10 things

We can all do to help nature adapt to a new climate

VICNATURE 2050

People helping nature adapt to a new climate

Credits

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CONTENTS

INTRODUCTION

Victoria is blessed with an amazing environment: from the alps to the mallee, tall forests to deep oceans, from rocky hills to fertile farmlands, wilderness and urban parks. Nature at its best.

Across the state, more than 300 different ecosystems provide homes for thousands of species of plants and animals; plus countless micro-organisms, many of which build our soils and purify our water.

These are the places where we live, work and seek respite; the natural areas we cherish and love. Our memories of the beach, a river, the bush and the farm make us who we are; they forge our sense of identity, of community and of place.

NATURE IN A NEW CLIMATE

As climate change intensifies, many of these places will change – a lot. Some plants and animals will decline, others will increase, some may move somewhere else. Some forests may disappear, some grasslands may turn to shrublands.

As CSIRO scientists Michael Dunlop and Peter Brown put it climate change will alter "the look, sound and smell of places we are familiar with". The natural areas that our children and grandchildren will experience in 2050 will look and feel very different to the places we have cherished.

This outlook poses a quandary for all of us. In a world that is set to be transformed by a changing climate, what can we do to leave the natural areas we value in the best condition possible? What practical steps can we all take to help nature adapt to a new climate?

TEN THINGS WE ALL CAN DO

In October 2015, three science and conservation organisations hosted a two-day symposium in Melbourne to tackle this question. The symposium – called Managing Victoria's Biodiversity under Climate Change – was organised by the Victorian National Parks Association, the Royal Society of Victoria and the University of Melbourne's Bio21 Institute, and was sponsored by Parks Victoria and the Victorian Department of Environment, Land, Water and Planning.

This report is one outcome from that event. It describes 10 positive actions: 10 things we all can do to help natural areas adapt to a new climate. **These actions are underpinned by – and in no way replace – the need to reduce greenhouse gas emissions.** In technical terms, the 10 actions provide an adaptation strategy that complements the mitigation strategy of reducing emissions.

The 10 actions are based on the best available science, as presented at the symposium by leading Australian researchers and synthesised from peer-reviewed papers. Importantly, this science is grounded by comments and feedback from more than 200 conference attendees; many of whom have a lifetime of experience on the land and in the fields of land management and conservation, in both urban and rural areas.

THE NEW AND THE OLD

One surprising outcome – recognised by the scientists and land managers – is that many of the things we need to do to help nature adapt to a new climate are not new.

Most of the key actions have underpinned nature conservation and sustainable land management for decades. Things like working with the entire community; controlling threats, weeds and feral animals; creating secure conservation reserves; and enacting sound land-use plans, will always be important. Diverse, intact, healthy ecosystems will always fare better than neglected, damaged ones.

However, climate change has catalysed new actions and new ways of thinking about questions such as "which species should we plant in revegetation areas?" We hope this report triggers more ideas and conversations.

SHARING THE MESSAGE

We want all of these messages to get out into the world so we created a set of materials for print, web and social media. This report describes the background to all 10 actions. On the website each action is captured in short phrases and images for sharing on social media, especially on Facebook, Twitter and Instagram. We encourage everyone to extend the conversation and to share the messages widely. Just visit **VicNature2050.org** to start sharing!

VICTORIA'S NEW CLIMATE

As you know, our world is getting hotter and, unfortunately, it's going to keep getting hotter for the next 100 years. Future temperatures depend on how much greenhouse gas we pump into the atmosphere. To keep things cool, we need to reduce our emissions.

If we continue to emit high levels of greenhouse gases, CSIRO scientists predict big changes to Victoria's climate. Some of these changes are described in this report and you can learn more at the interactive Climate Change in Australia website.

