive in the wild.

Building community capacity

Means: helping more people take part - training, grants, education, welcoming new volunteers.

Example in this section: Landcare Australia supports its network of more than 6,000 groups with grants, training and shared learning.

These practices appear again and again in this section - the difference between cases is who does them, and why.

Table of the five care practices of a custodial approach - cleaning up land, restoring and planting habitat, protecting threatened species, monitoring and counting, and building community capacity - each with what it means and a real Victorian example from this section

4. Four approaches to environmental management carry these practices in Victoria. The section walks through four families of approaches, each with a real Victorian case (Figure 4): **community land stewardship** — local volunteers, farmers and landholders caring for their own district in groups (the Landcare movement); **government park management** — a public authority with duties set out in law, managing the park system (Parks Victoria); **conservation management programs** — zoos, scientists, government and volunteer groups working as a team on targeted recovery (the helmeted honeyeater recovery); and **private land protection** — landholders, with conservation organisations, protecting nature on private land through voluntary legal agreements (Trust for Nature covenants). The four work at different **scales** — a local creek, a single farm, a state-wide park network — and they differ in who carries the duty and what makes it stick: community commitment, law, a program's plan, or a voluntary promise written into a land title. They also overlap in practice: no single custodian does it all, and the helmeted honeyeater, for example, relies on zoo scientists, volunteers and farmers at once.

Who takes responsibility? Four families of approaches

Custodial responsibility is shared out - different custodians work at different scales, and they often work together

Community land stewardship

Who: local volunteers, farmers, landholders in groups.

How: hands-on care of local land - planting, weeding, fencing, monitoring.

Victorian case: the Landcare movement, launched in central Victoria in November 1986; now more than 6,000 groups and 140,000 volunteers across Australia.

Government park management

Who: a public authority with duties set out in law.

How: plans, patrols, protection of plants and animals, managing visitors.

Victorian case: Parks Victoria manages more than 4 million hectares of public land and water for more than 100 million visits a year.

Conservation management programs

Who: zoos, scientists, government and volunteer groups working as a team.

How: breeding threatened species, releases, habitat works, research.

Victorian case: the helmeted honeyeater recovery program, running since 1989 around Yellingbo.

Private land protection

Who: landholders, with conservation organisations.

How: voluntary, legal agreements that protect nature on private land - permanently.

Victorian case: Trust for Nature covenants - more than 1,500 landholders, more than 119,000 hectares protected.

No single custodian does it all: the helmeted honeyeater, for example, relies on zoo scientists, volunteers and farmers at once.

Table of four families of approaches to environmental management in Victoria - community land stewardship, government park management, conservation management programs and private land protection - each with who carries it, how it works and a Victorian case, and a note that no single custodian does it all

5. Approach 1 — community land stewardship: the Landcare movement was born in Victoria. Stewardship means the organised care of land you do not own outright, for the good of others as well as yourself. The word *landcare* itself was launched in a small town in central Victoria in November 1986, through an initiative of Joan Kirner, then Victorian Minister for Conservation, Forests and Lands, and Heather Mitchell, then president of the Victorian Farmers Federation; Australia's first official Dunecare groups formed on the New South Wales mid-north coast in January 1988; and on 20 July 1989 Landcare became a national program, launched at Wentworth, New South Wales, with the Australian Government's Decade of Landcare Plan committing \$320 million to the National Landcare Programme (Figure 5). At that launch, Prime Minister Bob Hawke said the degradation of the environment "is not simply a local problem ... the damage being done to our environment is a problem for us all" — a custodial claim in one sentence. Landcare Australia, the national not-for-profit body, was set up the same year. Today the movement has grown to more than 6,000 groups and more than 140,000 volunteers — farmers, landholders, Coastcare, Rivercare and 'Friends of' groups — and the model has been taken up in more than 20 countries. In this approach, custodial responsibility is carried by **ordinary locals**: the people who farm, walk and weed a district decide its condition is their duty. Note the scale jump the timeline shows — a Victorian launch, a national plan, a global take-up.

Case study: Landcare — community land stewardship, born in Victoria

Source: Landcare Australia, 'About us' and 'Origins of Landcare' (retrieved 25 August 2026)

'The degradation of our environment is not simply a local problem ... Rather, the damage being done to our environment is a problem for us all.'

— Prime Minister Bob Hawke, Landcare launch, Wentworth, 20 July 1989



Timeline of the Landcare movement: the word landcare launched in central Victoria in November 1986, the first Dunecare groups in January 1988, the national Decade of Landcare Plan launched on 20 July 1989 committing \$320 million, and today more than 6,000 groups and more than 140,000 volunteers, taken up in more than 20 countries

6. Approach 2 — a conservation management program begins with a valued species: the helmeted honeyeater.

The helmeted honeyeater is Victoria's bird emblem, chosen in 1971. It is a **critically endangered subspecies** of the yellow-tufted honeyeater — in this section, *critically endangered* means at the highest risk of extinction in the wild, and *subspecies* means a distinct kind within a species, here found nowhere else but Victoria (Figure 6). It is about 20 cm from bill to tail tip, with a bright yellow crest that looks like a helmet. By 1989 the wild population had fallen to about 50 birds, living in streamside swamp forest in the Yarra Valley, east of Melbourne — its home centred on Yellingbo Nature Conservation Area, about 50 km east of Melbourne. The primary threat was loss of habitat to agriculture, with drought, bushfire, climate change and competition adding pressure. Read through Figure 1's steps: the emblem choice is the values step; the crash to about 50 birds made the duty urgent; the recovery is the protection step.

Case study: the helmeted honeyeater

Victoria's bird emblem, and the reason one of Australia's most involved recovery programs exists

The species

The helmeted honeyeater is Victoria's bird emblem, chosen in 1971. It is a critically endangered subspecies of the yellow-tufted honeyeater - a kind of honeyeater found nowhere else but Victoria. It is about 20 cm from bill to tail tip, with a bright yellow crest that looks like a helmet.

'Critically endangered' means at the highest risk of extinction in the wild.

Its situation

By 1989 the wild population had fallen to about 50 birds. The Friends of the Helmeted Honeyeater formed in May 1989 to help. The bird's wild range is restricted to streamside swamp forest in the Yarra Valley, east of Melbourne - its home is centred on Yellingbo Nature Conservation Area, about 50 km east of Melbourne.

The threats

- loss of habitat to agriculture (the primary threat)
- drought
- bushfire
- climate change
- competition from other birds

The number that started the rescue:

about 50 birds left in the wild by 1989 - down from a much larger population, and living in just one place.

Why this case shows custodial responsibility:

Values first: the state chose this bird as its emblem - it is officially valued.

Then duty: when the population crashed, zoo scientists, volunteers and government bodies all took responsibility for its survival.

Then action: a recovery program that has run since 1989 (Figure 7).

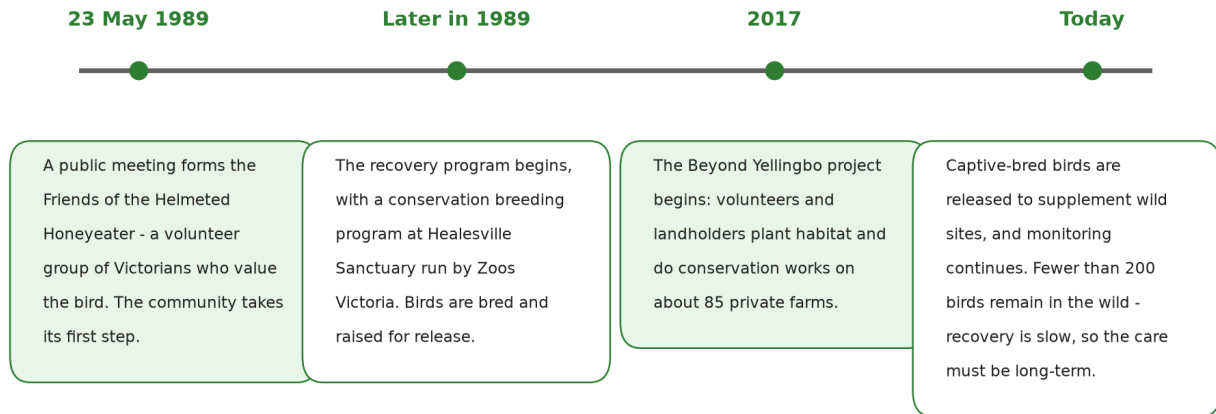
Case study panel on the helmeted honeyeater - Victoria's bird emblem since 1971 and a critically endangered subspecies found only in Victoria - showing its situation, about 50 wild birds by 1989 centred on Yellingbo about 50 km east of Melbourne, and its threats, led by loss of habitat to agriculture

7. How the recovery works: four dated moves, one long duty. The Friends of the Helmeted Honeyeater — a volunteer community group — formed at a public meeting on 23 May 1989; later that year the recovery program began, with a conservation breeding program at Healesville Sanctuary run by Zoos Victoria; from 2017 the Beyond Yellingbo project extended the work onto about 85 private farms, where volunteers and landholders plant and protect habitat; and today, captive-bred birds are released to add to the wild sites while monitoring continues (Figure 7). Fewer than 200 birds remain in the wild, so the program's own numbers say the care must be long-term. That is the custodial pattern in a single case: values (the emblem), duty (the 1989 rescue), practices (breeding, releasing, planting, counting), outcomes (the count that still decides the next step) — the full loop of Figure 2, with the habitat planting on private farms showing Approach 2 and Approach 4 working together.

How the recovery works

A conservation management program - zoos, scientists, volunteers and government bodies working together for the helmeted honeyeater

'The wild population had fallen to about 50 birds by 1989 - there was no time to lose.' The recovery program and its conservation breeding program at Healesville Sanctuary both began that year.



Sources: Zoos Victoria, 'Helmeted Honeyeater' (Healesville Sanctuary); Friends of the Helmeted Honeyeater Inc (retrieved 25 August 2026).

Timeline of the helmeted honeyeater recovery: the Friends group formed on 23 May 1989, the recovery program and conservation breeding at Healesville Sanctuary beginning later in 1989, the Beyond Yellingbo project extending habitat work onto about 85 private farms from 2017, and today captive-bred releases and monitoring continuing with fewer than 200 birds in the wild

8. Approach 3 — government park management: Parks Victoria holds the public system in trust. Parks Victoria is the **statutory authority** — a government body set up by law, here the *Parks Victoria Act 2018* — that manages more than 4 million hectares of public land and water, receiving more than 100 million visits a year; the parks hold more than 4,300 native plant species and around 1,000 native animal species, and more than 1,000 staff work at over 100 locations across the state (Figure 8). In its own words, its role is 'to help people enjoy Victoria's natural places while also protecting the environmental and cultural values that make them unique'. Read through the section's definition, that role is custodial on its face: the parks are held in trust for all Victorians — people now alive and generations still to come — and the duty of care is written into law rather than left to goodwill. Note the scale jump from Approach 1: from a local volunteer group to a state-wide system held by a public authority.

Case study: Parks Victoria - management at state scale

Source: Parks Victoria, 'About us' (retrieved 25 August 2026)



The role, in Parks Victoria's own words:

'to help people enjoy Victoria's natural places while also protecting the environmental and cultural values that make them unique.'

That role is custodial: the parks are held in trust for all Victorians - people now alive, and generations still to come. Parks Victoria works with government and community organisations, volunteers, tour operators, researchers and local communities.

Case study panel on Parks Victoria with six statistics - more than 4 million hectares of public land and water, more than 100 million visits a year, more than 4,300 native plant species, around 1,000 native animal species, more than 1,000 staff at over 100 locations, and the Parks Victoria Act 2018 - with its role statement in its own words and a custodial reading of it

9. Approach 4 — private land protection: most of Victoria's nature is not in parks. 62% of Victoria's land is privately owned — farms, homes and private blocks; on that private land, 78% of the native vegetation is rare or threatened; only about 1% of the state's native grassland still remains; and the Plains-wanderer, a small grassland bird, has fewer than 1,000 left in the wild (Figure 9). If custodial responsibility stopped at the park fence, much of Victoria's nature would be left out. One answer is the **conservation covenant** — a voluntary, legal agreement that permanently protects the natural values of a block of private land, written into the land's title (the legal record of who owns it) so it applies to future owners too. Trust for Nature, the Victorian body that runs these covenants, works with more than 1,500 private landholders and has permanently protected more than 119,000 hectares of habitat. Covenanting is a values choice: a landholder decides the bush on their property matters enough to protect forever. Custodial responsibility here is **shared and voluntary**: the landholder keeps owning and using the land, the trust holds the promise and checks the land is cared for, and the public gains habitat no government park would ever reach.

Why protect private land? And how covenants answer

Source: Trust for Nature (retrieved 25 August 2026)

Most of Victoria's nature is not in parks

62% of Victoria's land is privately owned - farms, homes and private blocks.

On that private land, 78% of the native vegetation is rare or threatened.

Only about 1% of Victoria's native grassland still remains.

The Plains-wanderer, a small grassland bird, has fewer than 1,000 left in the wild.

If custodial responsibility stopped at the park fence, much of Victoria's nature would be left out.

One answer: conservation covenants

A conservation covenant is a voluntary, legal agreement that permanently protects the natural or cultural values of a block of private land. It is written into the land's title, so it binds future owners too.

What Trust for Nature has achieved: more than 1,500 private landholders as partners, and more than 119,000 hectares of habitat permanently protected.

Covenanting is a values choice: a landholder decides the bush on their property matters enough to protect forever.

Custodial responsibility here is shared and voluntary:

The landholder keeps owning and using the land - but its natural values are protected.

The trust holds the legal promise and checks the land is cared for.

The public gains: habitat survives on land no government park would ever reach.

Two-panel diagram on private land protection: why it matters - 62% of Victoria privately owned, 78% of the native vegetation on private land rare or threatened, about 1% of native grassland remaining, fewer than 1,000 Plains-wanderers left - and how conservation covenants answer, with Trust for Nature's more than 1,500 landholders and more than 119,000 hectares permanently protected

10. People disagree about how far protection should go — steelman before you argue. A live question in Victoria is whether more land should be set aside permanently for conservation. The rule in this workbook is to **steelman**: state the strongest honest version of the other side's position before you argue against it (Figure 10). Test both sides against the three **criteria** — the standards this book uses to judge environmental decisions: **environmental** (does it keep habitats and species alive?), **social** (is it fair to the people who live and work on the land?), and **economic** (can the community afford it, now and later?). Marks in this section reward reasoning — defined terms, used evidence, admitted limits — not the conclusion you reach.

People disagree - steelman before you argue

Debate: Should more land in Victoria be set aside permanently for conservation?

The strongest case FOR setting more land aside

Nature cannot argue for itself; someone must take responsibility for it.

Once habitat is cleared it may be lost for good - the 1% of native grassland left shows how far loss can go.

Protected land keeps nature's life-support working: clean water, healthy soil, flood control.

The evidence is measurable: fewer than 1,000 Plains-wanderers remain in the wild.

Future generations inherit what we choose to protect now.

The strongest case AGAINST

Land set aside is land no longer available for farming, housing or jobs - real costs for real communities.

Fences and signs alone do not protect nature; without funding for care, set-aside land can run down.

Private landholders already act as custodians; voluntary covenants may protect more, faster, with less conflict.

Locking land away can cut people off from the very places that teach them to value nature.

Money spent on buying land may buy more protection if spent on managing land already reserved.

Test both sides against the three criteria used in this book:

Environmental - does it keep habitats and species alive?

Social - is it fair to the people who live and work on the land?

Economic - can the community afford it, now and later?

Class rules: state the other side's case in its strongest form, then give your own. Marks reward reasoning - defined terms, used evidence, admitted limits - not the conclusion you reach.

