

Greeniology 2020

Hot Topics

If we're going to save the planet it helps to understand what's wrong with it in the first place. To follow is a quick guide to our planet's major environmental issues and how they relate to your lifestyle.

We've come out of a century that has seen unparalleled environmental degradation. But there is a light at the end of the tunnel, if we choose to head in that direction. We've harmed the planet but hopefully we've learnt from our mistakes. Our planet is a wonderful, resilient, living thing. Let's stop harming it and help it to heal itself.

It's an advantage to understand what the terms you hear about all the time in the media really mean, so you can put all your efforts into perspective. If nothing else, you'll have some interesting information, facts, figures and trivia that will enable you to hold your own if dinner party conversation turns to the environment. Plus, a good grounding in environmental issues will help you cast a critical eye over the policies and promises of politicians so that you can use your vote to better effect.

Many issues like acid rain, deforestation, El Niño and biodiversity have been brought to our attention through the efforts and protests of environment groups and activists, such as Greenpeace. This has helped to raise the public's awareness of environmental issues and how human activities have caused or contributed to them. They also act to pressure businesses and governments into addressing these environmental problems.

Not everyone is comfortable with confrontation, controversy or protest. However, the work that these groups do is important because they help to define and highlight environmental problems that may have otherwise gone on unnoticed. Now that businesses, governments and individuals are becoming aware of these problems and how we influence them, we can also start to become part of the solution.

Remember, though, that sustainability is a team sport and there are roles for all levels of society to play. Yes, government policy makes a huge difference, but no matter what legislation is introduced, our individual choices and lifestyles can make a huge contribution to the planet's problems or their solutions. The team needs you to play your part – see if you can make your lifestyle cleaner and greener.

Acid rain

Imagine how your pot plants would grow if you watered them regularly with lemon juice or vinegar and you'll have some idea of how acid rain affects plant life.

Basically, acid rain is what you get when you mix rain clouds with air pollution, oxides of sulphur and nitrogen in particular. In the presence of sunlight and catalysts these gases react with water vapour to form sulphuric and nitric acids. These acids can travel great distances, dissolved in cloud droplets. They precipitate as acid rain, snow and fog.

Acid rain poisons both aquatic and terrestrial life, making plants and animals susceptible to disease, temperature extremes, pests and other stresses, which in turn can kill them. On land, acid rain causes the release of aluminium and heavy metals in soil. These metals damage roots and soil cultures and are washed into waterways where they also can kill fish and other marine life. Acidic rain also damages the leaves of plants, decimating forests, damaging crops and reducing soil fertility. In water ecosystems, acid rain is making lakes acidic and killing aquatic life, particularly in Northern America. Some countries are adding lime (the mineral, not the fruit), which is alkaline, to vulnerable lakes to neutralise the acidic water.

The effects of acid rain aren't confined to the natural world. Acid rain also corrodes bronze and other metals, dissolves paintwork and eats into stone buildings and statues. Several of the world's most famous monuments are under threat from acid rain erosion,

including the Sphinx in Egypt, the Taj Mahal in India, the Parthenon in Greece, and Gettysburg monuments and the Statue of Liberty in the USA.

We don't hear much about acid rain in relation to the environment in Australia and New Zealand. This is because the population of our countries, and consequently the scale of industrialisation, is relatively small when compared with Europe and America. However, as Australasia's population grows, we have to be careful to make sure that energy and product demands are met with minimal contribution to air pollution and the risk of acid rain.

Air pollution

Air pollution

According to CSIRO, death due to air pollution in Australia is higher than the road toll. An estimated 2,400 deaths each year are linked to air quality and health issues, an average of a death every 4 hours. This death toll increases if the long-term effects of air pollutants on cancer are included.

It's easy to think of air as harmless, and in most cases it is. However, air is simply a mixture of gases. While it's easy to avoid drinking from bottles with skulls and cross bones on the label, it's very difficult to avoid breathing toxic fumes, particularly when they're colourless and odourless. If you're surrounded by polluted air it is very hard not to breathe the pollution into your lungs and to keep it out of the sensitive tissues of your eyes. Our nasal passages, eyes and lungs provide an entry point for these gases to come into our bodies and potentially affect our health.

The harmful gases, such as carbon monoxide in car exhaust, that contribute to air pollution can cross the membranes in the lungs of humans and other animals and lead to health problems. Some gases are heavy and will tend to gather close to the earth's surface. Others are light and will gradually float to higher levels of the atmosphere. And they don't just float around and mind their own business; they react with each other, often aided by the energy in sunlight, to form additional chemicals, some better and some worse for the environment.

Gases also diffuse, which can lower the concentration of a particular gas in a given location. However, too many polluting industries rely too heavily on diffusion. Some gases only need tiny amounts to start interfering with the environment or wildlife.

The biggest single contributor to air pollution and the greenhouse effect is the burning of fossil fuels, such as coal and petrol. They are used to drive internal combustion engines and fuel electric power plants. Currently about three quarters of Australia's electricity needs are provided by coal-fired power stations. This releases large quantities of nitrogen and sulphur oxides into the air, contributing to smog and acid rain. This is particularly a problem in areas such as Eastern Europe, where poor quality coal is used extensively. Bushfires also add to air pollution, as does the disposal and decomposition of solid waste. Additives to fuels, such as lead added to petrol, also contribute to the nasty chemical cocktail of air pollution.

What you can do

We can reduce our contribution to air pollution and acid rain by cutting down our use of fossil fuels, such as natural gas or petrol, and choosing energy from GreenPower sources. Careful selection and maintenance of your vehicle, and using cleaner and greener heating systems will also make a difference to the quality of the air we breathe.

- Follow the energy saving tips in the Energy chapter.
- See Energy for information on GreenPower and renewable energy.
- Read the Getting Around chapter for alternatives to driving, fuel-saving advice, vehicle maintenance tips and information on choosing a greener car.

Animal welfare

Humans have many different relationships with animals. There are four legged animals we put saddles on and ride. There are animals we raise in farms to provide food to eat or fibre for making clothes. Some animals we love; some we hate. There are some majestic animals, like whales, we're content to admire from afar. There are some small creepy crawly animals that get sprayed with poison by people who don't want to share their homes with them. There are cute furry ones we feed and cuddle and keep as pets. Some assist with scientific experiments, though you couldn't call them 'volunteers'.

When it comes to the animal kingdom, humans are the top dogs. We are the planet's dominant species and have power to influence the wellbeing of other animals. Many people believe that it's the moral responsibility of those who have power and influence to protect and look after the welfare of those who don't. The difficulty with animals is that they don't have a voice to tell you in human language what they think, feel or want.

Animal welfare is sometimes defined as the idea that it is okay for humans to use nonhuman animals for food, in animal research, as clothing, and in entertainment, so long as unnecessary suffering is avoided. But some people have stronger views of animal rights - that animals should not be used or considered as the property of humans.

The 5 Freedoms of Animal Welfare

The RSPCA, Australia's main animal welfare body, works with the idea and aim that animals should have five basic freedoms:

1. Freedom from hunger and thirst
2. Freedom from discomfort due to their environment
3. Freedom from pain, injury or disease
4. Freedom to express normal behaviour for the species
5. Freedom from fear and distress

The green movement has often focused on saving dolphins, whales, koalas, pandas and other cuddly, intelligent or beautiful creatures. In academic circles they call these animals 'charismatic megafauna'. It's harder to motivate people to save the less photogenic species such as lobsters, prawns, krill, shrimp and crabs. They're not exactly the kind of creatures you want to hug, yet they're vital to the marine environment. Crustaceans are the vacuum cleaners of the ocean, removing pollutants from the sea to give the other marine life a healthy environment. Krill are also the main food source for a number of species of whale. It's all well and good to talk about saving the whale or the dolphin, but we also have to save all of the other species, plant and animal, that together provide a supporting environment that whales and dolphins can thrive in.