Cool-temperate rainforest floor. Photo: Phil Ingamells

There are many things we all can do to help nature adapt to a new climate. **Here are 10 great ideas to begin with, all informed by science and inspired by nature.**

Their predictions are pretty gloomy. By 2050, average temperatures in Victoria are expected to be 1.2° to 2.5°C warmer. There will be fewer frosts. There will be more heatwaves and heatwaves will last longer. Sweltering days over 40°C – when fires burn and birds and bats fall from trees – will be two to four times as common. The hottest summers that we remember will, by 2050, be considered "normal".

More rain may fall during intense storms in summer but less rain will fall in winter and spring. There will be less snow. Sea levels will rise – perhaps by 25cm above 1995 levels – and low-lying areas around the coast will flood more often. In 2050, Melbourne's climate will be more like the current climate in Wagga Wagga in central New South Wales. By 2090, Victoria will be hotter still.

We can make things better – by reducing our carbon emissions.

RESHAPING NATURE

This new climate will reshape nature in Victoria. As things get warmer, some plants and animals will move and become common in places where they were rarely seen before. Many will be directly affected by extreme events: mammals and birds may die in heatwaves and trees will suffer in droughts.

Other plants and animals will be affected in indirect ways. There will be more fires in many places. More frequent fires will weaken some plants and promote others. When the plants change, the habitat they provide for animals will alter. Each alteration will cascade across ecosystems in unpredictable ways. And, of course, many of the stresses caused by the new climate will be exacerbated as organisms compete with humans for space and resources, especially scarce resources like water.

We can't stop all of these changes but we can control the degree of change – by reducing our emissions of greenhouse gases – and we can have a big influence on the types of changes that do occur.

There are many things we all can do to help nature adapt to a new climate. Here are 10 great ideas to begin with, all informed by science and inspired by nature.

1. WE ARE LISTENING, ENGAGING AND WORKING WITH PEOPLE

What would you miss the most, if it disappeared from your favourite natural area because of climate change? Should you ask this question, the answers you receive will be many and varied.

I would miss "the smell of the sea and forest", "we would miss shade and food", "peace, and the opportunity that, one day, all will have access to clean air, water and food", "watching wrens … doing their thing, hopping and skipping around the place", "grand old red-gum paddock trees", "sharing the beauty of the natural world with my children", "freshwater, because it makes everything (and everyone) grow".

We all value nature, but for many different reasons. Some see nature as the place where plants and animals live. Others view nature as a source of resources, like clean water and food. For many of us, nature is where we go for a holiday with friends and family. In a busy city office, a small bird outside the window can make us stop and smile.

To help all these forms of "nature" adapt to a new climate, we need one thing: people, Aboriginal and non-Aboriginal, old and young, working together for a common future. People from different walks of life who enjoy, and are good at, different things: planting, organising, growing, recording, weeding, lobbying, enthusing and energising.

Social scientists emphasise the importance of working with people who have different values and experiences to us. Groups with diverse backgrounds can build strong allegiances and create lasting outcomes. A wide support base gives us political clout when we raise issues with our local council, member of Parliament or minister. Diversity is powerful when aligned to a common cause.

Verreaux's Tree Frog. Photo: David Paul/Museum Victoria

LIGHTING THE SPARK

Personal experiences, not learned facts, turn us on to nature. Our childhood fun at the beach, river or farm sparked our desire to explore nature and our commitment to protect the places we value.

In an urban world of gadgets, we risk raising a generation that misses out on fun in the bush. That can't be healthy – for our children or the planet.

To arrest this growing trend of "nature deficit disorder", we must create space and time for children (and adults) to be amazed by nature, so everyone can enjoy "the smell of the sea and forest", "grand old red-gum paddock trees" and "wrens … doing their thing, hopping and skipping around the place". In real life, not on a screen. We need to enthuse a new generation of nature lovers.

Species monitoring in Bunyip State Park. Photo: Tracey Koper

To help nature adapt to a new climate

- We are joining local groups to learn more and to work with others.
- We are respecting the values of all in the community, especially Aboriginal Australians, and finding common ground with those who hold different views.
- We are meeting with land managers, local councillors and members of Parliament.
- We are getting kids outdoors and enthusing a new generation of nature lovers.