Two-panel steelman of the debate on whether more land in Victoria should be set aside permanently for conservation - the strongest case for and the strongest case against - tested against the environmental, social and economic criteria, with the class rules for the debate

Worked examples

Worked example 1 — reading a source's own words as custodial responsibility (source-led)

Using Parks Victoria's role statement (Figure 8) and the section's definition (Figure 1), show how a source's own words can record custodial responsibility.

How to answer a “read the source through the definition” question: (1) quote the source's exact words; (2) name which step of the definition — held in trust, duty of care, protected and passed on — those words record; (3) explain the link in one sentence.

Model answer. Parks Victoria says its role is ‘to help people enjoy Victoria's natural places while also protecting the environmental and cultural values that make them unique’. The words ‘protecting the ... values that make them unique’ record the **duty of care** step: a body has accepted responsibility for the condition of the parks. The pairing of ‘enjoy’ now with ‘protecting’ for later records the **held in trust** step: the parks are for today's visitors and for people not yet born. The *Parks Victoria Act 2018* supplies the **protected and passed on** step, because the duty sits in law, so it survives changes of government and mood. In one sentence: a statutory authority whose law-written job is to protect public values for present and future users is a custodian by this section's definition.

Worked example 2 — using numbers to justify an approach (data-led)

Using Figure 9, explain why private land protection has to be one of the four approaches — that is, why custodial responsibility cannot stop at the park fence.

How to answer a “use the numbers to justify the approach” question: (1) say what each number measures; (2) say which number makes the strongest case, and why; (3) link the numbers to one management response.

Model answer. The first number, 62%, measures **where Victoria’s land sits**: most of it is privately owned, so most habitat is outside any park. The second, 78%, measures **how much of the rare nature is out there**: on that private land, most native vegetation is rare or threatened. The third, about 1%, measures **how far loss has already gone** in native grassland, with the Plains-wanderer’s fewer than 1,000 birds as the living cost. The strongest case is the 78%: even if every public hectare were perfectly cared for, the majority of rare vegetation would still sit on private titles, so no park-based approach can reach it. The response the numbers justify is the conservation covenant: a voluntary, permanent, title-written promise that puts private land inside custodial responsibility without taking it out of private ownership — more than 119,000 hectares protected so far.

Practice questions

Scaffolded

Q1. (a) What does *custodial responsibility* mean in this section? (b) Why does the section define the term before using it? (Hint: what kind of word is *custodial*?)

Q2. Figure 2 shows a four-step chain with a feedback link. (a) List the four steps in order. (b) What feeds back into what, and why does that make the chain a loop?

Q3. Using Figure 3, sort each action into the practice it belongs to: (a) removing weeds and rubbish from a creek bank; (b) counting helmeted honeyeaters each year; (c) breeding a threatened bird in care and releasing it; (d) replanting local plants to link two patches of bush; (e) running a training day for new volunteers.

Q4. Using Figures 4 and 5: (a) name the four approaches; (b) where and when was the word *landcare* launched? (c) what plan did the Australian Government announce on 20 July 1989, and how much did it commit? (d) how many groups and volunteers make up the movement today?

Q5. Using Figures 6 and 7: (a) in what year did Victoria choose the helmeted honeyeater as its bird emblem? (b) about how many wild birds remained by 1989? (c) which body runs the conservation breeding program, and where? (d) what project began in 2017, on about how many farms? (e) about how many birds remain in the wild today?

Q6. Using Figures 8 and 9: (a) name the Victorian law that sets up Parks Victoria, and one statistic from Figure 8; (b) what percentage of Victoria’s land is privately owned? (c) what is a conservation covenant, and what makes it permanent? (d) which two numbers describe what Trust for Nature has achieved?

Un scaffolded

Q7. The helmeted honeyeater case is this section’s worked test of the Figure 2 chain. Explain how the case shows all four steps plus the feedback link, using at least three dated facts from Figures 6 and 7.

Q8. Compare community land stewardship (Figure 5) with private land protection (Figure 9): give one similarity and one difference in how each approach carries custodial responsibility, each backed with evidence from the figures.

Q9. ‘Custodial responsibility can stop at the park fence, because parks are where the protected nature is.’ Use Figures 8 and 9 to argue against this claim with at least three numbers.

Q10. Covenants are voluntary: no law forces a landholder to sign one. Explain why a landholder might still take on a permanent promise that applies to future owners, and what the public gains. Use at least two numbers from Figure 9.

Extend — evidence-based response

E1. Question: *Should more land in Victoria be set aside permanently for conservation?* Write a response of 120–160 words that: defines *custodial responsibility* the way you are using it; steelmans the side you disagree with (states its strongest case fully, tested against the environmental, social and economic criteria); and takes a position of your own supported by at least two named cases from this section and at least one number from this section. Marks reward reasoning, not the conclusion you reach.

Answers

Q1. (a) The responsibility to care for a place or part of the environment, keep it healthy, and pass it on to future generations. (b) Because *custodial* is a contested word — people use it in different ways, and the meaning picked can change the conclusion, so the section fixes one meaning and states its frame. **Q2.** (a) Values → responsibility → practices → outcomes. (b) Outcomes feed back into values: success builds support and strengthens the values that started the work, so the chain runs again. **Q3.** (a) Cleaning up land. (b) Monitoring and counting. (c) Protecting threatened species. (d) Restoring and planting habitat. (e) Building community capacity. **Q4.** (a) Community land stewardship; government park management; conservation management programs; private land protection. (b) A small town in central Victoria, November 1986. (c) The Decade of Landcare Plan, committing \$320 million to the National Landcare Programme. (d) More than 6,000 groups and more than 140,000 volunteers. **Q5.** (a) 1971. (b) About 50. (c) Zoos Victoria, at Healesville Sanctuary. (d) Beyond Yellingbo, about 85 farms. (e) Fewer than 200. **Q6.** (a) The Parks Victoria Act 2018; any one statistic, e.g. more than 4 million hectares of public land and water. (b) 62%. (c) A voluntary, legal agreement that permanently protects the natural values of a block of private land; it is written into the land's title, so it applies to future owners too. (d) More than 1,500 landholders; more than 119,000 hectares permanently protected. **Q7–Q10.** Answers vary (see solutions). **E1.** Answers vary.

Fully-worked solutions

Q1. (a) In this section, *custodial responsibility* means **the responsibility to care for a place or part of the environment, keep it healthy, and pass it on to future generations**. (b) *Custodial* is a **contested** word: people use it in different ways, and the meaning you pick can change your conclusion. Defining it up front means everyone is arguing about the same idea — and because the meaning depends on whose responsibility we mean, every claim also names the custodian and the place or species.

Q2. (a) Values → responsibility → practices → outcomes. (b) Outcomes feed back into values: when the care works — habitat restored, a species count rising — success builds support and strengthens the values that started the work, so people take on more responsibility and the chain runs again. That feedback is what makes it a loop rather than a line.

Q3. (a) Cleaning up land. (b) Monitoring and counting. (c) Protecting threatened species. (d) Restoring and planting habitat. (e) Building community capacity.

Q4. (a) Community land stewardship; government park management; conservation management programs; private land protection. (b) A small town in central Victoria, in November 1986, through an initiative of Joan Kirner and Heather Mitchell. (c) The Decade of Landcare Plan, committing \$320 million to the National Landcare Programme. (d) More than 6,000 groups and more than 140,000 volunteers.

Q5. (a) 1971. (b) About 50 birds. (c) Zoos Victoria, at Healesville Sanctuary. (d) The Beyond Yellingbo project, on about 85 private farms. (e) Fewer than 200.

Q6. (a) The *Parks Victoria Act 2018*; for example, more than 100 million visits a year. (b) 62%. (c) A conservation covenant is a voluntary, legal agreement that permanently protects the natural values of a block of private land; it is permanent because it is written into the land's title, so it applies to future owners too. (d) More than 1,500 private landholders as partners, and more than 119,000 hectares of habitat permanently protected.

Q7. Values: Victorians chose the helmeted honeyeater as their bird emblem in 1971 — the species officially matters to them. **Responsibility:** when the wild population fell to about 50 birds by 1989, people felt they had to act; the Friends of the Helmeted Honeyeater formed at a public meeting on 23 May 1989, and the recovery program began later that year. **Practices:** conservation breeding at Healesville Sanctuary, releases, monitoring, and — from 2017 — habitat planting on about 85 private farms through Beyond Yellingbo. **Outcomes:** released birds add to the wild sites and new habitat is being planted, but fewer than 200 birds remain in the wild. **Feedback:** that low count is itself the feedback link — the outcome strengthens the duty and keeps the program running, and it pushed the work beyond the park and onto private farms. All four steps and the loop appear in one case.

Q8. Similarity: both approaches begin with values and rely on voluntary commitment rather than command. Landcare gives the movement's more than 140,000 volunteers giving their time to local land, and a covenant is defined as a

voluntary agreement — in each, the custodian chooses the duty. Difference: what makes the duty stick, and for how long. A covenant is legal and permanent — written into the land’s title so it binds future owners — whereas a Landcare group’s commitment is community-based and lasts only as long as volunteers keep turning up. Both are custodial; one is carried by law, the other by habit of care.

Q9. The claim gets the facts backwards. Figure 9 shows that 62% of Victoria’s land is privately owned, so most nature sits outside any park; that 78% of the native vegetation on that private land is rare or threatened, so the rarest nature is mostly outside the fence; and that only about 1% of native grassland remains, with fewer than 1,000 Plains-wanderers left — loss that happened largely on land no park covers. Figure 8 adds that the parks carry more than 100 million visits a year, so even inside the fence the values need active care, not just a line on a map. A custodial approach that stopped at the park fence would leave out the majority of the very nature it exists to protect — which is why covenants, and partnerships like Beyond Yellingbo’s work on about 85 private farms, extend the duty past it.

Q10. A landholder signs because covenanting is a values choice: the bush on their property matters enough to protect forever, and writing the promise into the title means the care outlives them — a future owner cannot simply clear it. The landholder also keeps owning and using the land, and joins a network of more than 1,500 landholders whose trust checks the land is cared for. The public gains habitat no government park would ever reach: with 62% of Victoria privately owned and 78% of the private native vegetation rare or threatened, those 119,000+ protected hectares are often the only permanent protection that nature has. Voluntary duty can be stronger than forced rule, because the carer chose it.

E1 (model). *Custodial responsibility means holding nature in trust for people not yet born. The strongest case against setting more land aside is this: set-aside land is land no longer available for farming, housing and jobs — real costs for real communities — and fences alone do not protect nature without money for care; voluntary covenants may protect more, faster, with less conflict. Even so, I support setting more land aside where the evidence is strongest. Only about 1% of Victoria’s native grassland remains and fewer than 1,000 Plains-wanderers survive, so for those habitats loss has already gone too far to trust to goodwill alone. The helmeted honeyeater shows why long-term, law-backed care works: a recovery program has run since 1989 and still counts every bird. Setting land aside — done with fairness and funded — is how this generation passes its share on.*

Teaching sequence (teacher)

1. **Hook (5 min):** ask “who is responsible for the creek near us — and for how long?” Collect answers on the board; sort them by *who* and *for how long*. Announce: today we study custodial responsibility — care held in trust.
2. **Direct teaching (10 min):** Figure 1 — a contested word, a fixed definition, three steps, and the rule for reading every claim (name the custodian and the place or species). Figure 2 — the four-step chain and its feedback loop.
3. **Practices (5 min):** Figure 3 — the five care practices. Run Q3 as a pair warm-up and check the sorts.
4. **The approaches map (5 min):** Figure 4 — four families of approaches at different scales; tell students each case that follows hangs on this map, and that no single custodian does it all.
5. **Cases 1 and 2 (15 min):** Figure 5 (Landcare — stress the Victorian origin and the scale jump to national and global), then Figures 6–7 (the honeyeater case as the worked test of the Figure 2 loop). Students attempt Q4 and Q5 in pairs.
6. **Cases 3 and 4 (10 min):** Figures 8–9. Teach Worked example 1 (reading a source’s own words through the definition) and Worked example 2 (using numbers to justify an approach). Students attempt Q6.
7. **Debate (10 min):** Figure 10 — steelman and the three criteria; set E1. Remind students: marks reward reasoning, not the conclusion.
8. **Check for understanding:** exit card — “one approach, one Victorian case, one number, and which step of the definition (held in trust / duty of care / protected and passed on) it shows.”

This section teaches the neutral conceptual core of VC2HG10K12 only. All four elaborations (VC2HG10K12.E01 – .E04) are excluded entire per the §2A record in the TOC, and no Aboriginal and Torres Strait Islander content is taught anywhere in this section, in line with Content Policy Rule 1 and the notice at the front of the book.

Sources (retrieved 25 August 2026 unless stated)

- Landcare Australia — ‘About us’ and ‘Origins of Landcare’ pages: more than 6,000 groups and more than 140,000 volunteers; the launch of the word *landcare* in central Victoria in November 1986 (Joan Kirner and Heather Mitchell); the first official Dunecare groups, January 1988, New South Wales mid-north coast; the national launch at Wentworth NSW on 20 July 1989, the Decade of Landcare Plan and the \$320 million commitment to the National Landcare Programme; Landcare Australia established 1989; take-up in more than 20 countries. Bob Hawke quotation from the Wentworth launch.
- Zoos Victoria — ‘Helmeted Honeyeater’ (Healesville Sanctuary): Victoria’s bird emblem chosen 1971; critically endangered subspecies of the yellow-tufted honeyeater, about 20 cm; the wild population fallen to about 50 birds by 1989; the recovery program and conservation breeding beginning in 1989; releases supplementing wild sites; ongoing monitoring; fewer than 200 birds remaining in the wild.
- Friends of the Helmeted Honeyeater Inc — formed at a public meeting on 23 May 1989; Yellingbo Nature Conservation Area about 50 km east of Melbourne; the bird’s streamside swamp-forest range in the Yarra Valley; the threat list (loss of habitat to agriculture as primary, drought, bushfire, climate change, competition); the Beyond Yellingbo project from 2017 across about 85 private properties with local Landcare groups.
- Parks Victoria — ‘About us’: statutory authority under the *Parks Victoria Act 2018*; more than 4 million hectares of public land and water; more than 100 million visits a year; more than 4,300 native plant species; around 1,000 native animal species; more than 1,000 staff at over 100 locations; role statement quoted (normalised to Australian spelling).
- Trust for Nature — covenant definition (voluntary, legal, permanent, written into the land’s title); more than 1,500 landholders; more than 119,000 hectares permanently protected; 62% of Victoria privately owned; 78% of the native vegetation on private land rare or threatened; about 1% of native grassland remaining; fewer than 1,000 Plains-wanderers.

All figures in this section are drawn from primitives for this workbook; no publisher’s map or diagram has been traced or copied.

Worldviews: how beliefs about nature shape support for sustainability

Theory

What is an environmental worldview?

Everyone carries a picture in their head of how the world works and what matters in it. Geographers call that picture a **worldview**: the set of beliefs and values a person uses to make sense of the world. An **environmental worldview** is the part of that picture about the environment — what nature is for, what it is worth, and what place humans have in it. The Victorian Curriculum uses this term (and the names *human-centred*, *eco-centred* and *Earth-centred*) without defining it, so this section states the working definitions it uses; other courses may draw the lines a little differently, and that is part of what makes the topic worth studying.

Why does this matter for sustainability? Section 3A defined **sustainability** as using what we need today in a way that leaves future generations able to meet their needs too. But whether a person *backs* (supports) actions that protect the environment depends on what they believe the environment is for. Two people can read the same facts about a river, a forest or the climate and reach different conclusions, because they bring different worldviews to the facts.

Three families of environmental worldview (E01)

The curriculum names three families of environmental worldview. Figure 1 states each in its strongest form.