Whales, dolphins and koalas are the supermodels of the natural world. Saving them without looking after the plants and animals that support them is sentimental pseudo-environmentalism. In other words, it's being a fake greenie. True environmentalists seek to conserve all of nature's biodiversity and respect the complexity of the environment. They understand that sometimes the beautiful plants and animals rely on ugly species to survive. Even the microscopic bacteria and other microbes are vitally important, even if we can't see them with the naked eye.

For some people, a love for animals and concern for their welfare is the main motivation for caring for the environment. The use of animal testing is an important ethical consideration. For example, some people are comfortable with animal testing for pharmaceuticals that may benefit human health, but draw the line at animal testing for cosmetics as they are unnecessary products.

What you can do

- Respect the habitat of all creatures great and small while you're exploring the natural environment and avoid products that destroy animal habitat in their production. See Out and About for more information.

- Animal welfare in relation to what we eat is covered in the Food chapter.
- Find out about animal welfare issues and cosmetics in Green Grooming.

Biodiversity

‘Biodiversity’ comes from the words ‘biological diversity’. It refers to the number of different species in a particular habitat or area and reflects the rich variety of life forms that live on our planet.

There are three aspects to biodiversity. Firstly, there’s the variety that occurs within a single species through the differences in genetic make-up. For example, humans are a single species, but we come in myriad different sizes, shapes, hair and skin colours and other features, according to our genes. A large population helps to preserve biodiversity by avoiding the detrimental effects of inbreeding.

Secondly, there’s the variety of different species that exist in different environments. Finally, there’s the variety of different ecosystems like grasslands, estuaries and alpine forests. These all combine to make up the biodiversity of our unique planet.

Biologists have identified around 1.5 million different species so far and every year more are discovered. Estimates of earth’s total number of species range from 10 million to 100 million.

Biodiversity is important because no species or individuals can exist alone. Instead, groups of species live together in mutually beneficial ecosystems, providing each other with food, water, air and dissolved gases. The unexplored biodiversity of South America’s tropical rainforests may yet give us a cure for cancer or provide other medicinal plants. Human beings are part of this interdependence and, like all other species, rely on continuing biodiversity for their survival.

What you can do

Be aware of and respect all creatures and their environments. Avoid products that result in a loss of habitat for threatened species.

- Read Green Garden to find out how your garden can either help or harm local wildlife.

Carbon

It seems that everywhere you look, someone is talking about carbon. People are talking about carbon taxes, putting a price on carbon, carbon footprints, carbon dioxide and even going on a carbon diet.

Carbon is a chemical element that can exist on its own or combine with other elements to make a wide range of substances. As an element, it occurs naturally in three forms: graphite, coal and diamond. What makes carbon unique is that it can be the party-animal of atoms – it loves to bond and hook up with other atoms. It can form small simple molecules, like methane or carbon dioxide. But unlike other elements, carbon also has the unique ability to form long chain-like molecules (like a long line of people holding hands). These range from simple to complex molecules, including simple sugars, the hydrocarbons in petrol, amino acids, DNA and other complex molecules in living things. Carbon, put simply, is the stuff of life!

Carbon moves through the environment in its many forms. In fact, you could say that nature is constantly recycling carbon, through the carbon cycle. At any given moment, some of the earth’s carbon is in the atmosphere in the form of carbon dioxide, methane and other gases. Some carbon is present in molecules that make up plant and animal tissues. Some carbon is in the soil as humus, the biological component of soil made from decomposing dead materials. And more carbon still is stored in the earth as fossil fuels.

The carbon cycle is a delicate balance between the amounts of carbon in the atmosphere, in living tissues, in the earth and in the ocean. Over the last century, humans have burnt fossil fuels to produce energy, releasing huge amounts of carbon into the atmosphere. Scientists believe that the rising global temperatures we’re experiencing are due to higher amounts of greenhouse gases, particularly carbon dioxide, in the atmosphere. They

act like a blanket for the earth, keeping the heat in. In short, the carbon cycle is out of balance.

Measuring greenhouse gas emissions

There are many different greenhouse gases, each with a different ability to warm the planet, so it was useful to come up with a standard way of measuring them. Greenhouse emissions are talked about in terms of kilograms or tonnes of carbon dioxide or CO₂, the main greenhouse gas, aside from water vapour. Other greenhouse gases are expressed as ‘carbon dioxide equivalents’, which are calculated by multiplying the amount or weight of each gas by its ability to warm the planet compared with carbon dioxide. For example, methane gas is 21 times more powerful a greenhouse gas than carbon dioxide, so 1kg of methane is 21kg (carbon dioxide equivalent or ‘CO₂-e’) of greenhouse emissions.

What you can do

Reduce the size of your own carbon footprint.

- Reduce your energy consumption, as outlined in the Energy chapter.
- Switch to renewable energy alternatives.
- Reduce your petrol consumption, as detailed in Getting Around.
- Avoid wasteful consumption.

Climate change

The Earth’s climate is constantly but gradually changing, with changes happening over tens of thousands and millions of years of time. Part of this is due to the greenhouse effect – the blanket of greenhouse gases in the atmosphere that keeps the Earth liveable. Slight changes in the Earth’s orbit around the sun can affect Earth’s climate by influencing how much of the Sun’s energy reaches the surface.

During the last ice age, which ended around 11,000 years ago, the average global temperature was about 6-10°C (11-18°F) colder than our present global average. Vast areas of land, including most of Canada and much of northern Europe, were covered in ice sheets. The changes in climate following the end of the ice age had a dramatic effect on wildlife. Some animals died out, while others thrived as a result of the gradual increase in temperature and its effect on the environment. The warmer climate was good for humans. Around 2,000 years after the end of the ice age humans started agriculture.

The fact that it took 10,000 years to warm a few degrees to the Earth’s current global average temperature shows that normal climate change happens very slowly. However, things seem to have sped up. The global average surface temperature increased by about 0.7°C over the last century. Scientists have also observed that there have been increasing amounts of greenhouse gases in the atmosphere since the Industrial Revolution due to human activities, such as burning fossil fuels (coal, natural gas and oil), clearing land and changing agricultural practices. These activities have upset the balance of nature’s carbon cycle.

Climate scientists say this recent warming is unusual and that the changes in climate we’ve seen in the last century or so can’t be explained by normal climate variation and natural causes alone.

As well as increasing temperatures, we’ve seen some strange weather and extreme weather events. Hurricane Katrina, strong El Niño and La Niña events, hail storms in Sydney, unusually long drought periods in Australia and many other countries, snow in Bagdad for the first time in a century, melting ice sheets, early blooming flowers and more storm activity and floods in the tropics are all symptoms of climate gone crazy!

A few degrees can make a vast impact. The few degrees difference between the last ice age and modern times demonstrate this. Scientists predict that the global average temperature is likely to rise by 1.1°C–6.4°C by the year 2100. This would change the world as we know it.

What's the difference between global warming and climate change?

Global warming is the overall increase in the average temperature of the Earth's lower atmosphere. This warming is due to the extra heat trapped by higher levels of greenhouse gases in the atmosphere. Climate change refers to the changes in climate characteristics and weather patterns that result from this warming. The two terms are often used interchangeably.

What you can do

Cut down your greenhouse emissions and your contribution to climate change.