2. WE ARE ACCEPTING THAT NATURAL AREAS WILL CHANGE

In 2013, many regenerating stands of Alpine Ash in Victoria's Alpine National Park were killed by repeated wildfires over 10 years. The young trees had no seed capsules and did not resprout; most trees died and few seedlings replaced them. To replace the dead stands, Alpine Ash seeds were aerially sown over 1800 ha. If these stands are killed by a fire in the next 20 years, seeds will have to be sown again. At that time, should we sow Alpine Ash or another eucalypt that can resprout after wildfires, or perhaps a mix?

As climate change intensifies, there will be more days of extreme fire-weather. For this reason, many areas are expected to become less suitable for Alpine Ash, and for other species. The burnt stands of Alpine Ash highlight a dilemma that we and our children will face more and more often as climate change intensifies.

To what extent should we try to save the species and ecosystems that currently occur in a particular area, and at what stage should we accept, or even assist, new plants and animals that are more suited to the new climate?

There are many things we all can do to help nature adapt to a new climate, but there are limits. As climate change intensifies, we will have no choice but to accept more changes in natural areas than we are accustomed to, or – if we choose to prevent changes – to accept more interventions than we are accustomed to. Ultimately, both options may catalyse new ways of thinking and working.

Tree ferns. Photo: Phil Ingamells

To suggest that we will need to "accept" more changes in natural areas does not imply that we should try to "like" these changes. We may not. And yet, we cannot disparage the new native species and altered natural areas that flourish under the new climate.

Our children will enjoy altered natural areas, like the forests of the Central Highlands, for many of the reasons we do: as places to seek respite, to holiday with friends and family, to enjoy nature. Even though those places have changed.

By accepting that natural areas will continue to change under a new climate, by intervening to curtail the changes we do not accept, and by respecting altered ecosystems as they adapt to the new climate, we ensure we do not devalue the natural places our children and grandchildren will cherish, love and work to conserve.

> 'To what extent should we try to save the species and ecosystems that currently occur in a particular area, **and at what stage should we accept, or even assist, new plants and animals that are more suited to the new climate?'**

Fire-killed Mountain Ash, Central Highlands, Victoria. Photo: Phil Ingamells

To help nature adapt to a new climate

- **We are accepting that natural areas will change as climate change intensifies.**
- **We are acknowledging the value of the new ecosystems that climate change will create.**
- **We are making sure we do not denigrate the new native species and the altered ecosystems climate change will deliver.**

3. WE ARE PROTECTING RESERVES AND LOOKING AFTER NATURE ON PRIVATE LAND

Grampians (Gariwerd) National Park is breathtaking. Steep rocky ridges rise above the forested hills and valleys. This single park contains more than one-third of Victoria's native plants and many threatened animals.

While not perfect, Victoria's reserve system is one of the best in the world; it contains examples of most of the state's plant and animal species and most major ecosystems. Victoria's reserves are also popular tourism destinations, and contribute more than $1 billion to Victoria's economy every year. And reserves are places where everyone can enjoy nature with family and friends.

As climate change intensifies, many species and ecosystems in the Grampians National Park (and every other park) will change. Some plants and animals will decline while others enter and become more abundant.

SAVING THE STAGE

No matter how much species change, a secure system of conservation reserves and Indigenous protected areas provides the **stage**, or **arena**, where new combinations of native plants and animals can colonise, compete, grow and evolve; especially the many species that cannot survive in disturbed areas like farms and towns.

In the words of CSIRO scientists Drs Suzanne Prober and Michael Dunlop:

"A network of perpetual conservation reserves, designed according to principles of comprehensiveness, adequacy and representativeness (CAR), remains a highly appropriate mechanism for conserving a diversity of natural environments" under a changing climate.

NATURAL REFUGES

The steep, rugged terrain of the Grampians forms a natural refuge against climate change. Steep slopes, shaded gullies and broad valleys all have different micro-climates, so species need only move short distances to reach more hospitable areas; seeds, for example, may spread from a hot, north-facing slope to a shaded, southerly slope.