Three families of environmental worldview			
Worldview	Core belief	Values most	Approaches it tends to support
HUMAN-CENTRED	Humans are the most important part of the environment; nature is a resource to use for human benefit.	Human wellbeing: food, jobs, energy, wealth and living standards.	Use resources efficiently; fix problems with technology and better management; weigh costs and benefits to people.
ECO-CENTRED	All living things and ecosystems have value; humans are one part of nature, not above it.	Balance: human needs met while ecosystems stay healthy.	Manage use so ecosystems keep working; repair damage done; share resources with other species (e.g. water set aside for rivers).
EARTH-CENTRED	The Earth and its life-support systems come first and must be protected, even at large cost to human convenience.	Health of the whole Earth system, now and into the future.	Protect first: keep wild places wild, avoid new damage rather than fix it later, and cut human impacts back to what the Earth can absorb.

These are families, not boxes: most people hold a blend, and the blend can shift from issue to issue.

Figure 1 Three families of environmental worldview. The curriculum names these three families but does not define them; the working definitions above are this section's. Each is stated in its strongest form — reasonable people hold each for good reasons.

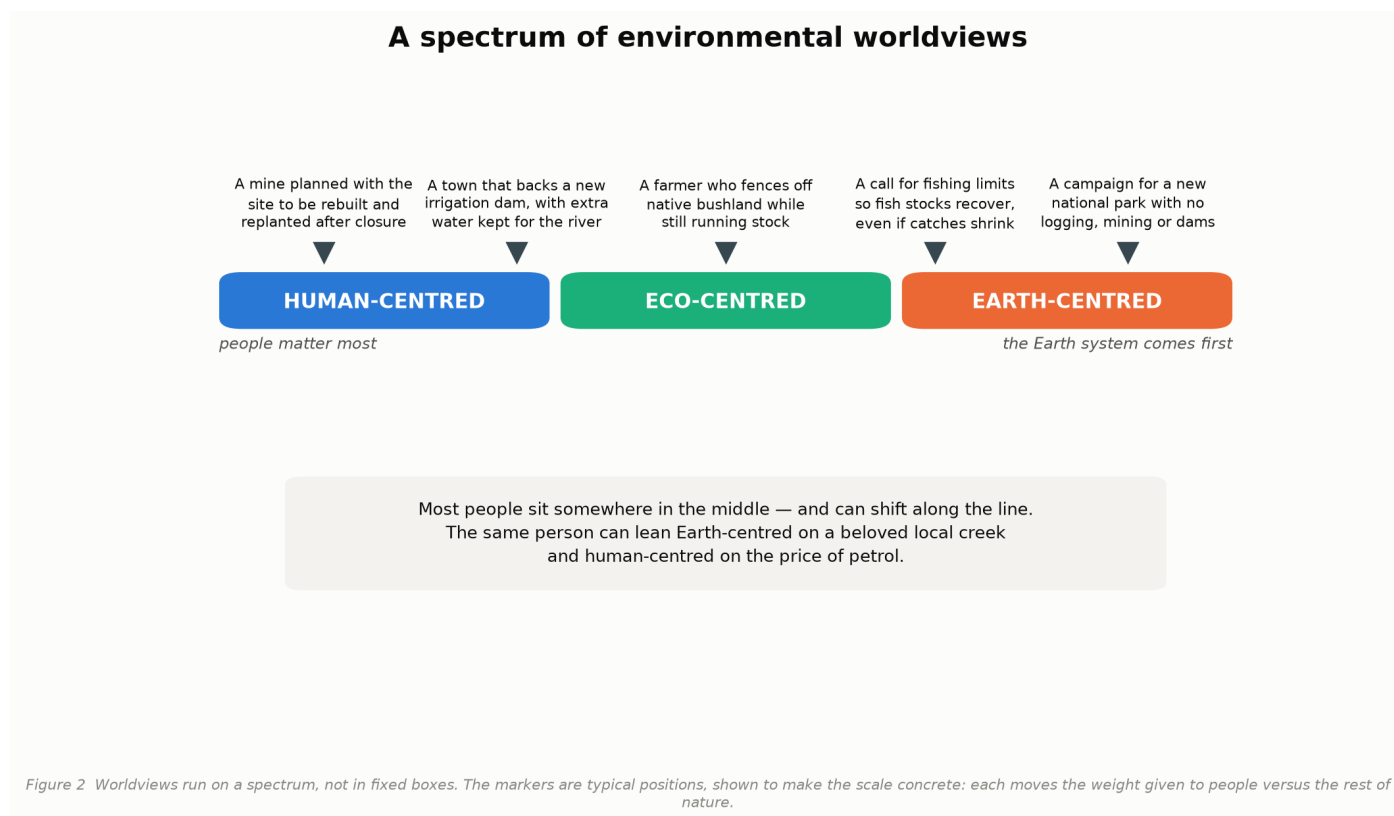
Table of three families of environmental worldview: human-centred, eco-centred and Earth-centred, each with its core belief, what it values most, and the management approaches it tends to support

Each family rests on a belief people hold for good reasons:

- **Human-centred.** The strongest case for this view is that human needs are real and pressing: food, homes, jobs and energy for billions of people. Nature supplies them. On this view, the sensible path is to use resources well, fix problems with better technology and management, and weigh costs and benefits to people.

- **Eco-centred.** The strongest case here is that everything is joined up: clean water, pollination of crops and healthy fish stocks are gifts of working ecosystems, so harming ecosystems harms people too. The sensible path is balance — meet human needs while keeping ecosystems healthy, and repair damage that has been done.
- **Earth-centred.** The strongest case for this view is that life-support systems cannot be rebuilt once lost: no technology restores a vanished species or a broken climate. The sensible path is to protect first, avoid new damage rather than promise to fix it later, and cut human impacts back to what the Earth can absorb.

No family has a monopoly on care for the future, and each has a blind spot. A human-centred view can downplay harm until it is too late; an eco-centred view still has to choose between competing needs when balance is impossible; an Earth-centred view can ask for sacrifices that real communities — mining towns, for example — carry unevenly. Most people hold a blend, as Figure 2 shows.



A spectrum of environmental worldviews from human-centred through eco-centred to Earth-centred, with five example positions marked along the line and a note that most people sit in the middle and can shift

From worldview to support (E01)

Figure 3 is a model of how a worldview becomes support for (or opposition to) environmental sustainability. A **worldview** shapes an **attitude** — what you count as a problem worth fixing. The attitude shapes an **approach** — which methods of management seem right. The approach shapes which **policies and programs** you support.

How a worldview becomes support (or opposition)

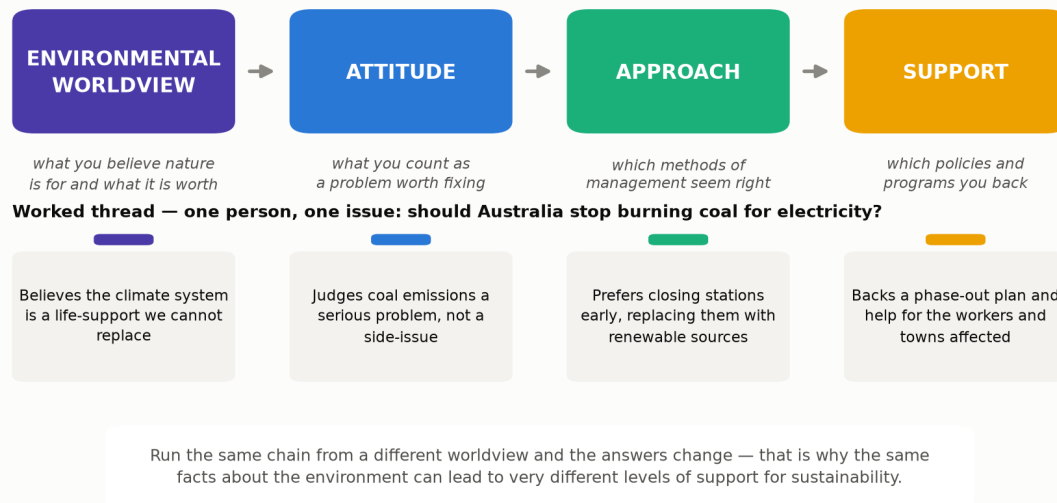


Figure 3 A model of how worldviews shape support for environmental sustainability. The thread is illustrative: real people mix beliefs, and the same worldview can reach different answers on different issues.

Flow model in four steps: environmental worldview, attitude, approach, support; with a worked thread about closing coal-fired power stations running under the four steps

The model explains a pattern you will see all through this section: the same facts, different support. If your worldview puts the climate system first, coal's emissions look like a serious problem and an early phase-out looks like the right method. If your worldview puts regional jobs and power prices first, the same closure looks like a threat, and slower change looks wiser. Neither person is failing to think; they start from different beliefs about what matters most.

One change, two readings: the Snowy Mountains Scheme

A real example makes the model concrete. The **Snowy Mountains Scheme** is a government project in the Australian Alps that began in 1949. Its authority was set up by law on 7 July 1949, the first blast was fired at Adaminaby on 17 October 1949, and the works were finished in 1974 at a cost of \$820 million, built by more than 100,000 workers from over 30 countries. Sixteen major dams and seven power stations, joined by 145 km of tunnels and 80 km of channels, collect the headwaters of the Snowy, Eucumbene and Murrumbidgee rivers and turn them west through the mountains. There the falling water makes **hydro-electricity** (electricity from water spun through machines called turbines), and the water then runs into the Murray and Murrumbidgee rivers to water inland farms — a use called **irrigation**.

The Snowy Mountains Scheme — a reshaped river system (schematic, not to scale)

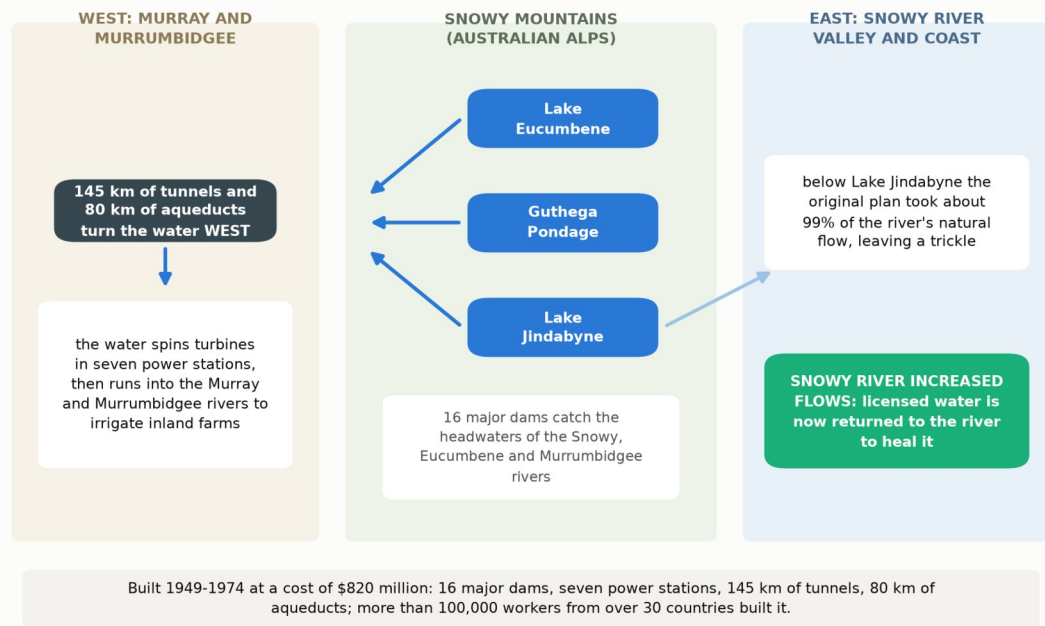


Figure 4 The Snowy Mountains Scheme (Snowy Hydro Limited, snowyhydro.com.au; Wikipedia, 'Snowy Mountains Scheme'; retrieved 25 August 2026). Schematic only — positions not to scale. The same engineering is celebrated as nation-building and criticised for starving the river: what you see depends on the worldview you bring.

Schematic diagram of the Snowy Mountains Scheme: dams in the Australian Alps send water west through tunnels to power stations and irrigation rivers, while the Snowy River east of the mountains was left with very little flow until licensed environmental water began returning to it

Run this change through the Figure 3 model and it splits in two. A human-centred reading sees nation-building: electricity for industry, water for farms and towns, and a point of pride celebrated at the time. An eco-centred or Earth-centred reading sees harm: below Lake Jindabyne the original plan took about 99% of the Snowy River's natural flow, leaving a trickle where a river had run, with native fish and river life the losers. Both readings are about the same dams and tunnels.

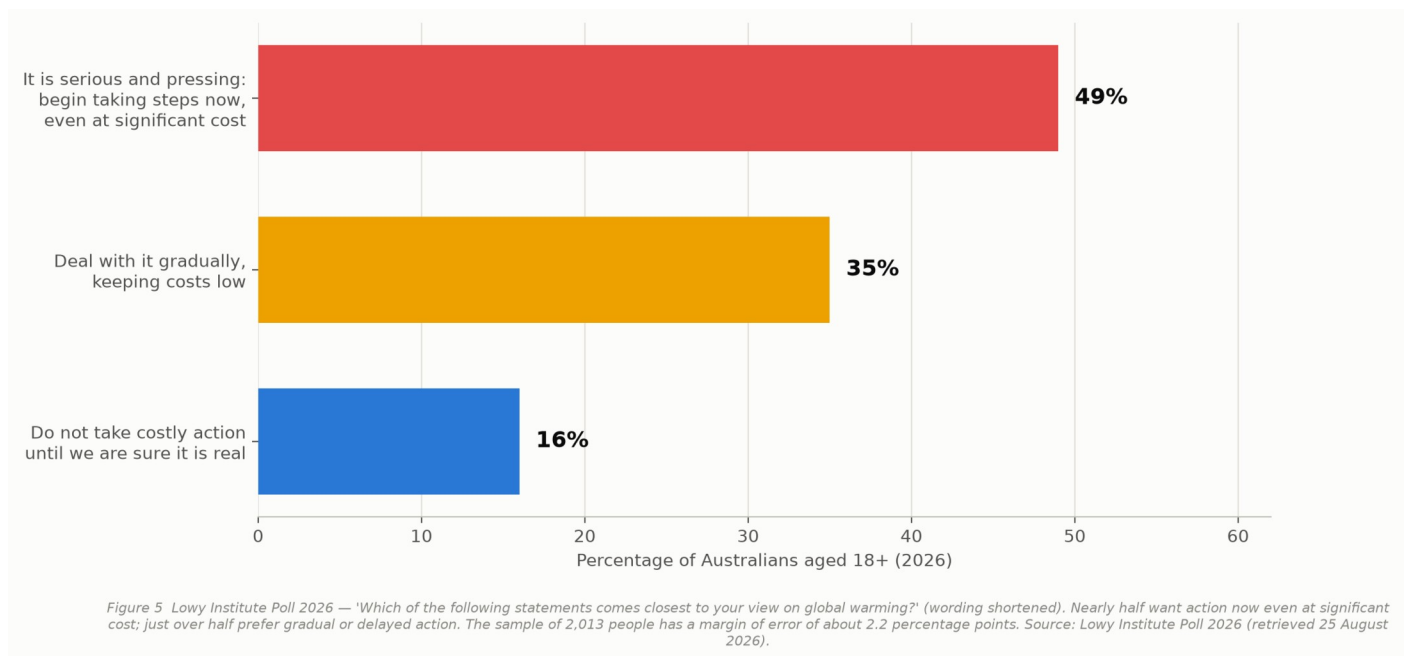
The management response shows worldviews negotiating. After decades of argument — including a formal inquiry into the river's water that began in January 1998 — a licence now sets aside **environmental flows**: water released back into the river to keep it working. The Snowy River Increased Flows return licensed water to the river while the farms still get their agreed share. Who gets how much water is a decision about values, not just about plumbing.