- Reduce your energy consumption, as outlined in the Energy chapter.
- Switch to renewable energy alternatives.
- Reduce your petrol consumption, as detailed in Getting Around.
- Avoid wasteful consumption.
- Join a tree planting effort.

Predicted effects of climate change

As climate is a crucial part of the environment, climate change will have wide-ranging effects.

Temperature

- The 1.1°C–6.4°C increase in global temperature is an estimate of the global average increase. But this average represents areas that will have more and areas that will have less than the predicted warming. Climate models show that the greatest warming will be in inland areas because of the greater land mass. Less warming will occur over oceans and near the coast. The Southern Ocean will have the least warming.

Rising sea levels

- Sea levels are predicted to rise due to increased water from melted glaciers and ice caps, and because materials (including water) expand slightly when warmed (this is called 'thermal expansion').
- Coastlines around the world could be submerged. Coastal cities, such as Sydney, Hong Kong, New York, Tokyo and Amsterdam will be under threat. Many low-lying Pacific islands will simply disappear.

Extreme weather & climate events

- Extremes in weather, such as drought, hurricanes and flooding, are predicted to become more common. For example, the Atlantic hurricane season and the South East Asian monsoon season are both expected to intensify. It is believed that the warmer ocean temperatures enabled Cyclone Yasi to carry more moisture, increasing its devastation when it struck Australia in early 2011.
- Heatwaves are also predicted.
- Drought and heatwaves can add together to increase the frequency and severity of bushfires. While bushfires are part of Australia's environment, they are happening more frequently than they used to, giving ecosystems less time to recover.

Water flows

- The amount and pattern of rainfall and other precipitation is predicted to change. This will reduce water supplies for people, agriculture and the environment in many areas. For example, the deserts in subtropical regions are expected to grow. Some areas may get more rainfall and flooding.
- Some areas are predicted to have less frequent but more intense rainfall. This kind of rainfall tends to run off the surface of parched earth, rather than seeping in, resulting in less benefit to ecosystems and less water flowing into the water catchments that supply our cities with drinking water.

Human social and health impacts

- Flooding can cause increases in water-borne diseases such as dysentery.

- Changing rainfall patterns and the shift of tropical regions bring disease-carrying insects, such as mosquitoes, with them. This can increase the range of insect-borne diseases such as malaria and Ross River Fever.
- Desertification of farming lands, less water and more severe weather will hit the world's poorest people the hardest.

Biodiversity, ecosystems & agriculture

- Some plants and animals, such as frogs, are very sensitive to changes in climate. There are likely to be extinctions as a result of climate change.
- Alpine and polar species are at risk of losing their habitat.
- Oceans, soaking up more CO₂, are likely to become more acidic, placing some marine species at risk.
- Coral is particularly sensitive to changes in temperature. A series of very hot days can cause coral bleaching, leading to the death of the coral, which is the centre of this diverse ecosystem. The Great Barrier Reef in Australia, a network of 2,900 reefs teeming with tropical fish and other marine life, is under threat from climate change due to both the temperature increases and increased storm activity buffeting these delicate systems.
- Climate change is changing the seasons as they are known and felt by plants and animals. For example, shorter winters mean a shorter hunting and feeding season for polar bears. In Britain, biologists have noted that spring seems to be starting a few days earlier than it did decades ago, with birds laying eggs sooner. Gardeners have noticed flowers blooming early. There is a danger that the patterns of nature may become 'out of sync' with each other.
- Crop yields would be reduced in many of the planet's current food producing nations. Cooler climates may find that the warmth improves their agricultural production to some extent. However, these areas generally have poor soil to begin with, so their yields will be low. Food shortages, already felt in many poorer countries, could become a worldwide problem.

Consumption

Consuming stuff is part of life. Food, for example, is the simplest type of consumption, and one that keeps us alive and healthy. But too much consumption of food can make us obese and unhealthy.

Beyond food, there are other things we buy and consume; things like clothing, magazines, energy, gadgets, sporting goods, shampoo and other toiletries and beauty products, and CDs. All of these things come at an environmental cost and have an impact, though it's usually not something we see. We don't see the level of pesticide use on a cotton crop, or the local impacts of mining the metals used to make our gadgets. We don't see the polluting wastewater from pulp mills, or smell the odours. And we generally don't see the landfill sites where our waste is buried.

Every product represents the use of the energy, water and material resources needed to make it and there are other environmental impacts during its life, right through to the disposal stage. The question you have to ask yourself is: "Are the good things about this product worth the resources needed to make it?" Sometimes the answer will be a big loud yes, and sometimes they'll be a reluctant no. Food, for example, is worth the water needed to grow it and we need it to survive and be healthy, but is an electric pepper grinder really worth the plastic, metals and energy needed to make it?

The good news is that we're finding better ways to make and deliver goods and services, with less environmental costs. You can buy music online and download it as digital files, completely by-passing the impacts of the material use, manufacture and distribution of CDs. Still you can make a huge difference to the environment by avoiding buying and consuming too much stuff!

What you can do

Buy things you know you will get good use of and know when enough is enough.

Ecological footprint

The ecological footprint is a way of measuring the environmental impact of a person's lifestyle. It estimates the amount of land or space needed to provide the resources to support that standard of living.

Things like the size of your house, your energy use, the kinds of food you eat and the transport you use all affect the size of your ecological footprint. The amount of space available per person on earth is 1.8 global hectares, but it's shrinking because of overpopulation, land degradation and pollution. In total, our world's footprint is 2.7 global hectares per person, so we're basically living beyond our means.

The average Australian ecological footprint is 6.8 global hectares. This means that we would need three additional planet earths for all of the world's population to have the same standard of living as that enjoyed in Australia.

Ecological footprint

The Global Footprint Network calculated the ecological footprint per capita of a number of nations, and published them in the *Ecological Footprint Atlas 2010* report. This and the *WWF Living Planet Report* are published every two years. Here are some of the results from the 2010 (which used data for 2007) and the 2004 (2001 data) reports.

| | Hectares per capita | |
|----------------|---------------------|--------|
| | (2001) | (2007) |
| Australia | 7.7 | 6.8 |
| Bangladesh | 0.6 | 0.6 |
| Belgium | 4.9 | 8.0 |
| Canada | 6.4 | 7.0 |
| China | 1.5 | 2.2 |
| Japan | 4.3 | 4.7 |
| New Zealand | 5.5 | 4.9 |
| United Kingdom | 5.4 | 4.9 |
| USA | 9.5 | 8.0 |
| World average | 2.2 | 2.7 |

To calculate your own ecological footprint, go to the Eco-footprint pages on the Victorian EPA website at www.epa.vic.gov.au/ecologicalfootprint, or the New Zealand Ministry for the Environment online calculator at <http://www.mfe.govt.nz/withyou/do/footprint/>.

What you can do

This book is all about the many ways to shrink the size of your footprint. Measure your footprint before trying the advice. Use this base measurement as a benchmark and recalculate your footprint in the future to see how the changes you've made can make a difference.

El Niño

El Niño, which means 'boy child' in Spanish, is a change to the normal temperature, wind and weather patterns in the Pacific Ocean. Trade winds normally drag warm conditions along the equator from east to west, bringing rain to Australia and cool, nutrient-rich water to the South American coastline. In an El Niño event, this climatic pattern is reversed, which is part of the Earth's normal climatic variation.

The result is warmer ocean temperatures and higher rainfall along the South American coastline. The warmer water has lower nutrient levels, leading to declines in marine life and disaster for local fisheries. On the other side of the ocean, dry cold air builds up over Australia's eastern coastline during the normally wet season. El Niño causes floods

in the southwest United States and western Latin America, and drought in eastern Australia and South-East Asia and southern Africa. It also increases the frequency of bushfires in Australia.