Rugged terrain can also protect plants and animals against extreme events like large wildfires, because slopes and rocks create protective "fire shadows". In other places, fertile soils and reliable water sources – like rivers and wetlands, soaks and springs – create refuges that buffer the effects of harsher climates.

GROWING NATURE ON PRIVATE PROPERTY

Conservation needs more than reserves, of course. Two-thirds of Victoria is owned privately, and private land is critical for helping nature adjust to a new climate. Many endangered ecosystems (like native grasslands, woodlands and many wetlands) occur only on fertile soils, and most fertile soils are on private land, especially in farming areas.

Remnants and plantings on private property have many values. They provide a home for plants and animals, help animals move across regions, shelter livestock, store carbon and beautify the places in which we live. More and more landholders have recognised these benefits by planting local trees and shrubs, fencing rivers and remnant vegetation, removing weeds and more.

As climate change intensifies, it will become more and more important to save nature on private land. For this reason, we need to make sure landholders can continue to apply for incentive payments to improve remnants and to plant "climate-ready" native vegetation. These actions benefit all of us.

LONG-TERM FUNDING

Conservation and sustainability are long-term, systemic issues that cannot be properly addressed using unreliable, short-term funding schemes. Every time we do this, we create familiar problems: like planting trees in a drought (because we have to spend all the funds by the end of the year) or launching a new campaign to plant trees without first investing in seed collection, seed orchards and community nurseries.

As climate change intensifies, our land "of droughts and flooding rains" will be hit by more droughts and more flooding rains; the climate is expected to become more variable. To deal with this variability, we need stable, long-term strategies and funding programs that are flexible and responsive to rapidly changing local conditions; not quick, political fixes that arrive after the horse has bolted.

And, of course, we need to make sure governments provide enough money to deal with these issues properly.

Superb Fairy Wren. Photo: David Paul / Museum Victoria

The funds required to help nature adapt to a changing climate are small when compared to the size of our total national budget, as Professor Michael McCarthy from the University of Melbourne has shown:

"$10 million per year is predicted to save all of Australia's bird species from extinction over 80 years. $10 million is equivalent to 4 hours of defence spending in Australia."

For 20 years, Australian researchers have led the world in designing "decision support" tools that help managers allocate conservation funds efficiently and effectively. By forcing us to articulate exactly what we want to achieve, these tools help us work out how to get the "the best bang from our green dollar". We need to continue to develop new ways to plan for the future and make decisions together to help nature adapt to a new climate.

To help nature adapt to a new climate

- **We are protecting our wonderful national parks, Indigenous protected areas and other conservation reserves.**
- **We are finding and protecting important climate refuges.**
- **We are planting and protecting native vegetation on our property.**
- **We are encouraging more incentives to plant native vegetation on private land.**
- **We are campaigning for stable, long-term funding for the environment.**
- **We are using new methods to get the best "bang for our buck" from every dollar.**

4. WE ARE REMOVING THREATS SUCH AS CLEARING, WEEDS AND FERAL ANIMALS

In 2015 the group Environment East Gippsland challenged a government department in court. Their goal was to protect important, unburnt habitats of three threatened owls – Sooty, Powerful and Masked owls – from logging. Their win in an out-of-court settlement creates a better future for these beautiful animals.

As climate change intensifies, more (not fewer) natural areas will be needed to protect nature, to store carbon, and to benefit society. We can't afford more losses. We need to reduce the threats to natural areas.

The threats we know – clearing, pollution, housing development, unsustainable harvesting, weeds, livestock grazing, feral animals and unsuitable fire regimes – will continue to threaten natural areas, regardless of climate change. We will always have to deal with these hard issues. Under a new climate, most of our work will be "business as usual".

Climate change does not make any of this work less relevant; it makes it more important than ever. Intact ecosystems, large connected patches, and large populations of native plants and animals have the greatest potential to adapt to a new climate.