What Australians think: causes and responses (E02)

Do Australians agree about environmental issues? Yes, in part. In *Climate of the Nation 2023*, a national survey by the Australia Institute (2,089 adults surveyed 16–23 June 2023), 77% of Australians said climate change is happening, 12% said it is not, and 11% said they did not know. A **survey** asks a **sample** — a smaller group chosen to stand for the whole population — and a **margin of error** says how far the true whole-population figure might sit from the sample's figure.

Where people disagree is about how serious the problem is and what to do. In the same 2023 survey, 30% of Australians agreed that the seriousness of climate change is exaggerated, while 52% disagreed. Agreement also varies with age and place: 92% of 18–24-year-olds said climate change is happening, against 67% of those 65 and over; and 74% of city dwellers were concerned, against 66% in regional areas.

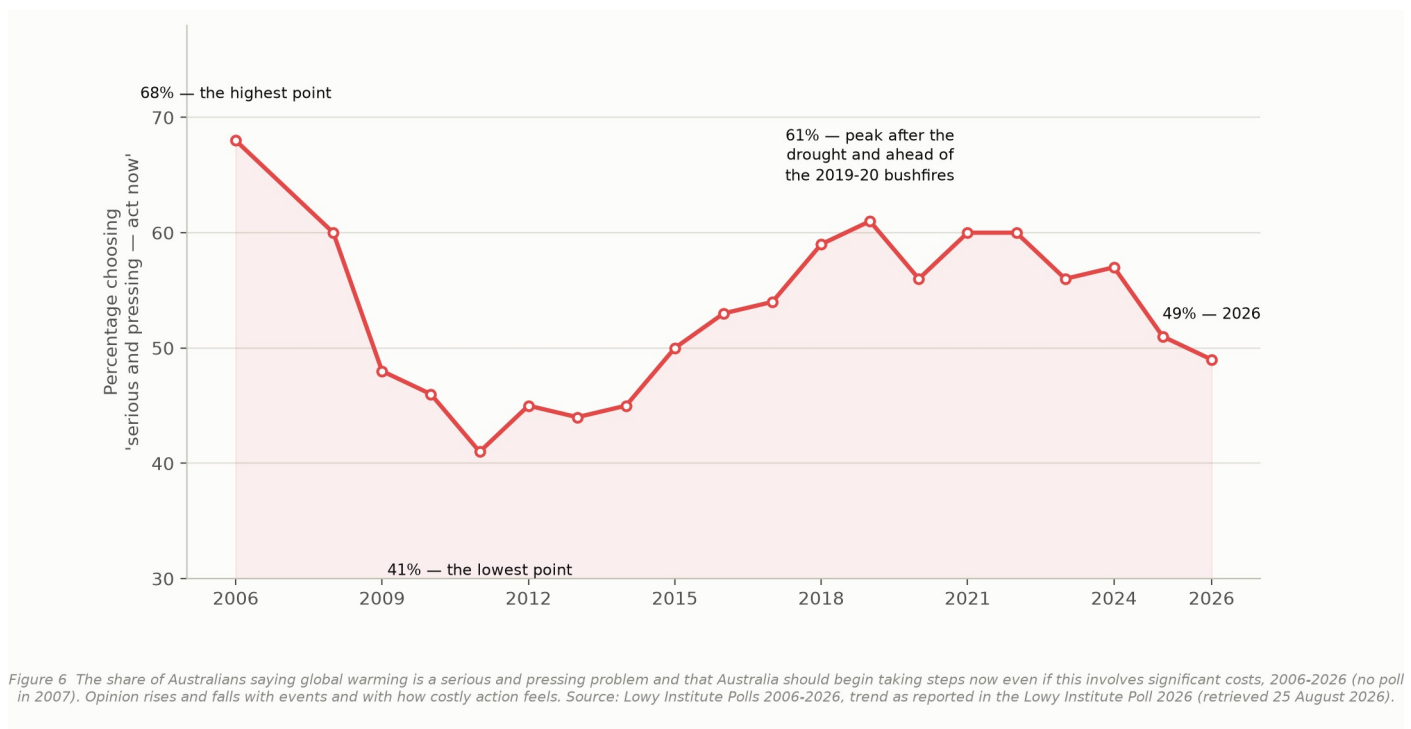
The Lowy Institute Poll 2026 (2,013 adults, surveyed 2–15 March 2026, margin of error about 2.2 percentage points) asks Australians to pick the statement closest to their view of global warming.



Bar chart of the Lowy Institute Poll 2026 three options: 49% say it is serious and pressing and to begin steps now even at significant cost, 35% say deal with it gradually keeping costs low, 16% say do not take costly action until sure it is real

Read the three bars as three worldviews at work. The largest group wants action now even at significant cost; a slightly larger group combined ($35\% + 16\% = 51\%$) wants cheaper, slower, or no action. Steelmanning both sides: people who want action now point to impacts already being felt — bushfires, droughts, floods and food prices. People who want a gradual path are not anti-environment: many are weighing real costs against real incomes, regional jobs, and whether one country's spending matters if others do not act. A fair discussion holds both views in their strongest form.

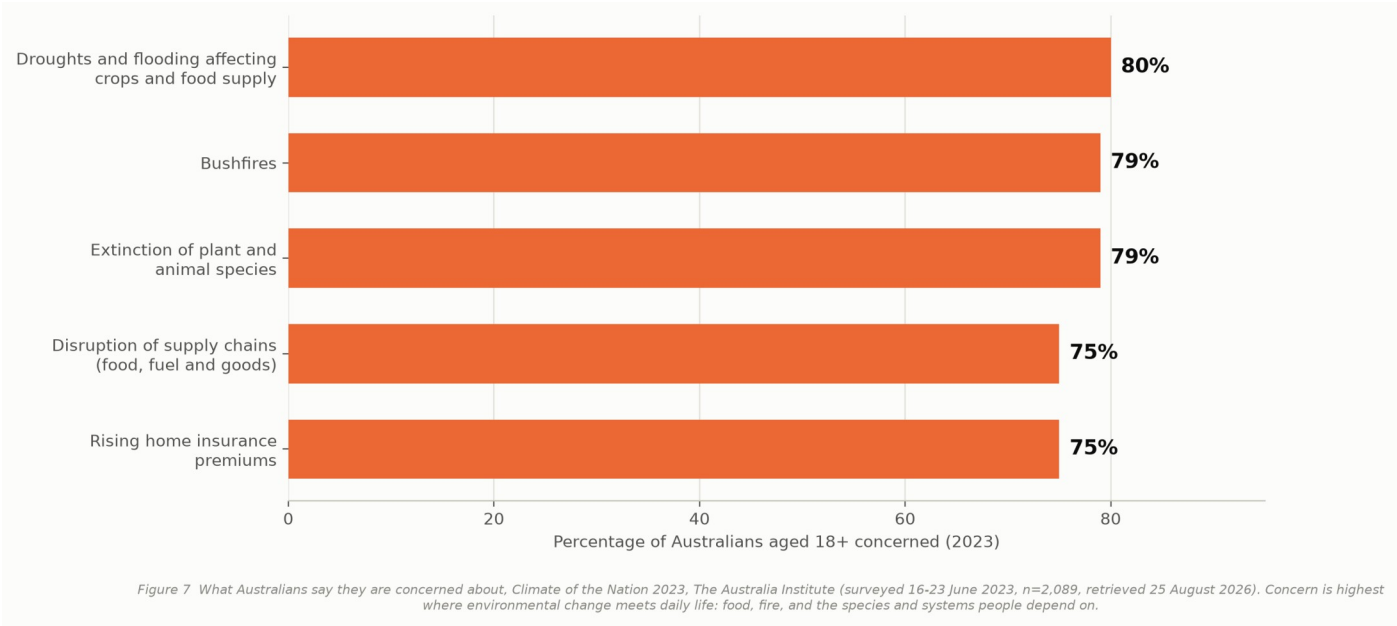
The same poll has asked this question since 2006, and the answers move with the times.



Line graph of the share of Australians choosing 'serious and pressing — act now', 2006 to 2026: starting at 68% in 2006, falling to 41% in 2011, peaking at 61% in 2019 after the drought and ahead of the 2019–20 bushfires, and easing to 49% by 2026

Support for urgent action rose into the drought years and the 2019–20 bushfire season, and has eased as the cost of living has risen. Worldviews are quite stable, but the weight people give them shifts with what else is happening in their lives.

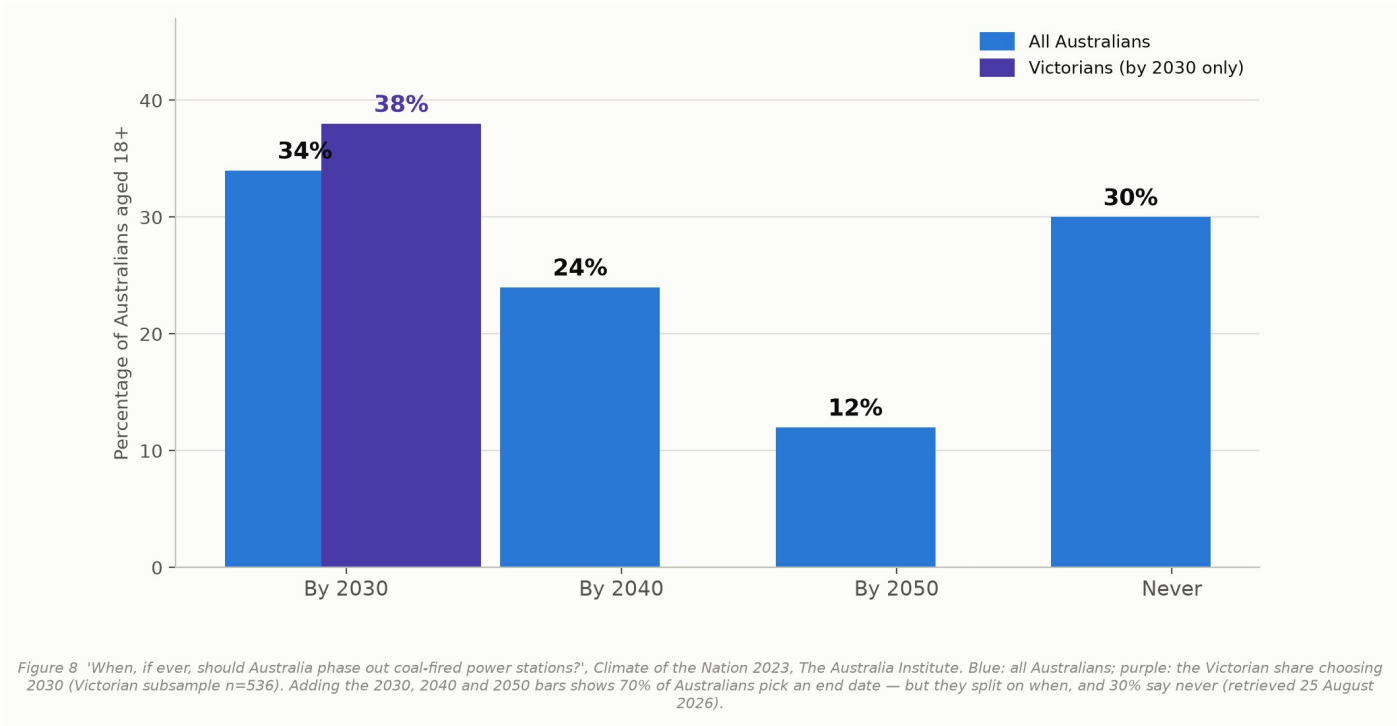
And what are Australians concerned about? The 2023 survey shows concern is strongest where environmental change meets daily life.



Bar chart of top concerns in Climate of the Nation 2023: droughts and flooding affecting crops and food supply 80%, bushfires 79%, extinction of plant and animal species 79%, disruption of supply chains 75%, rising home insurance costs 75%

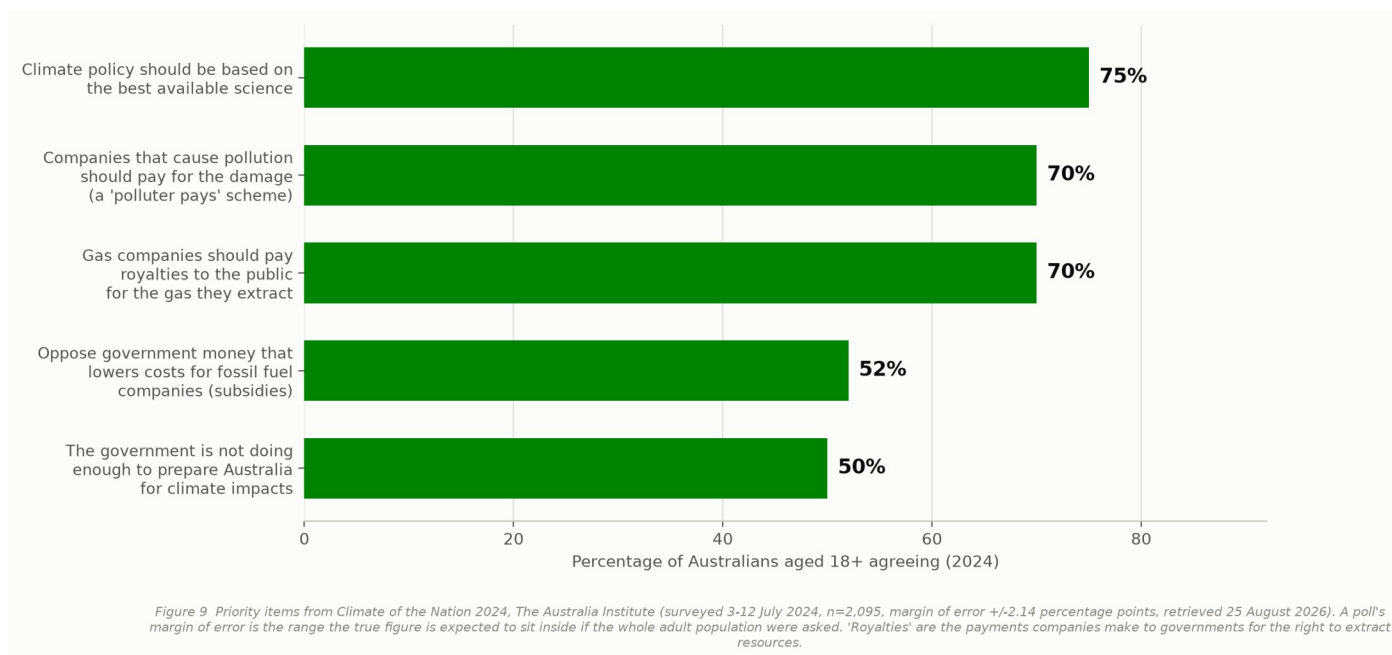
How much priority do Australians give environmental programs? (E03)

Priority means how high something sits in the list of things a person wants governments to act on and spend on. The surveys suggest environmental programs sit high for most Australians, but not at any price. In the 2023 survey, 70% of Australians chose some end date for coal-fired power stations (34% by 2030, 24% by 2040, 12% by 2050), while 30% said never; Victorians were slightly keener on 2030 (38%).



Bar chart: when Australia should end coal-fired power — by 2030: 34% of all Australians and 38% of Victorians; by 2040: 24%; by 2050: 12%; never: 30%

Climate of the Nation 2024 (2,095 adults, surveyed 3–12 July 2024, margin of error ± 2.14 percentage points) asked what Australians want environmental policy to do.