Recent years have seen dramatic El Niño events. In Australia, we seem to be experiencing drought conditions more frequently and severely, with higher incidences of bushfires. The first decade of the new century saw the worst drought and bushfire season for decades, both in Australia and in many other parts of the world. Canada and Spain in particular had dramatic wildfire seasons in recent summers. Many, but not all, scientists believe that global warming is altering El Niño patterns, leading to more frequent and more intense El Niño events.

Like all extremes, the pendulum swings in the opposite direction. Unusually cold ocean temperatures in the eastern equatorial Pacific characterise La Niña (El Niño is known by unusually warm ocean temperatures). La Niña events give rise to tropical cyclone activity in the Atlantic Ocean. The La Niña event of 2005–06 saw ferocious hurricane seasons hit the east coast of the United States, including Hurricane Katrina, which devastated New Orleans. More recently, the La Niña event of 2010–11 was believed to be a contributing factor to the severity of the flood and cyclone events Australia suffered during this period, particularly in Queensland and Victoria.

What you can do

Globally we need to reduce our greenhouse gas emissions and fight climate change to lessen the chances of more severe El Niño and La Niña events. This includes choosing renewable energy from greenhouse-friendly sources, reducing energy use and planting trees (or donating to tree-planting groups) to help remove greenhouse gases.

Energy: renewable

Renewable energy resources are those that we have an unlimited supply of, or that can be replaced quickly through the normal cycles of nature. Solar energy and wind power, for example, are inexhaustible. Crops that produce bio-fuels are also said to be renewable, as long as the rate at which they're grown isn't outstripped by the rate at which we use them. Around the world, governments, corporations and consumers are dipping their toes into renewable energy, for both environmental and political reasons. Renewable energy brings a whole range of options to the table. For example, countries with powerful river systems are already harnessing the power of a river's current in hydroelectric plants. Similarly, windy coastlines are becoming dotted with wind farms, and countries that lie on geothermal belts, such as New Zealand, are experimenting with geothermal energy. Perhaps the most hopeful option of all is the sun, which is able to provide an unlimited supply of solar energy to pretty much all of the world.

Countries can look at their landscape and choose the option that best suits their natural conditions and economy. For the first time in decades, some are able to imagine a future where they have energy security and independence. In the past, the domination of fossil fuels meant that many countries had to buy the fuel for their energy needs from other countries.

It's important to remember that renewable energy sources, while better than fossil fuels for the health of the planet, are not without their own environmental impacts. For example, hydroelectric schemes can upset the flow of river systems and the health of the related ecosystems. Alternative energy sources need to be well chosen and carefully developed, so that the solution to our energy problem doesn't become a problem itself.

Non-renewable energy

Non-renewable energy sources are those that will eventually run out, or that will take millions of years and certain climate and geological conditions to replace. There is a limited amount of the nuclear fuel uranium in the earth's crust. Once it is used, there is no more, so

nuclear energy from uranium is not renewable. Fossil fuels, such as natural gas, propane, LPG, coal, petrol and oil are also non-renewable.

What you can do

Increase the proportion of your energy use that comes from renewable sources. Consumer selection of greener energy supplies will allow these emerging energy options to become more and more widely available, as well as cheaper.

- Find out about renewable energy and Green Power in Energy.
- Get a solar hot water system. See the guide to choosing a hot water system in the Energy chapter.
- Reduce your use of energy from non-renewable sources, such as petrol or electricity from coal-fired power plants. The key is household energy efficiency.
- Household energy use is covered in Energy.
- Tips for reducing petrol use are included in Getting Around.

Extinction

Australia's endangered species

The Australian Environment Protection and Biodiversity Conservation Act list of threatened fauna lists over 380 species of animals including:

- Red-tailed black cockatoo
- Swift parrot
- Redfin blue-eye fish
- Spotted tree frog
- Loggerhead turtle
- Southern right whale
- Leadbeater's possum
- Proserpine rock wallaby.

The threatened flora list includes over 1300 plant species including:

- Windswept spider-orchid
- Phillip Island hibiscus
- Orange-flowered wattle
- Emu Mountain sheoak
- Norfolk Island water-fern
- Granite boronia
- Drummond grass
- Silky persimmon.

For more information, visit the threatened species section of www.environment.gov.au/biodiversity

New Zealand's Endangered Animals

The International Union for Conservation of Nature and Natural Resources (IUCN) has published the 'Red List' of the world's threatened species. Entries for New Zealand include:

- Brown kiwi
- Little piked whale
- Bryde's whale
- Chatham Island bellbird
- New Zealand dolphin
- Pot-bellied seahorse
- Striped skink
- New Zealand flax snail
- Shy albatross

For information about threatened species around the world, visit the IUCN Red List of Threatened Species website at www.redlist.org.

Scientists estimate that we could lose half of our planet's current species if we continue on our current eco-nasty path. We're seeing earth's sixth period of mass extinction and this time it's our fault. Over the past 500 million years there have been five massive extinctions. It took 20 to 100 million years for biodiversity to recover after each one. This current period of mass extinction is seeing species lost at a faster rate than before.

There are great hopes that the tropical rainforests of the world will give us new species and substances that will cure diseases and ease suffering. If we continue to liquidate our planet's natural assets we'll lose them long before we ever get a chance to discover their full value.

Many people hope that cloning will enable the human race to bring animals, such as the Tasmanian tiger and even dinosaurs, back from extinction. This idea is taking away some of the feeling of urgency to protect endangered species. However, experts say that there may not be enough samples of Tasmanian tiger DNA to provide the genetic variation needed to re-establish the species. Dolly, the famous sheep who was the world's first cloned mammal, suffered early from arthritis before dying at the age of six, raising concerns that cloning may cause genetic defects.

With extinction, like most problems, prevention is preferable to cure. Governments are starting to impose international bans on the trade of animal products from endangered species. Zoos are working on breeding programs to keep species on the verge of extinction from being lost. Some nations are scaling back land clearing and deforestation. Programs are also being developed to control feral animals and plants and to prevent more from being introduced. It is hoped that these measures will bring certain species back from the verge of extinction.

What you can do

- The conversion of areas of natural vegetation to agricultural land or opening them up for mining results in the loss of habitat for wildlife. Some of these habitats are home for endangered species. We can all make a difference by lessening our consumption of unnecessary products and avoiding food wastage.
- Avoid products made from endangered species, particularly souvenirs as outlined in Out and About, and traditional medicines and grooming products as outlined in Green Grooming.
- Find out about sustainable timber choices in Green Building and Renovating and eco-office paper in the Working Green chapter.
- You can also contribute to the reversal of species loss by supporting causes and associations such as the World Wildlife Fund, David Suzuki Foundation, Greenpeace, Fauna and Flora International, the Australian Conservation Foundation, Friends of the Earth and Planet Ark.

Fish

There is a limit to how much food the ocean can provide us with, just as there is a limit to the amount of food that a given patch of land can grow. Human exploitation of fish and other marine species is placing some at risk of extinction. The IUCN Red List in 2003 listed 750 fish species as threatened. The list for 2008 grew to 1,275 threatened fish species. In the 21st century, instead of finding Nemo, we may need to think about saving Nemo!

Small-scale local fishing, such as that done by Pacific Islanders to feed themselves, has very little or no impact on the environment. But larger-scale fishing starts to create problems. If more fish are taken from water ecosystems than can be replaced by normal fish reproduction, their numbers (called 'fish stocks') start to decline. Overfishing happens when too many fish are caught, placing the fish species and their local ecosystems at risk.