The best way to help nature adapt to a new climate is to help nature survive in the current climate.

TRANSFORMING SOLUTIONS

As climate change intensifies and Victoria's population grows, natural areas will experience new threats, many caused by people. For example, engineering works that are designed to protect bayside suburbs from rising sea levels could well damage coastal and marine ecosystems.

Monitoring feral deer populations. Photo: Federation Training students

> 'Climate change does not make any of this work less relevant; **it makes it more important than ever.'**

To address big social and environmental problems, we will (ultimately) need to find the types of solutions social scientists call "transforming solutions" rather than reacting responses. Transforming solutions seek new ways to think about and address problems, in ways that aren't tied to past practices. By contrast, reactive responses create quick, short-term fixes that lock in past practices.

The quest for transforming solutions is not naive or over-optimistic; in the end, all of our big responses to climate change will be transformative. Our goal is to get there sooner rather than later.

On the other hand, we don't need to "solve" every long-term problem now, or anguish because we cannot. With our local communities we can develop adaptation pathways: plans that describe future "triggering" events (like big floods) and which suggest ways to respond after each event occurs. Adapting to a changing climate will always be a "process of adjustments over time" rather than a problem we can solve in one hit.

Blackberries in the Dandenong Ranges. Photo: Phil Ingamells

To help nature adapt to a new climate

- **We are campaigning to stop vegetation clearing.**
- **We are advocating for land-use policies that protect the environment.**
- **We are removing threats such as weeds and feral animals.**
- **We are seeking long-term, 'transforming' solutions rather than reactive stop-gap fixes.**

5. WE ARE USING NATURAL PROCESSES LIKE FIRES AND FLOODS TO PROMOTE DIVERSITY

Bottle Bend Lagoon lies beside the Murray River near Red Cliffs. Naturally, the lagoon would flood, dry and flood again in a regular cycle. But in the 1920s a weir was built downstream on the Murray. For the next 75 years, the lagoon was covered with water. It finally dried out in 2002, during the drought, and things quickly turned bad. The chemistry of the soils changed for ever. The dry lake bed turned to acid.

Wetlands like Bottle Bend rely on natural cycles of flooding and drying. They degrade when kept flooded for too long and, at the other extreme, when kept dry for too long. The only way we can prevent this problem is to manage environmental flows so that Bottle Bend Lagoon, and other important wetlands, can continue to flood, dry and flood again in regular cycles.

All natural ecosystems are supported by natural processes and disturbance regimes. Wetlands rely on cycles of flooding and drying; coastal estuaries depend on the waxing and waning of the tides; forests, heathlands and other ecosystems rely on specific fire regimes.

Many animals rely on, or are most common in, forests that have not been burnt for long periods of time. We must not destroy their habitats by burning too often.

We must always make sure human activities do not constrain these important ecological processes. Sound planning policies are critical. For example, local, state and federal governments must continue to guarantee water for the environment, control the spread of housing in bushland areas, use fire regimes that promote biodiversity, minimise development in flood-prone coastal areas, and more.

The Nankeen Night Heron relies on healthy wetlands. Photo: David Paul/Museum Victoria

Sound land-use planning underpins a healthy and vibrant economy, society and environment.

Natural areas will change as climate change intensifies and the natural processes and disturbance regimes that support them, like fires and floods, will also change. Current regimes (and regimes from the past) may not create diverse, sustaining ecosystems in the future; they will however provide lots of valuable information to guide us. Regardless of changes, we must always ensure that natural processes operate in ways that sustain natural ecosystems and promote natural diversity.

REPLACING CRITICAL NATURAL FEATURES

In recent years, Manna Gums have died across thousands of hectares on the Monaro Tableland in southern NSW. No young trees have replaced them. Tree deaths were most severe where the least rain fell.

This devastation has triggered a lot of discussion: if Manna Gums will not survive in this region under a new climate, then what (if any) species should we plant in their place?