Bar chart of Climate of the Nation 2024: 75% say climate policy should be based on the best available science; 70% back a polluter pays scheme; 70% say gas companies should pay royalties; 52% oppose subsidies to fossil fuel companies; 50% say the government is not doing enough to prepare

Three terms in that chart need defining. A **polluter pays** scheme makes companies that cause pollution pay for the damage. **Royalties** are the payments companies make to governments for the right to dig out resources such as gas. **Subsidies** are government payments that lower costs for an industry — here, for fossil fuel companies. On all three, a clear majority of Australians backs the environmental side. So does a majority back the idea, in line with the International Energy Agency's pathway, that Australia should approve no new coal or gas projects (55% in the 2023 survey).

Support also meets an economic test. The Lowy Institute Poll 2026 asked whether Australia would be better or worse off if it reached net zero emissions by 2050 — that is, cut its greenhouse gas releases (gases such as carbon dioxide from burning fossil fuels) to balance what is absorbed: 38% said better off, 38% said worse off, and 22% said no difference. An even split like this is a worldview signal: the same target looks like opportunity to one person and like a cost to another. Australia's law — the *Climate Change Act 2022* — sets a target of cutting emissions 43% below 2005 levels by 2030; whether voters keep supporting that target is exactly the question this section studies.

Is environmental change necessarily a problem? (E04)

The short answer is no — and Figure 10 shows why.

Is environmental change necessarily a problem?			
The change (real, dated)	Seen as progress by	Seen as harm by	The management question
SNOWY MOUNTAINS SCHEME, 1949-1974: rivers dammed and turned west	Nation-building: electricity and irrigation water for inland farms and towns; a point of pride, celebrated in its own time.	The Snowy River's flow was cut to a trickle below Jindabyne; native fish and river life suffered.	How much water should be returned to the river without wrecking the farms that rely on it?
CANE TOADS, introduced to Queensland in 1935 to eat cane beetles	Few today: an introduced animal meant to help farming that escaped control and spread across northern Australia.	Its toxins kill native predators that try to eat it; it is now counted among Australia's worst introduced species.	How do you slow a pest that has already spread across a continent?
COAL-FIRED POWER STATIONS closing and being replaced	Cleaner air, fewer greenhouse gas emissions, and new industries in renewable energy.	Coal towns lose jobs and income; some households fear higher or less reliable power in the changeover.	How fast to close, and who helps the workers and towns adjust?
ENVIRONMENTAL FLOWS: licensed water returned to rivers (e.g. Snowy River)	Rivers recover: fish and birdlife come back; the river keeps working for everyone later.	Less water is left for irrigation and power in dry years; some farmers carry the cost of the repair.	How much is enough, and how is it shared in drought?

Figure 10 The same pattern repeats: whether a change counts as a 'problem' depends on who is judging, what they value, and who pays the costs. The worldviews of Section 3D explain why the judgements split the way they do.

Table of four real changes — the Snowy Mountains Scheme 1949–1974, cane toads introduced in 1935, coal-fired power stations closing, and environmental flows returned to rivers — with columns for how each is seen as progress, how it is seen as harm, and the management question it raises

Four patterns stand out:

1. **Some change is chosen and celebrated.** The Snowy Scheme was environmental change on a huge scale — dammed and redirected rivers — and its builders saw progress, not a problem.
2. **Some change is chosen and later regretted.** Cane toads were **introduced** to Queensland in 1935 to eat the beetles damaging cane crops; an introduced species is one brought to a place it did not come from. The toads spread across northern Australia, their poisons kill native animals that try to eat them, and almost everyone now counts them as a problem.
3. **The same change can be both, depending on the worldview.** Closing coal-fired power stations is cleaner air and fewer emissions to one person, and lost jobs and dearer power to another.
4. **A repair can also be contested.** Returning environmental flows heals the river, but in a dry year it is water a farm no longer has.

Whether a change counts as a problem is a judgement, and the judgement runs on the worldview model of Figure 3. So do the methods people choose. Human-centred thinking tends to pick engineering and technology: build, manage, adapt. Eco-centred thinking tends to pick repair and balance: environmental flows, replanting, limits on use. Earth-centred thinking tends to pick prevention: reserves where nothing is taken, and no new damage approved. Most real programs mix methods — the Snowy licence mixes engineering with environmental flows — because most real decisions have to carry more than one worldview at once.

Section 3E returns to these worldviews when it debates how to manage a selected environmental issue; the families defined here are the ones that debate uses.

Worked examples

Example 1 — scaffolded (E01)

Question: Use the Figure 3 model to compare how two people read the same change: Australia closing its coal-fired power stations. Complete one row of the model for each person.

Step	Person A	Person B
Worldview	Believes the climate system is a life-support that cannot be replaced (Earth-centred leaning).	Believes nature is a resource to use well, and regional jobs and power prices matter most (human-centred leaning).
Attitude	Counts coal's emissions as a serious problem.	Counts lost jobs and unreliable or dearer power as the serious problem.
Approach	Close stations early; build renewable energy — energy from sources that renew themselves, such as sun and wind.	Keep stations running while replacements are built; fix emissions with technology where possible.
Support	Backs a fast phase-out and the 2030 target.	Backs a slower path and help for coal towns first.

Answer: Both rows run the same four-step model and both people are reasoning, not ignoring, the facts. Person A's Earth-centred weighting makes emissions the problem and speed the right method; Person B's human-centred weighting makes jobs and prices the problem and care the right method. The difference in support for sustainability flows from the difference in worldview — which is exactly what E01 asks you to describe.

Example 2 — unscaffolded (E04)

Question: “The Snowy Mountains Scheme was an environmental problem.” Discuss this claim, using Figure 4 and at least two dated facts.

Model answer (what a strong one looks like): Whether the claim is true depends on the worldview doing the judging, which is E04's point. On a human-centred reading the Scheme was progress: built 1949–1974, it gave inland farms irrigation water and gave the grid hydro-electricity, and more than 100,000 workers from over 30 countries helped build a project the nation celebrated. On an eco-centred reading it was a problem: below Lake Jindabyne the original plan took about 99% of the Snowy River's natural flow, leaving a trickle and harming native fish and river life. A strong response also notes that the country's own judgement changed over time: the inquiry that began in January 1998 and today's licensed environmental flows (the Snowy River Increased Flows) show Australians deciding the river needed healing — an answer that mixes engineering with repair. So the Scheme was not *necessarily* a problem: it was a problem to the river, a benefit to the farms, and the management question ever since has been how much water each gets.

Practice questions

Scaffolded

Q1. In your own words, define (a) *worldview* and (b) *environmental worldview* as this section uses them.

Q2. Look at the Figure 1 table. (a) Which family values “balance: human needs met while ecosystems stay healthy”? (b) Which family says protect first, even at large cost to human convenience? (c) Give one management approach the eco-centred family tends to support.

Q3. Look at the Figure 2 spectrum. Place each statement on the line (human-centred end, middle, Earth-centred end): (a) “Build the dam, but keep extra water for the river”; (b) “No logging, mining or dams in the new national park”; (c) “Rebuild and replant the mine site after closure”.

Q4. Look at the Figure 5 chart. (a) What share of Australians in 2026 wanted action now even at significant cost? (b) Add the other two options. (c) What does that total tell you about agreement on climate action?

Q5. Look at the Figure 7 chart. (a) Name the top concern and its percentage. (b) Which two concerns sit at 79%? (c) In one sentence, what do the top five concerns have in common?

Q6. Look at the Figure 8 chart. (a) What is the most popular single end date for coal-fired power, and its national share? (b) How many percentage points higher is the Victorian share for 2030? (c) What share says never?

Unscaffolded

Q7. Using the Figure 3 model, explain how the same person can lean Earth-centred on one issue and human-centred on another. Give your own two-issue example (not the petrol one from Figure 2).

Q8. E02 asks you to compare differences in people’s views. Using the Figure 5 and Figure 6 charts, state one thing most Australians agree on and one thing they split on, and give a steelman (strongest-form) reason for each side of the split.

Q9. “Australians give environmental programs a high priority, but not at any price.” Support or challenge this claim with two dated figures from this section (E03).

Q10. E04: is environmental change necessarily a problem? Use the cane toad and one other row of the Figure 10 table to discuss, and name the management question each row raises.

Inquiry task

A class survey of environmental priorities (E03). Run a short survey in your class, then compare your class with the national surveys.

- Write four survey questions that mirror this section’s national questions, for example: “Should Australia end coal-fired power by 2030, later, or never?” and “Is climate change a serious and pressing problem, a gradual problem, or not a real problem?” Keep questions anonymous and voluntary — people may pass.
 - Survey your whole class and record the counts. Calculate each option’s share as a percentage of the class.
 - Represent your class results in one divided bar graph or set of bars, drawn with a title, labelled axes and a source line (“Class 9..., [date]”). Compare your bars with Figures 5 and 8: which option did your class rank higher or lower than the national sample, and by how many percentage points?
 - Write 4–6 lines explaining two reasons your class share might differ from the national share. Think about sample size, age (the national surveys ask adults 18+), place, and margin of error. Cite one national source by name with its retrieval date.
-

Answers

Q1. (a) A worldview is the set of beliefs and values a person uses to make sense of the world. (b) An environmental worldview is the part of that picture about the environment: what nature is for, what it is worth, and humans' place in it. **Q2.** (a) Eco-centred; (b) Earth-centred; (c) any one, e.g. setting water aside for rivers. **Q3.** (a) Middle; (b) Earth-centred end; (c) Human-centred end. **Q4.** (a) 49%; (b) $35\% + 16\% = 51\%$; (c) a bare majority prefers cheaper, slower or no action — the country splits on pace and cost, not on the facts alone. **Q5.** (a) Droughts and flooding affecting crops and food supply, 80%; (b) bushfires, and extinction of plant and animal species; (c) all five are where environmental change meets daily life: food, fire, species and costs people pay. **Q6.** (a) By 2030, 34%; (b) 4 points ($38\% - 34\%$); (c) 30%. **Q7.** Any two-issue example with a clear shift, e.g. Earth-centred on a beloved local creek (no dumping, restore banks) and human-centred on fuel prices (keep petrol cheap for the family budget); the blend is the point. **Q8.** Agreement: most Australians accept climate change is real and are concerned (77% in 2023 saying it is happening; 49–68% choosing “serious and pressing” across the years). Split: pace and cost (49% act now vs 51% gradual/unsure in 2026). Steelman: act-now — impacts already felt in bushfires, droughts, floods and food prices; gradual — real incomes, regional jobs, and doubts about one country acting alone. **Q9.** Support: 70% want a coal end date; 70–75% back polluter pays, gas royalties and science-based policy (2024). Not at any price: 30% say never to a coal end date; only 49% want action now even at significant cost (2026); net zero by 2050 splits 38/38. **Q10.** Cane toads: change almost everyone counts as a problem now, though it began as a chosen fix; management question: slowing a pest that has spread across a continent. Any other row with its question, e.g. Snowy: progress to farms, harm to the river; how much water to return without breaking the farms.

Fully-worked solutions

Q1. (a) A worldview is the picture a person carries of how the world works and what matters in it — the beliefs and values used to make sense of events. (b) An environmental worldview is that picture applied to the environment: what nature is for, what it is worth, and what place humans have in it. The section treats worldviews as families (human-centred, eco-centred, Earth-centred) that most people blend.

Q2. (a) The eco-centred family. (b) The Earth-centred family. (c) Any approach from its column, for example sharing resources with other species by setting water aside for rivers.

Q3. (a) Middle (eco-centred) — the dam proceeds but the river keeps extra water. (b) Earth-centred end — protection first, no taking. (c) Human-centred end — use the resource, then repair the site for people and nature afterwards.

Q4. (a) 49%. (b) $35\% + 16\% = 51\%$. (c) Just over half of Australians prefer gradual, cheap or no action, so the national conversation is a genuine split about pace and cost between people who mostly accept the same facts.

Q5. (a) Droughts and flooding affecting crops and food supply, at 80%. (b) Bushfires and extinction of plant and animal species, both 79%. (c) Each concern joins environmental change to something people eat, fear, love or pay for — concern tracks where change touches daily life.

Q6. (a) By 2030, at 34% of all Australians. (b) $38\% - 34\% = 4$ percentage points higher in Victoria. (c) 30% say never.

Q7. The model says a worldview sets the weighting a person brings to each issue, and people carry more than one weighting. A person may insist a local creek be protected and restored (Earth-centred: the creek cannot be replaced) yet oppose raising fuel prices because the family budget and a relative's transport job come first (human-centred). The blend shifting from issue to issue is normal, which is why surveys show the same population concerned and cost-cautious at once.

Q8. Agreement: across both surveys most Australians accept that climate change is happening (77% in Climate of the Nation 2023) and most years a majority has called it serious and pressing (Figure 6, 2006–2026). Split: in the Lowy Institute Poll 2026, 49% choose act-now against 51% choosing gradual or wait-and-see. Steelman of act-now: impacts are already being felt — bushfires, droughts, floods, food and insurance costs — so delay loads more cost onto later generations. Steelman of gradual: households face a real cost of living, regional jobs depend on fossil fuel industries, and one country's spending achieves little if large emitters do not move; therefore pace costs to what families can carry.

Q9. The claim is well supported. High priority: 70% of Australians chose an end date for coal-fired power (2023); in 2024, 75% said policy should follow the best available science and 70% backed both polluter pays and gas royalties. Not at any price: 30% would never end coal power (2023); only 49% would act now even at significant cost (2026); and net zero by 2050 splits 38% better-off against 38% worse-off (2026). Australians want environmental programs, and they weigh the bill.

Q10. No — Figure 10's four rows show four kinds of judgement. The cane toad began as a chosen fix (beetle control for cane farms, 1935) and became a change almost everyone now counts as a problem: the toads spread across northern Australia and their poisons kill native animals; its management question is how to slow a pest already spread across a continent. The Snowy Scheme shows the opposite split: progress (irrigation water, hydro-electricity, national pride, 1949–1974) and harm (about 99% of the river's flow taken below Jindabyne) at the same time; its management question is how much water to return to the river without breaking the farms. Whether change counts as a problem is a judgement made by a worldview, and the method chosen (engineering, repair, prevention) follows that judgement.

Inquiry task (a)–(d). Answers will vary. A strong response: (a) four clear questions mirroring the national ones, anonymous and voluntary; (b) counts recorded and converted to percentages of the class; (c) one well-drawn bar representation with title, labelled axes and a source line, plus a correct percentage-point comparison against Figures 5 and 8; (d) two reasons drawn from sample size (a class of about 25 is far smaller than a national sample of about 2,000, so one person moves a class result about 4 points), age (classmates are 14–15, not the 18+ adults the national surveys ask), place, and margin of error; one national source cited by name with its retrieval date.