Large-scale fishing vessels, equipped with advanced technology, have aided overfishing. These ships are able to cast out and pull in huge nets, catching large quantities of the desired fish, along with millions of tonnes of unwanted marine life or "by-catch". This

by-catch includes dolphins, turtles and sea birds, which are tossed back into the sea, usually killed by their ordeal.

Globally, demand for fish is increasing. As well as catching fish from the wild, fish can also be raised for human consumption in 'fish farms', which may be specially built pools of water or floating 'netcages'. This is known as aquaculture. Fish farms are becoming bigger and more common. Some are managed unsustainably, with serious effects on local aquatic ecosystems and native fish stocks. Many fish farms raise fish such as salmon in densely packed conditions for commercial sales and profit. Like all intensive farming, they produce huge amounts of wastes, including drug-laden faeces and excess food. Farmed salmon are given more antibiotics (drugs to fight certain diseases) by weight than any other livestock. This is contributing to the development of antibiotic-resistant strains of disease-causing bacteria, nicknamed 'superbugs'. Some farm fish escape from their netcages and compete with native fish for food and habitat. These fish farms can also pass parasites and disease to wild populations. Good management can limit these problems.

What you can do

- The Food chapter has advice on making greener seafood choices.

Fossil fuels

Fossil fuels provide around 80% of the world's energy. They provide fuel to power motor vehicles and manufacturing plants and are burnt to drive turbines in power stations for the generation of electricity.

Not only are fossil fuels environmental offenders, supplies are slowly running out with the remaining reserves becoming increasingly hard to extract. There is also dramatically increasing oil demand, required to fuel the burgeoning economic and industrial growth of China and India. The extraction itself has an environmental impact, harming habitats and contributing to erosion and pollution. Burning fossil fuels also pollutes the air, causing respiratory problems in humans, harming wildlife and causing acid rain. The biggest problem is that the fossil fuels we currently use produce greenhouse gases, which climate scientists predominantly agree are contributing to global warming and causing the climate to change.

Fossil fuels are on their way out, both from an environmental and a long-term economic point of view. Business and industry know that supplies will eventually run out so some are looking at the alternatives now.

Environmentally, we need to dramatically reduce our use of fossil fuels long before supplies dwindle. While we can see the bottom of the oil barrel approaching, there's still enough oil and coal left to seriously affect our planet's climate through the greenhouse effect.

What you can do

- Look into Energy alternatives.

Genetically modified organisms

In the past, farmers and horticulturalists have cross-bred plants from the same family to produce plants with desired characteristics, such as a different flavour in fruit or to vary flower colours. With the advent of gene technology, genetic engineers can now swap genes between unrelated species. Plants can be spliced with a fish gene to make them less sensitive to cold weather, for example. Crops can be engineered to be pest-resistant. They can even be engineered to be resistant to the herbicides used on crops to kill weed plants. Currently, genetically modified (GM) crops have largely been developed to make farms more productive. The benefits are for the food producer, not the consumer. However, the supporters of gene technology ultimately wish to engineer crops to have better nutritional value or even to contain therapeutic properties.

The claimed benefits of GM technology are that more people can be fed with the same amount of land and world hunger could potentially be solved. The need for pesticides is also, theoretically, decreased.

However, there are some major environmental concerns with GM crops. The drawbacks of GM food crops are:

- Pest-resistant crops engineered to kill a target pest insect can also kill other, sometimes, beneficial insects. For example, some laboratory trials have found that pollen from genetically modified corn can harm the monarch butterfly caterpillars, which are already endangered.
- Crops engineered to be resistant to weedkillers will encourage overuse of herbicides, wiping out all other plant life except for the crop plant. This will remove food sources for local wildlife, such as birds and small mammals.
- GM crops are hard to contain. GM plants can contaminate non-GM crops and honey production and are a threat to the organic farming industry.
- Once released into the environment they are difficult to 'recall'.
- GM crops have had very little testing. The long-term effects of consuming GM food are unknown.

When GM foods were first introduced in the US, authorities basically concluded that, for example, if a GM tomato looked the same, smelt the same and tasted the same as a normal tomato, then it effectively was the same food and didn't need any additional testing or labelling. Australia followed the lead of the US until a consumer backlash led to the development of labelling laws for GM foods in Australia. Greenpeace is campaigning for better GM labelling on product content in New Zealand. Many scientists believe that GM foods should undergo the same rigorous testing as pharmaceuticals, with independent scientific reviews and extensive human trials, including long-term Generational studies. We may yet find out that they're safe. However, in the meantime we're effectively the guinea pigs.

What you can do

- Food has a quick guide to avoiding GM foods.

Greenhouse effect

Global dimming

Global dimming is the reduction of solar irradiance (the amount of sunlight reaching the earth's surface), thought to be caused by pollution in the atmosphere. The worldwide average is estimated at around 5% reduction. By blocking the sun's light, global dimming has a cooling effect. It is suspected that global dimming may have led scientists to underestimate the true effect of greenhouse gases on global warming. It may also limit the photosynthetic activity of plants, which is the basis of the food chain.

The traditional greenhouse is a glass garden house that allows sunlight in to warm air and surfaces, and stops that warmed air from escaping. Air inside the glasshouse is therefore maintained at a warmer temperature than that outdoors. In much the same way, a layer of 'greenhouse' gases in the atmosphere insulates the earth. The gases allow sunlight in, which warms the earth. Some of this heat bounces off the earth as infrared radiation.

Greenhouse gases are those that are infrared active. The layer of greenhouse gases in the atmosphere acts like a blanket to stop heat escaping to space, keeping the temperature at the earth's surface relatively even and accommodating for life. In fact, the greenhouse effect is necessary to make life on earth possible. The big environmental problem is that we're seeing an enhanced greenhouse occurring.

Prior to last century, greenhouse gases (such as carbon dioxide and methane) mainly came from the gas exchange of plants, the excrement of animals and the rotting of dead plants and animals. Photosynthesis turns these gases to build carbohydrates in plant tissues. This is part of the 'carbon cycle'. Constant and interconnected cycles of photosynthesis and

respiration, along with consumption, growth and decay, move the carbon in its various forms through plants, animals, the earth, air and water. While a relatively small amount of carbon is in the atmosphere as greenhouse gases, much of the carbon is stored carbon, 'locked' in complicated organic molecules in plants and in fossil fuels.

Since industrialisation, humans have been logging forests and burning huge amounts of fossil fuels such as coal, oil and natural gas, to provide power. The burning of fossil fuels unlocks the stored carbon, producing an oversupply of carbon dioxide and other greenhouse gases to the atmosphere. They are adding to the planet's blanket and the blanket's getting too thick.

The sad truth is that the global emissions of greenhouse gases need to be drastically slashed to stop global warming. Renewable energy offers many viable alternatives, without having to resort to the Russian roulette of nuclear power.

What you can do

You can make a huge difference by reducing your energy use and getting your energy from renewable, cleaner sources. Make a commitment to support and use GreenPower. Don't let politicians convince you that nuclear energy is the answer to climate change.

Health issues

Global population

- In 1800 the global population was around 1 billion. Today it is well over 6 billion.
- Developed countries represent 25% of the global population but use 80% of its resources and produce 75% of its waste.

Day after day, human activity dumps solid waste on the land, washes chemicals and contaminated liquids into the water and releases poisonous gases into the air. Slowly we are poisoning the food, water and air supplies of all living things, including ourselves. These poisons are accumulating in the food chain, with meat-eating humans at the top.