One obvious way to promote biodiversity is to replace the dead trees with species from nearby dry regions that perform similar functions to Manna Gums. Functions like:

- Pulling up water and nutrients from the subsoil through deep roots.
- Casting shade from a wide canopy.
- Producing seasonal food in flowers and fruits.
- Providing a place for animals to hide and hunt under peeling bark.
- Forming holes for nesting in old branches.
- Dropping leaves and logs to the ground for animals to live in.

More broadly, we can help plants and animals by replenishing key habitat features, especially features that create cool and moist micro-habitats like shady trees, hollow branches, logs and leaves on the ground, and reeds and rushes around dams and wetlands. We may never replace Manna Gums on the Monaro but we can replenish the habitat Manna Gums used to provide.

Black Saturday fire at Wilsons Promontory National Park. Photo Phil Ingamells

To help nature adapt to a new climate

- **We are making sure human activities do not damage important natural processes that promote diversity.**
- **We are using natural disturbances like fires and floods in ways that benefit nature.**
- **We are keeping and replacing natural features that boost biodiversity (such as paddock trees and hollow logs) when they are lost or damaged.**

6. WE ARE CONNECTING LANDSCAPES AND USING "CLIMATE-READY" PLANTS

Project Hindmarsh is an inspiration. Since 1998, volunteers and landholders have planted more than a million trees and shrubs to re-connect vast areas of native vegetation in western Victoria: from the Big and Little Deserts, through Lake Hindmarsh to the Wimmera River. More people are doing wonderful things in other places. And every project, big and small, inspires more great work somewhere else.

For decades, groups have toiled to re-connect isolated patches of bushland and, at bigger scales, to increase ecological "connectivity" across entire landscapes: by protecting remnants and planting new patches to form stepping stones, corridors, biolinks, flyways and more.

To keep up with climate change, many species may need to migrate across long distances. Unless they can migrate or inter-breed, plants and animals risk being stranded in places that will become more and more intolerable. Unfortunately, our farms, cities and dammed rivers stop lots of organisms from going anywhere, while their environment changes more and more rapidly.

To help species survive under climate change, we need to create landscapes that help species to move: far and fast. We can do this by linking patches in local areas and building networks across regions, as demonstrated by big projects such as Project Hindmarsh, the Great Eastern Ranges Initiative and Habitat 141. We can help aquatic animals and plants move along rivers by building fish-ways over dams and weirs and by directing environmental flows to streams and wetlands.

Australian Bass. Photo: David Paul/Museum Victoria

Shady trees lower the temperature of river waters and river banks on hot, dry days. Rivers and wetlands are important refuges for animals so wet places are key destinations for climate-ready plantings. We can help animals adapt to a new climate by planting trees that cast shade over rivers and streams and by linking wet places with shady plantings.

"CLIMATE READY" PLANTINGS

The species and genetic varieties we plant in these linkages must also be suitable in a new climate. The vegetation that grows in an area now, and that grew there in the past, will change as the climate changes; some species will decline, others will become more common, while others will adapt to the new conditions.

We can create "climate ready" plantings by planting species that are most likely to survive in a new climate including Australian species that now grow in hotter and drier areas. Similarly, when we plant local species that grow across large areas, we can include seed stock from drier and hotter regions of Australia, instead of relying solely on local provenances of local species. This increases the genetic diversity in our plantings, and will give planted populations more chances to adapt to a new climate.

Suggestions to use "non-local" plants should not encourage a "free-for-all" approach when selecting species. Instead, we can promote the regional distinctiveness of every part of Australia by choosing species and seed stocks from nearby areas and by avoiding plants from other countries and distant parts of Australia. More work needs to be done to create lists of "climate-ready" native plants for every region.

Project Hindmarsh tree planting. Photo: Brett Wheaton

To help nature adapt to a new climate

- We are connecting landscapes so species can move more quickly across long distances.
- We are protecting and creating biolinks, flyways, stepping stones and corridors.
- We are planting native trees and shrubs to cast shade along rivers and creeks.
- We are using native plants from nearby hot and dry areas and increasing genetic diversity in our plantings.