Sources (real, checkable referents; all retrieved 25 August 2026): The Australia Institute, Climate of the Nation 2023 (YouGov Galaxy online survey, 16–23 June 2023, n=2,089 Australians 18+, Victorian subsample n=536; published 13 September 2023) — 77/12/11 belief split, 92% vs 67% by age, 74% vs 66% city/regional concern, 30% exaggerated vs 52%, top concerns 80/79/79/75/75, 55% no new coal or gas projects, 66% coal phase-out plan, coal end-date split 34/24/12/30 with Victoria 38%; The Australia Institute, Climate of the Nation 2024 (survey 3–12 July 2024, n=2,095, margin of error ± 2.14 percentage points; published 29 November 2024) — 75% best-science policy, 70% polluter pays, 70% gas royalties, 52% oppose subsidies, 50% not doing enough; Lowy Institute, Lowy Institute Poll 2026 (2,013 Australians 18+, 2–15 March 2026, Social Research Centre Life in Australia panel, margin of error about 2.2 percentage points) — 49/35/16 three-way split, 2006–2026 trend (68, 60, 48, 46, 41, 45, 44, 45, 50, 53, 54, 59, 61, 56, 60, 60, 56, 57, 51, 49), net zero 38/38/22, and the Climate Change Act 2022 target of 43% below 2005 by 2030; Snowy Hydro Limited, snowyhydro.com.au — Scheme authority set up 7 July 1949, first blast Adamina 17 October 1949, completed 1974, \$820 million, 16 major dams, seven power stations, 80 km of aqueducts, 145 km of tunnels, 100,000+ workers from 30+ countries, Snowy Water Licence and Snowy River Increased Flows; Wikipedia, 'Snowy Mountains Scheme' — original plan diverted about 99% of the Snowy River's natural flow below Lake Jindabyne; Snowy Water Inquiry begun January 1998; Australian Museum, 'Cane Toad' — introduced to Queensland 1935, spread and toxin impacts. All figures are original diagrams drawn for this section; the Snowy schematic is not to scale.

Managing one environmental issue: strategies and evaluation

Theory

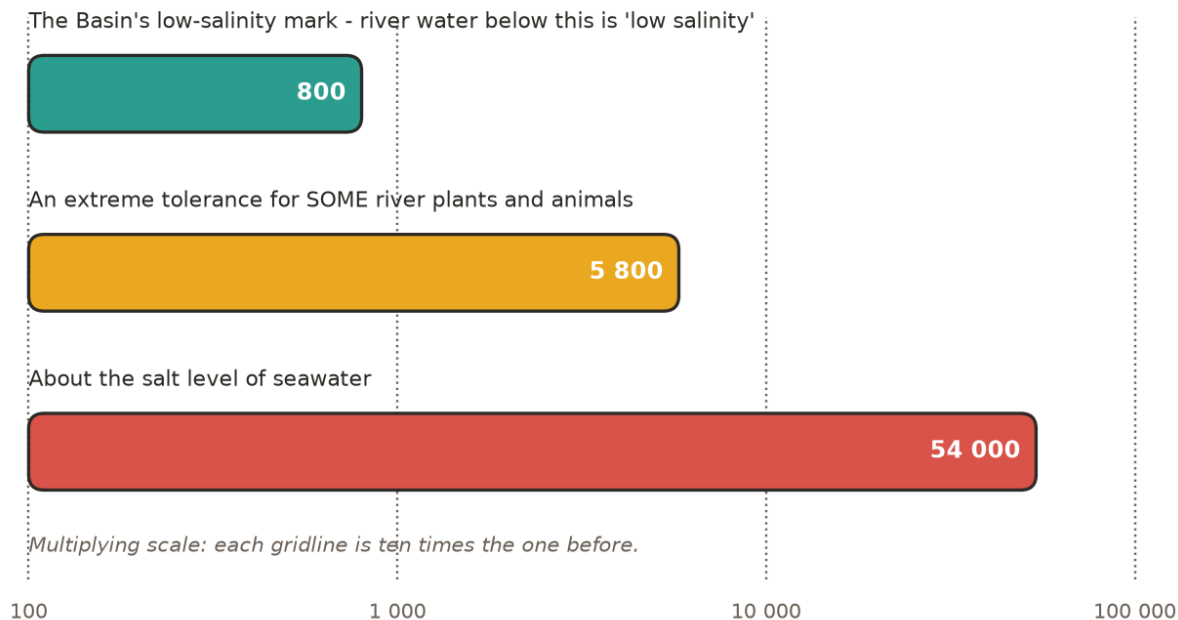
The issue returns: what is at stake, now and later (E01)

Section 3B selected **salinity** in northern Victoria as this book's case-study environmental issue, and Section 3E keeps the same issue. The definition carries over: salinity is the amount of salt in soil, groundwater or river water, and it becomes a problem when salt builds up where it causes harm. Section 3B explained how the salt got there — clearing and irrigation lifted the watertable, and capillary action brought stored salt to the surface. This section asks the next question: *what can be done about it, and how do geographers judge whether a response is any good?*

Managing salinity matters because the harms are serious and they are projected to grow. According to the Murray–Darling Basin Authority (MDBA), salinity degrades water quality, hinders plant growth, reduces biodiversity and farm production, and leaves poorer-quality water for people to drink. During the **Millennium drought** (2001–2009), very low flows left salt concentrated in the rivers, and unique environments across the Basin were badly damaged by extreme salt levels. The MDBA also warns that salinity is **forecast to keep rising** over time, so management is not a job with a finish line. To see why, it helps to know how salt is measured.

Salinity is measured as **electrical conductivity (EC)** — how easily water carries a tiny electric current. Saltier water carries current more easily, so a higher EC means saltier water. Across the Basin, EC is reported in **microsiemens per centimetre ($\mu\text{S}/\text{cm}$)**. The MDBA treats river water below **800 $\mu\text{S}/\text{cm}$** as low salinity; some river plants and animals can tolerate more, generally up to an extreme of about **5,800 $\mu\text{S}/\text{cm}$** ; seawater, for comparison, sits at about **54,000 $\mu\text{S}/\text{cm}$** . These marks give managers (and students) a scale to judge against.

How salty is salty? EC thresholds (microsiemens per cm, $\mu\text{S}/\text{cm}$)



Values: Murray-Darling Basin Authority, 'Salinity' (last updated 27 June 2025, retrieved 26 August 2026).

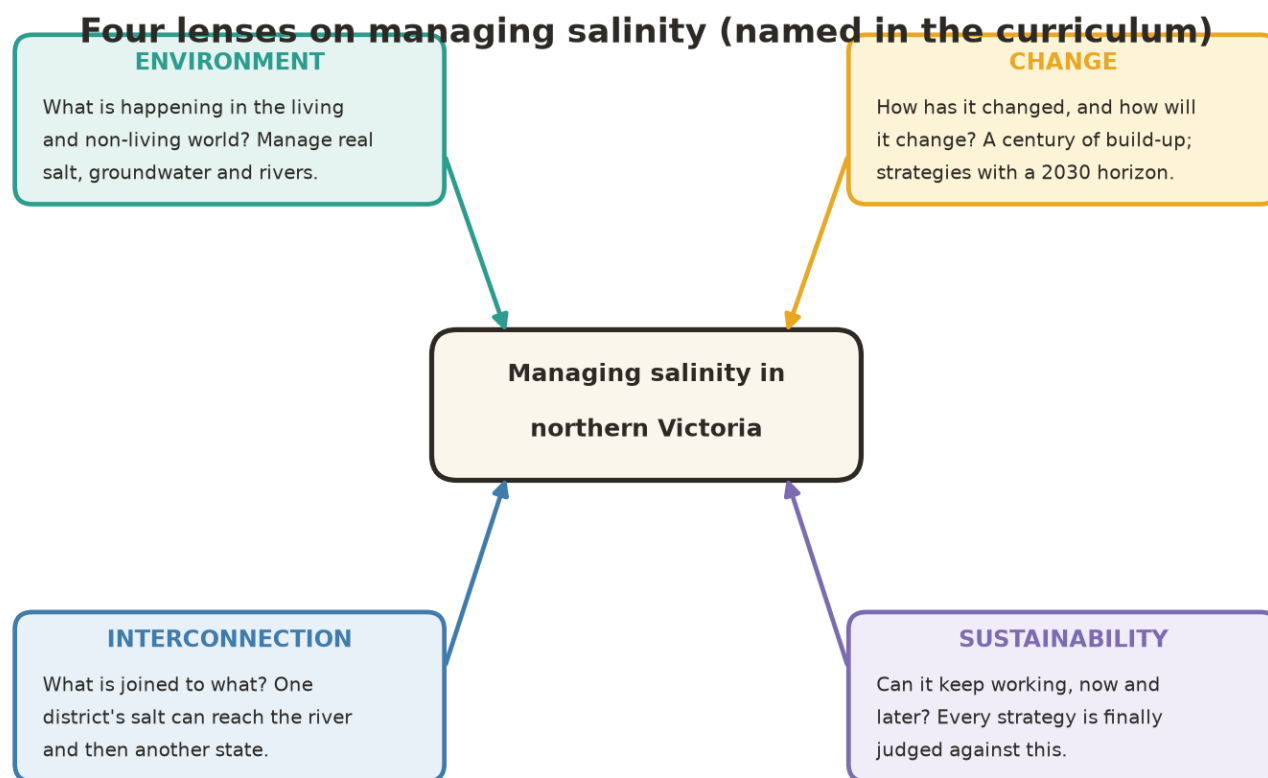
Three horizontal bars on a multiplying scale comparing salt levels in microsiemens per centimetre: 800, the Murray–Darling Basin Authority's low-salinity mark; 5 800, an extreme tolerance for some river plants and animals; and 54 000, about the salt level of seawater

Two further facts from Section 3B frame everything below. First, salt in the river crosses state borders: irrigation salinity around Mildura and Kerang becomes a water problem for South Australia downstream. Second, salt can only *leave* the river system through the **Murray Mouth**, south-east of Goolwa in South Australia — according to the

MDBA, releasing water to dilute the salt and flush it out to sea can happen nowhere else. When the river runs low, the mouth risks silting shut; it has been dredged for years at a time (2002–2010, resumed 2015–2016, and again from November 2023) at a cost of about \$3–6 million a year, which Wikipedia’s ‘Murray Mouth’ article records. Managing salinity is therefore also managing flows.

The geographical approach: four lenses on management

A geographical approach to management thinks with concepts. Section 3B used seven geographical concepts as lenses on causes; for management, the curriculum names four concepts to think with — **environment**, **change**, **interconnection** and **sustainability**. Each lens asks a different question of the same problem.



A management plan that answers all four questions is the 'geographical approach' of this section.

Four lens tiles — environment, change, interconnection, sustainability — set around a hub labelled “managing salinity in northern Victoria”, each tile giving the question its lens asks of a management plan

- **Environment** asks *what is happening in the living and non-living world?* Management must deal with real salt, real groundwater and real rivers — the schemes below pump, drain, dilute and replant.
- **Change** asks *how has this changed, and how will it change?* Salinity built up over about a century; the response has changed too, from local fixes to a basin-wide strategy with a 2030 horizon.
- **Interconnection** asks *what is joined to what?* Salt that rises in one district can reach the river and then another state. Managing one patch without the whole river in mind treats a symptom, not the system.
- **Sustainability** asks *can this keep working, now and later?* Section 3A’s definition carries over: using what we need today in a way that leaves future generations able to meet their needs too. Every strategy below is finally judged against it.

Proposing strategies: management sorted by idea (E02)

E02 asks students to **propose management strategies based on geographical concepts**. The curriculum’s own examples group strategies into families: *spatial* strategies decide **where** things happen (the curriculum’s example is reserves and corridors to protect biodiversity); *environmental* strategies work **with living systems** (its examples are ecosystem-based management and choosing environmental over engineering solutions); and **interconnected thinking** addresses underlying and immediate causes together. Engineering strategies — building works that hold, move or remove water — round out the kit. Figure 3 sorts real salinity strategies into these families.

Managing salinity: strategies sorted by the geographical idea

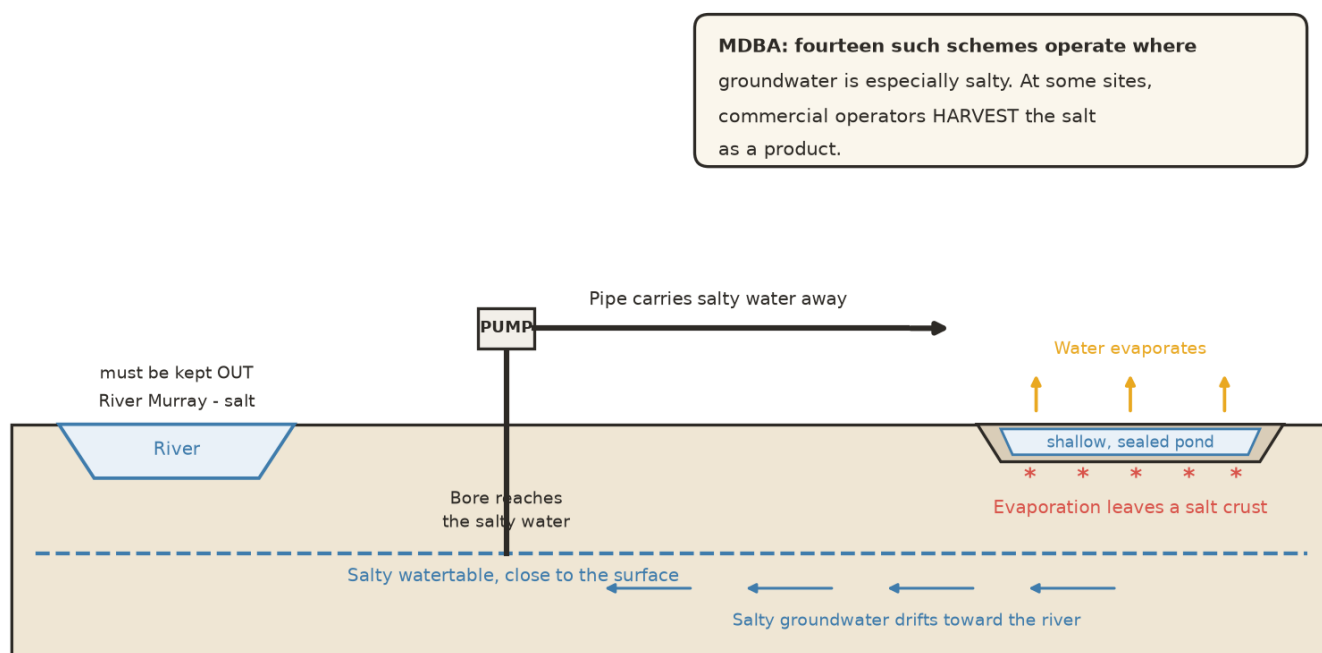
Approach	The geographical idea	A real Basin example	How it helps
SPATIAL	Decide WHERE built works go	Fourteen interception schemes sited where groundwater is especially salty; evaporation basins placed on land that can be given up to salt (MDBA).	Salt is caught near where it enters the river.
SPATIAL	Decide WHERE new development goes	Steer new irrigation away from land where the watertable is already rising, so no new water is added where salt is already discharging.	New recharge is kept off the worst ground.
ENGINEERING	Pump the salty water AWAY	Interception pumps and pipes send salty groundwater to evaporation basins; deep open drains, pumps and siphons on discharge land (MDBA; 'Dryland salinity').	Salty groundwater is kept out of the river.
ENGINEERING	Reduce seepage and waste	Better farming and irrigation practice so less water (and salt) seeps or washes into rivers (MDBA).	Less water soaks down to lift the watertable.
ENVIRONMENTAL	Work WITH living systems	Stop clearing deep-rooted plants; replant eucalypts and salt-tolerant species; alley farming; keep ground covered in winter and spring ('Dryland salinity').	Recharge is cut at its source and soil is held.
INTERCONNECTED	Treat cause AND symptom; track joins	The MDBA's salinity credits and debits register; under BSM2030 environmental water and salinity targets sit in one plan (MDBA).	The whole Basin is managed as one joined system.

Sources: MDBA, 'Salinity' and 'Basin Salinity Management 2030'; Wikipedia, 'Dryland salinity' (all retrieved 26 August 2026).