Industrial pollution is seeing plants and animals come into contact with highly dangerous chemicals that their tissues weren't designed to cope with. Exposure to chemicals such as DDT, dioxins and polychlorinated biphenyls (PCBs) and a range of other toxins and carcinogens is increasing. Many of them are entering our diets. There is growing evidence that exposure to these chemicals is increasing cancer risk and the incidences of other illnesses. Other animals are also being affected by contaminated food. For example, some bird species that eat pesticide-tainted food lay eggs with weakened shells too fragile to develop.

Clean air is essential for quality of life. Harmful gases and fine airborne particles are posing a very serious danger to human health and the health of other animals. Air pollution causes respiratory diseases and is linked with lung cancer and asthma. In the last 30 years, developed countries have reduced the amount of airborne particulate pollution, so the air appears cleaner and less sooty or hazy. However, many toxic gases are odourless and colourless. Just because you can't see them doesn't mean that they can't hurt you.

What you can do

Consider the health of the people and animals around you. Start making changes in your home, and then encourage similar changes in the wider environment. Also look for the apple symbol throughout this book. This indicates information and advice that may relate to your health.

- Read the Health Home, Healthy Planet chapter.
- Healthy food is covered in Food.
- Green Cleaning also considers health.
- Health is also a consideration in the Green Building and Renovating, Green Grooming and How to Have a Green Baby chapters.

Land clearing and deforestation

Forests covered a third of the earth's land 10,000 years ago. Then came agriculture, forestry and industrialisation. Now we've lost a quarter of our planet's forests and only 12% are still in their natural state. Each year we're still losing at least 16.2 million more hectares (40 million acres) of our forests through logging and land clearing, placing around 10% of the world's tree species in danger of extinction.

It's not just the trees themselves that are becoming endangered through land clearing. The habitat for a variety of wildlife is destroyed. This places some species at risk of becoming extinct. In Australia, for every 100 hectares (247 acres) of woodland cleared, 1000–2000 birds lose their homes. Similarly, 200 reptiles are killed for every hectare of mallee country cleared. Land clearing also causes dryland salinity.

Land clearing and deforestation are contributing to air pollution and climate change. Bulldozed, rotting and burning forests unlock carbon and release massive amounts of greenhouse gases and other pollutants into the air. Deforestation, combined with erosion and high rainfall, can also cause landslides and river flooding. This is particularly a problem in parts of South-East Asia, where unsustainable and even illegal logging is not uncommon. In February 2006, a landslide thought to be caused by high rainfall and logging, killed an estimated 1400 people in the Philippines town of Guinsaugon.

Some of the forests that are being cleared are old-growth forests. Old-growth forests are complicated ecosystems that take centuries to establish. Tree hollows occur in only very old trees. Around 400 of Australia's land-dwelling animals (including birds, marsupials and other mammals, amphibians and reptiles) use these tree hollows. Crazy as it seems, some forestry companies are clearing old-growth forests to plant regrowth forests. Once the land is cleared, the forestry companies lay bait laced with 1080 poison to kill any animals that might dare to eat the new seedlings. These new forests will have no tree hollows or fallen hollow logs to provide homes for animals. They also will reduce the amount of rainfall that's converted into flows in catchment areas.

Tropical rainforests are also disappearing at an alarming rate. Rainforests help to stabilise the global climate and purify the air and water, and they contain more than half of all the world's plant and animal species. This biodiversity contributes billions of dollars to the world's economy through the production and sale of products that come from rainforests. The plants alone produce a range of hardwoods, rubber, essential oils, fruit, spices, coffee and medicines. Tropical rainforests still hold hundreds of undiscovered species and many more that haven't been fully investigated. It's hoped that these forests may provide treatments and cures for cancer, AIDS and other illnesses. Yet this huge medical potential may go untapped and these plants and animals may never be discovered. Rainforests are rapidly being destroyed. At the current rate of destruction they will be gone by 2050.

What you can do

- Find out about recycled and 'forest-friendly' timbers and alternatives, such as bamboo, in Green Building and Renovating.
- Paper and tissue product choices are covered in Working Green.

Natural disasters

Natural disasters happen when the forces of nature are at their most powerful and doing the most damage. They harm the natural environment, man-made structures and settlements alike.

The natural disasters that you'll hear the most about are the ones that kill the most people or that inflict the most expensive damage. For example, Hurricane Katrina, a hurricane that tore through the Gulf of Mexico and into Southern USA in August 2005, was not the strongest on record, but it cost many lives and caused billions of dollars in damage to the city of New Orleans – a modern, prosperous city.

Munich Re, an insurance company, estimates that the world's natural disasters in 2010 killed 295,000 people and cost US\$130 billion. The year with the most expensive natural disasters was 2005 with a bill of US\$230 billion. This was the year Hurricane Katrina hit America.

Some natural disasters take us by surprise. Earthquakes, and the tsunami they can cause, come with little or no warning. Some natural disasters happen in predictable areas, times of year and patterns, such as 'Tornado Alley' between the Rocky Mountains and Appalachian Mountains in the United States and the summer bushfire season in Australia. Being predictable, people can make plans to avoid these disasters, prepare for them or manage their effects.

Some natural disasters are starting to show signs of human influence. Climate change is changing the frequency and strength of certain weather disasters. Plus, landclearing, deforestation, mining and other human activities are affecting the stability of some land areas, increasing the amount of damage that can be done by natural disasters. For example, logging removes the trees that might slow down an avalanche or whose roots would hold down the soil in heavy rainfall.

Natural disasters can be scary, but it's important to learn about them. That way, we can be prepared and know what to do when they happen. In the case of those that stem from climate change, we may even be able to help prevent them from getting too much worse.

What you can do

- The chapter Becoming Future Ready looks at the increased risks Australia is facing, due to climate change. See what applies to your region.
- Do all you can to reduce your personal contribution to climate change.

Nuclear energy

Reactor down-under

Australia's only nuclear reactor is at Lucas Heights in Sydney, right on the doorstep of a major population centre. If you were to put a 30 km no-go zone around the Lucas Heights reactor, like the one surrounding Chernobyl, it would cover all of Sydney's southern and south-western metropolitan areas.

Nuclear energy is not considered a renewable energy source because it relies on fuels such as uranium. Supply is limited by the amount that can be extracted from the earth's crust. Some people venture to call nuclear energy a 'clean' source of energy and argue that no carbon dioxide (a major greenhouse gas) is expelled in the production of nuclear energy. As such, it is being heralded as the solution to the challenge of providing cheap greenhouse-friendly electricity. The Australian Conservation Foundation argues that there are indirect emissions at every stage of the nuclear power process, including exploration, construction, transportation, the mining and processing of uranium, disposal of wastes, reprocessing of spent fuel rods, more transportation for reprocessing and finally decommissioning of the reactor.

There's a certain romance and excitement to the sound of the phrase 'harness the energy of the atom'. In an ideal scenario there would be no accidents and we would discover a way to make radioactive waste safe so we could all enjoy the benefits of clean, limitless energy. In reality, accidents do happen and have happened. When they do happen, the consequences are horrific, as seen with the Chernobyl disaster. More recently, the massive earthquake and resulting tsunami that hit north-west Japan in early 2011 led to a major nuclear incident at electricity generating nuclear reactors in Fukushima. Until nuclear power becomes safe, both in normal and worst-case scenarios, it will continue to be a gamble with incredibly high stakes.

There is always a small, generally safe amount of background radioactivity in nature. However, the advent of nuclear power has produced radioactivity in quantities that can kill. The radioactivity of both the mining waste and the spent reactor waste is a huge risk

to environmental health. The waste must first be sealed in aluminium foil to block alpha and beta radiation, then sealed in lead to block X-ray radiation from escaping, and finally sealed in a thick layer of concrete to block the gamma radiation. Like all materials, these layers will decay over time. The hastily constructed concrete sarcophagus that now houses the remains of Chernobyl's Reactor 4 is ageing badly. If it collapses another cloud of radioactive dust could be released. There are also concerns that future wild fires in contaminated areas could remobilise radioactivity.

Exposure to uranium and other sources of radioactivity have been linked with cancer and other major health problems. Nuclear energy is only truly a viable option if:

- adequate solutions can be found to clean up uranium mining sites,
- we find better ways to take care of radioactive waste, and
- we find ways to make reactors accident-proof and human-proof. Nuclear accidents can and have happened, with serious results.

Even meeting these needs, nuclear energy is at best a 'bridging technology': there is a limited amount of nuclear fuel in the ground. This could buy humans more time, but renewable energy sources are still the best for our long-term future.

What you can do

Support the development of genuine renewable energy alternatives.

Oil spills

Victims of the Exxon Valdez spill

Although it is hard to measure the direct and indirect damage caused by the Exxon Valdez oil spill in 1989, scientists estimate that:

- Around 20 killer whales died, probably through eating contaminated fish,
- Up to 5000 sea otters died, with many more displaced by local food shortages,
- Up to 300 harbour seals died,
- Up to half a million seabirds died.

Since 1970 there have been over 50 spills as big as the Exxon Valdez spill.

The worst oil spill disaster was the 1991 Gulf War.

Oil spills from oil tankers and pipelines wreak havoc on the marine environment. Oil smothers and poisons the animal and plant life that lives in and around the sea. The infamous 42 million litre (11 million-gallon) Exxon Valdez spill of 1989 killed thousands of aquatic mammals, hundreds of thousands of seabirds and shut down the local fishing industry. Seabirds were coated in oil, which ruined the waterproofing effect of their feathers. They died from exposure to the cold.

Even more infamous now, is the BP oil spill that occurred in the Gulf of Mexico in 2010. On April 20th there was an explosion on the Deepwater Horizon oil drilling rig, which killed 11 workers and left massive amounts of oil pouring into the ocean. The size of the spill is estimated at over 757 million litres (200 million gallons) and was treated with millions of litres of chemical dispersants. Scientists are still assessing the short- and long-term effects of the oil spill and its remediation on the ecology of the region, but already there are reports of increased dolphin deaths, and that's just scratching the surface.

Even low-level oil pollution can damage wildlife. The relatively minor 6800 litre (1800 gallon) diesel spill near the Galapagos Islands in January 2001 at first appeared to take no casualties. However, a later study found that 62% of the iguanas on one of the affected islands died within a year of the accident.

The oily road run-off from a city of 5 million could release as much oil into the ocean over a year as one large tanker spill.

What you can do

Remember that stormwater run-off is another killer of wildlife in the ocean and can also lead to the contamination of ground water used for drinking. Think about what you put down the drain. See the Getting Around chapter for advice on maintaining your vehicle and recycling motor oil.

Ozone depletion

Think of the ozone layer as SPF 30+ sunscreen for the planet, blocking out the more harmful wavelengths of the sun's radiation. Too much UV radiation would increase the number of people with skin cancers and eye cataracts, natural vegetation and crops would all be damaged, and the numbers of plankton, the basis of the marine food chain, would be depleted. So we definitely want just the right amount of ozone in the atmosphere.

Ozone is a molecule containing three oxygen atoms. There's a relatively high concentration of ozone 14–45 km above the earth's surface in a diffuse gaseous layer called the ozone layer. However, ozone-depleting gases, particularly chlorofluorocarbons (CFCs) are slowly eroding this protective layer. CFCs were commonly used to make certain types of plastics and foam packaging, in refrigerators and car airconditioners and as a propellant gas in aerosol cans.

When CFCs in the atmosphere are exposed to sunlight, they release highly reactive chlorine atoms. This chlorine reacts with ozone, converting it to oxygen. The chemical reaction destroys ozone but reforms the reactive chlorine atom. One free chlorine atom can destroy thousands of ozone molecules and itself remain intact. Our atmosphere still has a vast reserve of these ozone-destroying chlorine atoms that will remain there, wreaking havoc, for decades.

Scientists have discovered fluctuating holes in the ozone layer over the polar regions, along with areas of decreased ozone concentration. Holes over the inhospitable poles are one concern but more alarming is the gradual thinning of the atmospheric ozone at middle and high latitudes. These are the areas where most of the world's agricultural productivity occurs and where the most people live.

In 1987 an international agreement to phase out CFCs in manufacture was developed. On 1 January 1989, the Montreal Protocol on Substances That Deplete the Ozone Layer came into force. The aerosol industry was one of the first to respond and phased out CFCs and other halocarbons. However, we can't rest on our laurels. The production of CFCs needs to cease, and old CFC-containing products, such as unwanted fridges or the airconditioners in scrapped cars, must be carefully disposed of so that the remaining CFCs are contained. Remember that we still have the problem of the active ozone destroying chlorine atoms that are already in the ozone layer. Let's not exacerbate the problem by adding more.

What you can do

When your car or old refrigerator comes to the end of its life, make sure you dispose of it appropriately instead of dumping it.

Salinity

Salinity is the condition in which a build-up of salt poisons the soil and plant life dies. Salinity is caused by the loss of vegetation that once soaked up rainwater. Instead, the rainwater seeps into the soil, making the water table rise, bringing ancient salt deposits with it to the surface. The Australian government estimates that at the current rate of land salination, over 17 million hectares (42 million acres) of Australian land will be affected by 2050. This salt also poses a threat to wildlife. CSIRO estimates that about 450 species of plant, insect and bird life are under threat in south-west Western Australia alone.

Salinity damages farmland, water supplies, building foundations, roads and other infrastructure. According to the Australian Conservation Foundation, salinity costs Australia

A\$270 million each year in the loss of environmental assets, damage to urban infrastructure and through lost agricultural production. In Australia, there are many federal and state programs coming into force that attempt to reverse the effects of salinity.

What you can do

At a micro level, involving yourself in local Landcare initiatives, particularly tree planting, will help to reverse this degradation.

Sustainability

In the business climate of the eighties, greed was good. Then in the nineties we tightened our belts and the customer was always right. In the new millennium, everyone is talking about the triple bottom line and making their business sustainable. In fact, sustainability is almost becoming a buzzword.

There's nothing new or complicated about the concept of environmental sustainability. It's based on themes that we learnt in kindergarten. Instructions like 'you made the mess; you clean it up' and 'don't take more than your fair share' sit just as well in the grown-up rat-race as they do in the schoolroom.

Anything that can go on indefinitely is said to be sustainable. One common definition is that a sustainable situation is one in which the current needs of the population are met without compromising the ability of future generations to meet their own needs.

In business, people often talk about sustainability in terms of three aspects: economic, environmental and social sustainability. These elements are commonly referred to as the triple bottom line for companies. Companies that adhere to the triple bottom line principles are financially viable, can be sustained by the natural environment and are socially responsible. They are the good corporate citizens.

What you can do

Supporting such companies, via your product purchase or share investment decisions (ethical investing), is the best way to encourage even more companies to behave in an environmentally and socially responsible manner.

- This whole book is dedicated to household sustainability. Try to establish a new greener habit each week.
- An introduction to green investment is included in the Working Green chapter.