Table of salinity management strategies sorted by the geographical idea — spatial, engineering, environmental, interconnected — with a real Basin example and how each strategy helps

Engineering: pump the salt away. The clearest built response is a **salt interception scheme** — *interception* here means catching salty groundwater before it reaches the river. Pumps draw the salty water up from the ground and send it through pipes to **evaporation basins** — shallow, sealed ponds where the water evaporates and the salt stays behind as a crust. According to the MDBA, fourteen such schemes operate at places in the Basin where the groundwater is especially salty, and at some of them commercial operators harvest the salt as a product. Three of the fourteen sit in Victoria — **Mildura–Merbein, Barr Creek** (a drainage scheme) and **Pyramid Creek**, the two nearest to the case-study wetlands around Kerang — and a fourth, **Mallee Cliffs**, sits just across the border in New South Wales, near the Victorian Mallee.

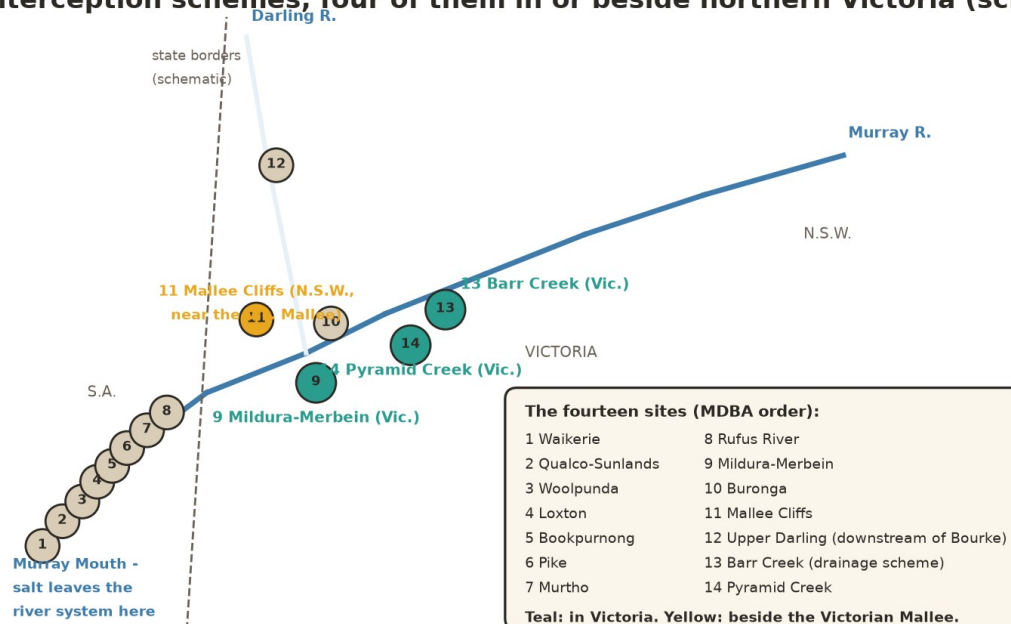
How a salt interception scheme works (schematic - not to scale)



Model drawn for this workbook from MDBA, 'Salinity' (updated 27 June 2025, retrieved 26 August 2026). Not to scale.

Schematic labelled cross-section of a salt interception scheme: a pump and pipe lift salty groundwater away from a river and into an evaporation basin, where evaporation leaves a salt crust; a note records that some schemes harvest the salt

Fourteen salt interception schemes, four of them in or beside northern Victoria (schematic)



Schematic map drawn for this workbook - not to scale; positions approximate. Site list: MDBA, 'Salinity' (retrieved 26 August 2026).

Schematic map, not to scale, of the fourteen salt interception scheme sites along the Murray and Darling rivers, with the four sites in or beside northern Victoria highlighted and named: Mildura–Merbein, Mallee Cliffs, Barr Creek and Pyramid Creek

Environmental: work with living systems. The watertable rose because shallow-rooted crops replaced deep-rooted native plants (Section 3B). The environmental answer runs the film backwards: minimise **recharge** — the water soaking down past roots to the groundwater. According to the research summarised in Wikipedia's 'Dryland salinity' article, options include stopping the removal of deep-rooted plants, replanting deep-rooted species such as eucalypts

and salt-tolerant plants, planting wide-spaced rows of trees with crops between them (**alley farming**), and keeping ground covered with living plants in winter and spring. In **discharge** areas — where the salty watertable is already close to the surface and salt is being discharged to the land — salt-tolerant plants can hold the soil and use the salty water, alongside drains and pumps where needed.

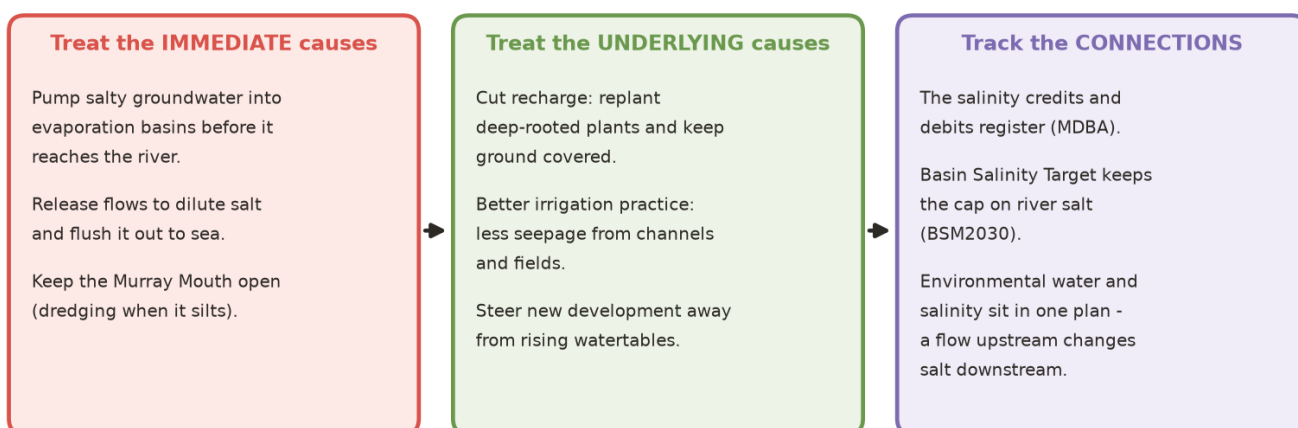
Spatial: decide where things go. Both engineering and environmental strategies have a where. Interception schemes are placed on purpose where the groundwater is saltiest and closest to the river, and evaporation basins need land that can be given up to salt. Recharge control is also spatial: it matters most uphill of the salty patches, where water soaks in, while discharge care belongs on the salty patches themselves. Spatial planning can also steer new development away from land where watertables are rising — deciding where irrigation may expand is a management choice about place, not just about water.

Interconnected: track the joins. Because salt moves through one connected system, the MDBA keeps a **register of salinity credits and debits**: actions that add salt to the river (debits) are tracked against actions that remove or prevent salt (credits), so management across the whole Basin can be balanced and checked. The register is interconnected thinking made into a tool — no district can claim its salt problem stops at its border.

Holistic thinking in management (E03)

E03 asks how **holistic (interconnected) thinking** helps identify causes and impacts. In management it makes one demand above all: treat the **immediate** and the **underlying** causes *together*. Pumping salty groundwater treats the symptom now; lowering the watertable by cutting recharge treats the cause over decades. Either one alone is incomplete — pumping without recharge control is bailing water forever, and replanting alone leaves today's salt still flowing to the river.

Managing salinity needs all three: symptoms, causes and connections



How to read this web (holistic thinking):

1. Pumping alone bails water forever - it treats the symptom, not the cause.
2. Replanting alone takes decades - today's salt still reaches the river.
3. The register stops any district pushing its salt problem downstream.

Facts from this section's sources (MDBA; Section 3B). Interconnected thinking per VC2HG10K14.E03.

Three-column management web: treating immediate causes (pumping, flushing, keeping the Murray Mouth open), treating underlying causes (recharge control, better irrigation), and tracking connections (the salinity credits and debits register, basin-wide rules), with a note on why all three are needed together

The 2012 Basin Plan and the strategies under it run on the same logic: water released for the environment and water managed for salinity are connected in one plan, because a flow decision made upstream changes the salt level downstream.

Judging with sustainability (E04)

E04 asks students to **judge how significant an environmental change is, using the idea of sustainability**. *Criteria* — the tests a judgement is measured against — are the three pillars Section 3A used: environmental, economic and social. A strategy can score well on one pillar and badly on another, which is why the evaluation must name all three.

The sustainability table: judge the change and each strategy three ways

Change / strategy	ENVIRONMENTAL	ECONOMIC	SOCIAL
SALINITY ITSELF (the change)	FAIL shrinks the source and services functions	FAIL harms farm production	FAIL poorer drinking water; sick rivers
Salt interception schemes	MIXED protects rivers, but basins take land	MIXED pumps cost power to run; salt sales give some back	STRONG keeps town and recreation water fit
Better irrigation practice	STRONG less seepage, so the watertable stops rising	MIXED costs money to install	STRONG saves water for crops and towns
Recharge control by replanting	STRONG cuts recharge at its source	SLOW income falls while the trees grow	MIXED changes how farms earn, but heals land for later

First: salinity itself fails all three pillars. Second: no strategy passes every pillar cleanly.

Judgements follow the body of this section; the three pillars are Section 3A's sustainability criteria (VC2HG10K14.E04).

Sustainability table: the salinity change itself and three strategies — salt interception schemes, better irrigation practice, and recharge control by replanting — judged against environmental, economic and social criteria

Two patterns matter. First, salinity itself fails all three pillars: it shrinks the **source** and **services** functions of Section 3A (less production, poorer water and habitat), it loads the **sink** with more salt than rivers can store or flush, and it diminishes the **spiritual** function — a sick river and scalded paddocks in places people love. That is what makes the change significant. Second, no strategy passes every pillar cleanly. Interception schemes protect towns and farms but take land for evaporation basins; better irrigation practice saves water and lowers seepage but costs money to install; replanting heals recharge areas but changes how a farm earns. Sustainability evaluation does not hide those trades — it puts them on the table so the decision is made knowingly.

The worldviews debate (E05)

Strategy choices do not come from facts alone. Section 3D defined an **environmental worldview** as the part of a person's picture of the world about what nature is for and what place humans have in it, and it named three families: **human-centred** (people's needs first), **eco-centred** (balance between people and healthy ecosystems) and **Earth-centred** (protect the Earth system first). Those families are reused here without change — the worldview names and definitions are Section 3D's.

E05 asks students to **debate how environmental worldviews shape positions on environmental issues**. For salinity, one sharp question is:

Should irrigation be allowed to expand in districts where the watertable is already rising?

Figure 8 states each worldview's case in its strongest form, as the house rule on contested terms requires (define contested words such as *should* and *allowed* before arguing; steelman the other side first; marks reward the quality of reasoning, never the conclusion reached).

Three worldviews, one debate: should irrigation expand where the watertable is rising?

HUMAN-CENTRED	ECO-CENTRED	EARTH-CENTRED
Ask: what is best for people? Case: yes, with conditions - expansion brings jobs, food and income to dry regions, and salt can be managed with better irrigation practice and interception schemes. Blind spot: can keep postponing the day the watertable wins.	Ask: what is best for living things and their homes? Case: not yet - rivers and wetlands already carry extra salt from existing irrigation, so hold new development until the present load is under control; harming ecosystems harms people too. Blind spot: must answer what the district earns from now.	Ask: what keeps the whole system healthy for the long run? Case: only if expansion repairs as well as it takes - living soil, deep roots and healthy rivers must still be here in 2030 and beyond. Blind spot: the long view can understate today's jobs and food.

Debate rules (as in Section 3D):

1. Define the contested words (should, allowed) first, then state the OTHER side at its strongest.
2. Give EVIDENCE for every claim - name the source and the date.
3. Judge the argument, never the person.

Worldview definitions per Section 3D; the cases restate this section's fully-worked Q10.

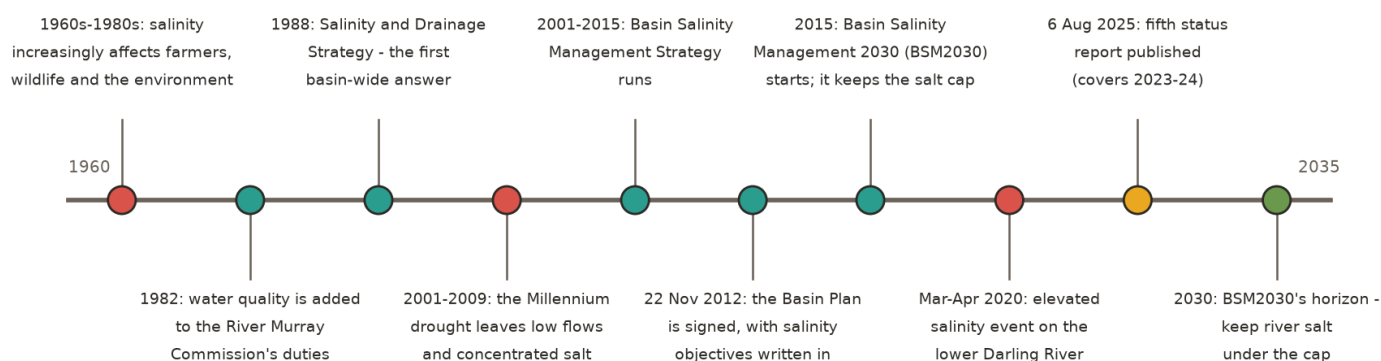
Three worldview panels — human-centred, eco-centred and Earth-centred — each giving its strongest honest case on the question “Should irrigation expand where watertables are already rising?”, plus one blind spot, with debate rules beneath

Notice that all three positions accept the same facts from this section — the rising watertable, the salt in the river, the cost of interception. They differ on what counts as the most important thing to protect. That is the point of the debate: management is where facts and values meet, and geography asks students to see both.

The change lens: managing salinity over time

The change lens turns the story into a timeline. Salinity was noticed as a growing problem from the 1960s to the 1980s; governments first agreed a basin-wide answer in 1988; and management has been re-built in stages since, each strategy building on the last.

Timeline: harm grows first, then management is built in stages



Red = harm. Teal = plans and duties. Yellow = the report card. Green = the horizon ahead.

Dates from this section's sources: MDBA 'Salinity' and 'BSM2030'; Wikipedia 'Murray-Darling Basin Plan' (all retrieved 26 August 2026).

Timeline of salinity management: salinity increasingly affecting farmers, wildlife and the environment from the 1960s to the 1980s; water quality added to the River Murray Commission's duties in 1982; the Salinity and Drainage Strategy of 1988; the Millennium drought 2001–2009; the Basin Salinity Management Strategy 2001–2015; the Basin Plan signed 22 November 2012 with salinity objectives; Basin Salinity Management 2030 starting in 2015; the lower Darling elevated salinity event of March–April 2020; the fifth status report published 6 August 2025; and the 2030 horizon

Three lessons come off the timeline. One: responses arrived **after** the harm was plain — the salinity built by a century of clearing and irrigation forced the first strategy in 1988. Two: management itself changes — the current plan, **Basin Salinity Management 2030 (BSM2030)**, has run since 2015 and keeps the cap on river salinity through a **Basin Salinity Target**, while looking for ways to run interception schemes more cheaply in years when river salt is forecast to be low. Three: the work is continuous — the MDBA reports on salinity status every two years (the fifth status report, covering 2023–24, was published on 6 August 2025), and even in managed years local events still happen: in March–April 2020 the lower Darling River had an elevated salinity event that Basin governments reviewed together.

Skills: measuring and watching salinity

Management runs on data. The table below links the questions a class can ask to the data collected, the skill practised and a real source — the same fieldwork and data spine the Skills chapters use.