Waste

Very few of us in our first world suburban backyards set about deliberately poisoning the earth. We're not exactly burying used plutonium under our garden fruit trees. However, our consumer-based lifestyles do produce a huge amount of waste. Part of this is the waste we actually see, the things we put into our own rubbish bin that are taken away to landfill by the local garbage collection service.

Organic waste such as food and garden scraps will eventually decompose, whether in a compost bin in your backyard or in a landfill tip. Bacteria and earthworms know what to do with this organic matter. However, humans have invented a range of new substances, such as plastics and metal alloys. These are new to nature and rely on chemical decomposition to break down. They can't rely on biological decomposition; the bacteria don't know what to do with them and the worms don't want to eat them. As a result we've got this mounting pile of rubbish that won't go away.

Recycling is providing a way for us to reduce the amount of waste we dump and get further use from our planet's limited resources. Materials such as steel, aluminium and glass need huge amounts of energy to be mined and/or manufactured from raw materials. When you recycle, you're making these materials available for use again. In many cases it takes less energy and water to make a new product from recycled materials than it does from raw

materials. There are many industries that view waste as secondary raw material, valuable manufacturing feedstock that they can make new products out of. So don't bury useful materials in landfill.

Landfill tips have their own environmental problems. When it rains, the rainwater leaches harmful substances from the rubbish into the soil, where they can pollute ground water. Many governments have set up hazardous waste collection programs so that people can dispose of any hazardous items they have in a safe, controlled collection program. Landfill dumps also give off gas. This gas includes greenhouse gases and occasionally some poisonous chemical gases. Many landfill tips collect the gas, which contains a lot of methane, and burn it to produce electricity.

Ultimately, landfill is not a long-term solution to our waste problems. Landfills can go on producing polluting gases and liquid run-off for 20–30 years after they're closed. Landfill leaves the proper solving of the waste problem to future generations.

What you can do

Avoid producing the waste in the first place. Appropriate recycling, composting, and sorting of your household waste can also have an immediate, positive impact. Educating family and friends to do the same will have a multiplier effect.

- Reducing waste and recycling at home is covered in Waste and Recycling.
- Reducing waste and recycling at work is covered in Working Green.
- See the guide to composting and recycling in the garden in Green Garden.
- For those concerned about nappy waste, the great nappy debate is included in How to Have a Green Baby.

Hazardous waste

Waste: out of sight, out of mind

A classic example of a hazardous waste fiasco is a waste disposal site in upper New York State in the US. Nearly 22,000 tonnes of chemical waste were dumped. Warnings were forgotten and the new suburb called Love Canal was built on the site. The mistake was found after a foul-smelling liquid began to appear and locals started becoming sick.

Australia produces 3.26 million tonnes of hazardous waste per year. A lot of this waste comes from mining and manufacturing.

As well as displacing huge amounts of earth, mining operations use chemicals such as cyanide, mercury and sulphuric acid to extract the metal from the ore. The discarded tailings (the excavated rock left over once the ore is removed) are often highly toxic and can seriously pollute ground water and surface waterways.

Manufacturers have also produced some nasty by-products and not known what to do with them. Drums of toxic chemicals, solvents, pesticides and tar have been dumped or buried. The problem with buried hazardous wastes is that they're often forgotten.

Many of these toxins are harmful to the health of the environment and that of humans. Of particular concern are 'biologically persistent' chemicals, such as dioxins, that accumulate in the fatty tissues of animals and build up in the food chain. While it is hard to pinpoint the causes, there are increasing incidences of cancer, particularly in areas of high pollution.

All of this may seem far, far away from your backyard. Common hazardous wastes that come from ordinary households include left-over paint and solvents, used motor oil, pesticides, some cleaning products, batteries and electronic waste.

What you can do

It often feels futile to try to fight multi-national corporations that have irresponsible waste disposal procedures, but increased vigilance with your own waste at a local level is within everybody's power.

- Hazardous waste tips are included in the waste and Recycling chapter.

- Avoid toxic pesticides. See the Green Cleaning chapter for green pest control indoors and the Green Garden chapter for outdoors.
- Green DIY advice is included in Green Building and Renovating.
- Electronic waste advice is included in the Working Green chapter.

Water quality and pollution

Safe drinking water is readily available and relatively cheap in urban Australia, the US and the UK. However, nearly half the world's population faces a scarcity of water. In countries where safe drinking water is in short supply, it's a precious and expensive resource. Drinking water costs more if you live in a slum in Manila, than if you live in an apartment in London. But with drought and increasing costs for new water infrastructure and upgrading older systems, water charges will rise in Australia in coming years.

While we're creating a demand for water, human activities are also polluting our supplies of it and interfering with the natural mechanisms that help to purify it. Vast tracts of land are being sealed with suburban sprawl. Stormwater run-off from the concrete jungle washes litter and chemicals into rivers and the sea. We're chopping down the trees whose root systems help to filter the water. Agricultural run-off and effluent overflows from animal farms (such as piggeries) also pollute our waterways. The industrial sector contributes a cocktail of chemical nasties to the mix. Unfortunately, water systems have long been used to take waste away from factories in the hope that they'll be sufficiently diluted downstream to become harmless. The waterways, lakes and oceans have also provided a convenient mode of transportation through shipping, but not without environmental consequences, such as oil spills and other water pollution.

As governments and businesses in developed countries have become more aware of the consequences of water pollution, outflows from industry have become more tightly regulated. Now industries have to closely monitor and control their factories' contribution to water and air pollution, though even 'acceptable' levels of some pollutants can be harmful to the environment. Regulations only cover licensed operators, going about their day-to-day business. Often the more dramatic and harmful cases of water pollution come from accidents or illegal dumping.

Our homes can also affect water quality. Garden chemicals can be washed off our land and into stormwater drains, nearby waterways and ground water. In addition, household cleaning products can increase the pollution load on urban sewerage systems or septic tanks. For example, phosphates in laundry products should be avoided.

What you can do

At a local level, careful monitoring of what you put down the drain will lead to a cleaner run-off.

- Grey water reuse can pose a health risk if poorly done. Grey water advice is included in the Water and Green Garden chapters.
- Capturing rainwater and storing it in a tank takes some of the pressure off our stormwater management systems and reduces run-off. Find out about rainwater harvesting in Green Garden.
- Try low-chemical cleaning as outlined in the Green Cleaning chapter.

Water: supply and demand

Water for life

An old American Indian proverb says: 'The frog does not drink up the pond in which he lives'. In other words, a smart person does not completely exhaust their water supply.

All living things, including humans, plants, animals, crops and livestock, need water to survive. Ideally, there has to be enough fresh water readily available in places where it is needed. Agriculture is by far the largest user of water, representing 70% of the world's total water consumption. About 20% is used in industry. Together with the 10% we use in our

homes, this creates a need for fresh water that will keep increasing as the world's population grows.

We tend to take water for granted. We turn the tap on and water comes out. However, there is not an endless supply of water. Australia is the driest populated continent, with a rural sector that's recently been ravaged by drought. Whether or not water restrictions are in force, we're going to have to start using less water in our homes.

Sooner or later we're going to be paying a lot more for the water we use. A number of water policy and consumption studies have been done around the world. Many of them recommend that water authorities increase the price per kilolitre of water to give the public the financial incentive to reduce their water use. Manufacturing standards and building codes are also changing to ensure that all new products and homes are more water efficient.

What you can do

Following the water-saving tips in this book will ensure you save precious drops, as well as dollars, in your home and office.

- Water efficiency is covered in detail in the Water chapter.
- The Green Garden chapter looks at choosing water-wise plants, reducing outdoor water use, water-saving products, grey water reuse in the garden and rainwater tanks.