A fieldwork and data plan: five questions a class can ask about salinity

QUESTION	DATA COLLECTED	DATA SKILL	WHERE IT COMES FROM
How salty is the water?	EC readings (uS/cm) at several sites along one waterway	Fieldwork: measure, repeat, record	Your own survey; compare with MDBA's 800 uS/cm low-salinity mark
Where are the salt patches?	Positions of discharge land and affected farms	Spatial: map and overlay	State salinity maps; local landholders
How deep is the watertable?	Depth to water in watch bores, month by month	Graph change over time	Farm bores; state government monitoring
How has the district changed?	Old and new maps and aerial photos, side by side	Compare across time	Historical maps; aerial photos
What do people do about it?	Interview or survey answers about the strategies in use	Gather and summarise people's views	MDBA reports; the local water authority

Fieldwork model for this workbook; EC scale per MDBA, 'Salinity' (retrieved 26 August 2026).

Fieldwork table for salinity: five questions — how salty is the water, where are the salt patches, how deep is the watertable, how has the district changed, what do people do about it — each with the data collected, the data skill, and where the data comes from, plus a safety note

EC meters are cheap and safe in school hands, which makes salinity one of the few environmental issues students can measure directly. Comparing a local reading with the MDBA's 800 $\mu\text{S}/\text{cm}$ low-salinity mark is a genuine act of geographical judgement: it turns a number into a statement about place.

Worked examples

Example 1 — scaffolded (strategies, E02)

Question: Four strategies are proposed for a salty irrigation district. Sort each into spatial, engineering, environmental or interconnected, using Figure 3, and give the real example that matches it.

Strategy	Family	Real example from this section
Pump salty groundwater into evaporation basins before it reaches the river.	Engineering	Salt interception schemes; fourteen operate in the Basin, including Mildura–Merbein and Pyramid Creek.
Steer new irrigation away from land where the watertable is rising.	Spatial	Planning where development goes — the “where” decision of spatial strategy.
Replant deep-rooted species and keep ground covered to cut recharge.	Environmental	Alley farming and replanting eucalypts and salt-tolerant species (Wikipedia, ‘Dryland salinity’).
Track salt added and salt prevented across the Basin.	Interconnected	The MDBA's salinity credits and debits register under BSM2030.

Answer: Each strategy belongs to the family whose question it answers. Pumping moves salt with built works (engineering); steering development decides *where* (spatial); replanting works with living systems to lower recharge (environmental); and the register tracks the connections between districts (interconnected). E02 wants proposals in all families, because one family alone cannot manage an issue whose causes are joined.

Example 2 — unscaffolded (evaluation, E04)

Question: How sustainable is the Mildura–Merbein salt interception scheme? Judge it against environmental, economic and social criteria.

Model answer (what a strong one looks like): The Mildura–Merbein scheme is one of fourteen interception schemes the MDBA operates where groundwater is especially salty. Environmentally, it keeps salty groundwater out of the River Murray, so river water stays closer to the 800 $\mu\text{S}/\text{cm}$ low-salinity mark and downstream habitat is protected — but the evaporation basins take land out of other uses and concentrate salt in one place. Economically, the scheme protects the irrigation industries of Mildura and Merbein, and at some Basin sites the harvested salt is sold, which offsets part of the cost; BSM2030 also tries to run schemes more cheaply in years when river salt is forecast to be low. On the social side, the scheme helps keep river water fit for towns to drink and for recreation, which supports the places people value. Against all three pillars the scheme earns its keep — its significance as management is high — with the honest cost that it manages salt rather than stopping the recharge that produces it. That mix is typical: a sustainability evaluation exposes the trade instead of hiding it.

Practice questions

Scaffolded

- Q1.** In your own words, define (a) *salinity* and (b) *electrical conductivity (EC)* as this section uses them.
- Q2.** Look at the thresholds figure. (a) What EC value marks low salinity in the Basin? (b) About how many times saltier is seawater than the extreme-tolerance mark? (c) Why does the figure use a multiplying scale rather than equal steps?
- Q3.** Look at the strategy-sort figure. Match each strategy to its family: (a) planting wide-spaced trees with crops between them; (b) siting evaporation basins on land that can be given up to salt; (c) pumping salty groundwater away from the river; (d) the salinity credits and debits register.
- Q4.** Look at the timeline. Give the year of: (a) the first basin-wide Salinity and Drainage Strategy; (b) the start of Basin Salinity Management 2030; (c) the Basin Plan being signed.
- Q5.** Look at the scheme map. (a) How many salt interception schemes operate in the Basin? (b) Name the schemes in or beside northern Victoria. (c) Where is the only place salt can leave the river system?
- Q6.** Look at the management web. Give one strategy that treats an immediate cause and one that treats an underlying cause, and explain in one sentence why management needs both.

Unscaffolded

- Q7.** Propose one spatial, one engineering and one environmental strategy for managing salinity near Kerang, and for each say how it helps (E02).
- Q8.** Explain how interconnected (holistic) thinking improves salinity management, using the salinity credits and debits register as your example (E03).
- Q9.** “Salinity is a significant environmental change.” Evaluate this claim using the three sustainability criteria — environmental, economic and social — and the four environmental functions from Section 3A (E04).
- Q10.** Steelman both sides of the debate question: *Should irrigation be allowed to expand in districts where the watertable is already rising?* Give the strongest honest human-centred case and the strongest honest eco-centred case, then name one blind spot in each (E05).
-

Inquiry task

Evaluate a strategy, then recommend. Use the strategy-sort figure, the sustainability table and the sources at the end of this section.

- (a) Choose one salinity management strategy from the strategy-sort figure. Name its family (spatial, engineering, environmental or interconnected) and one real example from this section.
 - (b) Build a three-row table evaluating your strategy against the sustainability criteria: environmental, economic and social. Each row needs at least one dated fact or a named source from this section.
 - (c) Predict which worldview family from Section 3D would be most likely to support your strategy and which would question it, and give one reason for each prediction.
 - (d) Write a 6–8 line recommendation: should your strategy be kept, expanded or replaced by another strategy from Figure 3? Use your table as evidence, name the trade you are accepting, and cite one source by name with its retrieval date.
-

Answers

Q1. (a) Salinity: the amount of salt in soil, groundwater or river water; a problem when salt builds up where it harms. (b) EC: how easily water carries a tiny electric current; saltier water carries it more easily, and it is reported in microsiemens per centimetre ($\mu\text{S}/\text{cm}$). **Q2.** (a) $800\ \mu\text{S}/\text{cm}$. (b) $54\ 000 \div 5\ 800 \approx 9.3$ times. (c) Because the values jump by large factors (hundreds, then thousands, then tens of thousands), so equal steps would squash the two smaller bars flat. **Q3.** (a) Environmental; (b) spatial; (c) engineering; (d) interconnected. **Q4.** (a) 1988; (b) 2015; (c) 2012 (22 November). **Q5.** (a) Fourteen. (b) Mildura–Merbein, Mallee Cliffs (across the border in N.S.W., near the Victorian Mallee), Barr Creek and Pyramid Creek. (c) The Murray Mouth, south-east of Goolwa. **Q6.** Immediate: pumping salty groundwater into evaporation basins (or flushing salt to sea; keeping the Murray Mouth open). Underlying: replanting deep-rooted plants or better irrigation to cut recharge. Both, because pumping alone bails water forever while replanting alone leaves today's salt still moving. **Q7.** Any one per family with a “how it helps”, e.g. spatial — steer new irrigation off land with a rising watertable; engineering — a drainage or pumping scheme like Barr Creek or Pyramid Creek; environmental — plant salt-tolerant species on discharge land near the wetlands. **Q8.** Salt added in one district reaches the river and then other states; the register records each district's debits (salt added) and credits (salt prevented), so the whole Basin is managed as one joined system instead of patch by patch. **Q9.** Any answer using all three criteria, e.g. environmental — rivers and wetlands sicken, the sink overloads; economic — farm production falls and towns pay for water treatment; social — drinking water, recreation and loved places degrade. Sustainability falls on every pillar, which is what makes the change significant. **Q10.** Human-centred steelman: expansion brings jobs and food, and better irrigation practice and interception can manage the salt. Eco-centred steelman: the river and wetlands are already carrying extra salt; balance means no new load until the existing one is under control. Blind spots: the human-centred case can postpone the reckoning; the eco-centred case must still say what the district lives on.

Fully-worked solutions

Q1. (a) Salinity is the amount of salt in soil, groundwater or river water; it becomes an issue when salt builds up where it causes harm (Section 3B's definition, kept here). (b) Electrical conductivity (EC) measures how easily water carries a tiny electric current. Saltier water carries current more easily, so EC rises with salt. Across the Basin it is reported in microsiemens per centimetre ($\mu\text{S}/\text{cm}$).

Q2. (a) $800\ \mu\text{S}/\text{cm}$ — the MDBA's low-salinity mark. (b) $54\ 000 \div 5\ 800 \approx 9.3$, so seawater is about nine times saltier than the extreme-tolerance mark. (c) The three values span from hundreds to tens of thousands; on a multiplying scale each step is ten times the last, so all three bars stay visible and comparable.

Q3. (a) Alley farming is an environmental strategy — it works with living plants to cut recharge. (b) Siting basins is spatial — it decides where built works go. (c) Pumping is engineering — built works move the salty water. (d) The register is interconnected — it tracks the joins between districts' actions and the river's salt.

Q4. (a) 1988 — the Salinity and Drainage Strategy, developed by the Basin state governments and the Australian Government. (b) 2015 — BSM2030 has run since 2015 and stays in place to 2030. (c) 2012 — the Basin Plan was signed on 22 November 2012 (Section 3B); it carries basin-wide environmental, water quality and salinity objectives.

Q5. (a) Fourteen schemes, at sites where the groundwater is especially high in salt. (b) Mildura–Merbein; Mallee Cliffs, across the border in N.S.W. near the Victorian Mallee; Barr Creek (a drainage scheme) and Pyramid Creek, both in northern Victoria near Kerang. (c) The Murray Mouth — the MDBA says releasing water to dilute and flush salt out to sea can happen nowhere else.

Q6. Immediate-cause strategies act on the salt already moving: interception pumps, flushing flows to the mouth, keeping the Murray Mouth open. Underlying-cause strategies act on why the salt is moving at all: recharge control by replanting and better irrigation practice. Both are needed because pumping alone treats a symptom forever, while recharge control alone takes decades and leaves the present salt still reaching the river — holistic management holds the two together.

Q7. Near Kerang: (spatial) steer new irrigation development away from land where the watertable is rising, so new water is not added where salt is already being discharged; (engineering) operate a drainage or pumping scheme like the Barr Creek drainage scheme or the Pyramid Creek interception scheme to keep salty groundwater out of the river

and the nearby wetlands; (environmental) plant salt-tolerant species on discharge land and keep recharge land covered with living plants, so the soil is held and less water soaks down. Each helps a different part of the system — which is E02's point.

Q8. Holistic thinking says the parts are joined: salt that rises around an irrigation district enters the river, crosses state borders and becomes downstream water quality. The salinity credits and debits register makes that joining visible — every action that adds salt (a debit) or prevents or removes salt (a credit) is recorded, so management can be balanced across the whole Basin and checked over time. Without the register, each district could treat its patch and pass the cost downstream; with it, the Basin is managed as one connected system.

Q9. Environmental: salinity degrades water quality, hinders plant growth and reduces biodiversity; rivers and wetlands carry more salt than the sink can store or flush, and habitat services weaken. Economic: farm production falls — saline soil grows less — and water for towns and industry costs more to treat. Social: drinking water quality falls, recreation suffers, and places people value (the lakes and birdlife near Kerang, the river at Mildura) diminish. Using Section 3A's functions: the source shrinks, the services weaken, the sink overloads and the spiritual function is diminished. Sustainability therefore falls on all three criteria, which is what makes salinity a significant environmental change rather than a local nuisance.

Q10. Human-centred steelman: people's needs are real — expanding irrigation brings jobs, food and income to dry regions, and salt can be managed with better irrigation practice and interception schemes, so expansion with conditions is the sensible path. Eco-centred steelman: everything is joined — the river and the Ramsar-listed wetlands near Kerang already carry extra salt from existing irrigation, so balance means holding new development until the present load is under control; harming the ecosystem harms people too. Blind spots: the human-centred case can keep postponing the day the watertable wins; the eco-centred case must still answer what the district earns a living from while it waits. Marks reward the reasoning — terms defined, evidence used, limits admitted — not the side chosen.

Inquiry task. Answers will vary. A strong response: (a) one strategy named with its family and real example, e.g. interception pumping (engineering; Mildura–Merbein). (b) Three rows — environmental (keeps salty groundwater out of the river; basins take land and concentrate salt), economic (protects irrigation industries; harvested salt can be sold; BSM2030 looks to run schemes more cheaply when river salt is forecast low), social (drinking water and recreation protected) — each with a dated fact or named source. (c) Worldview predictions with reasons, e.g. human-centred most likely to support a scheme that protects farms and towns; Earth-centred most likely to question any scheme that manages salt without cutting the recharge causing it. (d) A recommendation that names its trade, e.g. keep interception running but pair it with recharge control, because pumping treats the immediate cause while replanting treats the underlying one; one source cited by name with its retrieval date.

Sources (real, checkable referents; all retrieved 26 August 2026): Murray–Darling Basin Authority, 'Salinity' (mdba.gov.au, last updated 27 June 2025) — salinity defined as the concentration of salt in water or soil; impacts on water quality, plant growth, biodiversity, farm production and drinking water; natural salt from weathering rock, rain, wind-blown dust and ancient ocean sediment; human causes (clearing, irrigation, agriculture, urban and industrial use); the Murray Mouth as the only exit for salt; salinity increasingly affecting farmers, wildlife and the environment from the 1960s to the 1980s; the Salinity and Drainage Strategy of 1988; EC measured in $\mu\text{S}/\text{cm}$, low salinity below $800\ \mu\text{S}/\text{cm}$, tolerances generally up to about $5\ 800\ \mu\text{S}/\text{cm}$, seawater about $54\ 000\ \mu\text{S}/\text{cm}$; the Millennium drought (2001–2009) and extreme salt levels; improved farming and irrigation practice and fourteen salt interception schemes with the site list (Mildura–Merbein, Mallee Cliffs, Barr Creek drainage scheme, Pyramid Creek); the salinity credits and debits register and BSM2030 running until 2030. Murray–Darling Basin Authority, 'Basin Salinity Management 2030 — strategies and reports' — salinity forecast to continue to increase; BSM2030 in place since 2015, building on the Basin Salinity Management Strategy (2001–2015); the cap on salinity kept through the Basin Salinity Target; running interception schemes more cheaply when river salinity is forecast to be low; the lower Darling elevated salinity event of March–April 2020; the fifth BSM2030 status report (2023–24) published 6 August 2025. Wikipedia, 'Murray Mouth' — the mouth about 10 km south-east of Goolwa; a closing mouth as a visible sign of over-extraction; dredging October 2002–2010, resumed January 2015 to late 2016, restarted November 2023; dredging cost of about \$3–6 million a year. Wikipedia, 'Dryland salinity' — clearing as little as 25% of a catchment can start salinity; native roots to about 6 m versus shallow cover around 1 m; capillary action bringing salt to the surface; recharge minimised by ceasing removal of deep-rooted plants, replanting eucalypts and salt-tolerant species, alley farming and winter ground cover; discharge areas managed with salt-tolerant plants, deep open drains, pumps and siphons. Wikipedia, 'Murray–Darling Basin Plan' — basin-wide environmental, water

quality and salinity objectives; endorsed 22 November 2012. Continuity from Section 3B's sources (retrieved 25 August 2026): water quality added to the River Murray Commission's duties in 1982; the Basin Plan signed 22 November 2012; Mildura, Red Cliffs and Kerang case-study facts. Worldview families and definitions per Section 3D; environmental functions and the sustainability definition per Section 3A. All figures are original diagrams drawn for this section; the scheme map and cross-section are schematic and not to scale.