7. WE ARE WELCOMING NATURE INTO OUR CITIES

In 2010, a group of Grey-headed Flying-foxes – large fruit bats that are vulnerable to extinction – first appeared in a park in Bendigo. Their numbers have waxed and waned since then, but the park now provides a permanent home and breeding place for these beautiful animals. Over the past 30 years, Grey-headed Flying-foxes have moved into many cities in southern Australia: Melbourne, Geelong, Bendigo and Adelaide. They always get a lot of media attention. Flying-foxes alert city people to a world of nature.

The flying-foxes in Bendigo are one of many examples of how cities can help nature adapt to a new climate. Big cities like Melbourne, Geelong and Adelaide were founded on fertile soils, by rivers, wetlands and the coast. We built our cities in the most productive and biologically diverse parts of the world.

As the cities grow, many of the original ecosystems have become threatened. Melbourne and Canberra keep spreading into endangered natural grasslands, Sydney into endangered woodlands and coastal ecosystems. Many of Australia's threatened plants and animals, including the Striped Legless Lizard and the Button Wrinklewort daisy, live in urban (as well as rural) areas. Their survival in urban areas depends on good urban planning, management and care.

Dragonfly. Photo: David Paul / Museum Victoria

> 'Study after study has shown that **nature improves human health and well-being.'**

MAKING CITIES MORE LIVEABLE

City parks and reserves are also the places where many of us have our first exciting encounters with nature. Parks need our support just as we need parks to support us. Urban nature makes people better. Trees lower city temperatures and make hot summers more bearable. Parks, rivers and beaches make great places to relax and have fun.

Study after study has shown that nature improves human health and wellbeing. People who live and work in places with more parks, trees and animals have lower levels of stress, show less aggression and are less likely to suffer from attention-deficit disorder and other ailments.

Natural places in urban areas promote social engagement and trigger our sense of community and place. A view of a park from our office window even improves our productivity at work. We feel better when we welcome nature into the city.

Pacific Black Duck. Photo: David Paul/Museum Victoria

To help nature adapt to a new climate

- **We are making space for nature in urban planning.**
- **We are supporting urban parks and reserves.**
- **We are reminding others that nature makes our cities more liveable.**

8. WE ARE RECORDING CHANGES IN OUR LOCAL AREA

The Millennium Drought hit birds hard. Many birds died and, unfortunately, many species did not fully recover in the wet years that followed. Luckily, birds fared better in some places than others: more birds survived in places that had lots of trees, especially where there were trees along rivers and streams.

What can we learn from these birds? Two things. First, climate change will not affect plants and animals in a direct, straight-forward way. Species will not simply die out or migrate to cooler areas. Instead, they will be affected by many, many factors, including how many trees there are along rivers and streams. And many changes will be very hard to predict; even if they do seem obvious in retrospect.

The second lesson is: long-term monitoring is really important. We now know how severe droughts affect birds because researchers and volunteers went out and recorded birds in the same areas over and over again. Without long-term data, we cannot see, and we cannot hope to influence, the many ways that plants and animals will respond to a new climate.

We knew we needed more long-term monitoring long before climate change was apparent. Climate change makes this need even greater. We need information to make sure we don't lose things without knowing it – especially "the little things that run the world", the soil micro-organisms, invertebrates and fungi.

The more we know about how things change, the more we can anticipate future changes, and the faster we can act to reduce losses. Information gives us the power to take action to save species and natural communities.

Gang Gang Cockatoo. Photo: Jenny Barnett

THE POWER OF CITIZEN SCIENCE

In a single week in October 2015, more than 38,000 Australians identified more than one million birds in the Aussie Backyard Bird Count. No single research project could ever collect this much information.

We can all collect important data on plants and animals. The Backyard Bird Count and projects like the Great Koala Count, FungiMap, Red Map (for marine organisms), NatureWatch and the Atlas of Living Australia collate millions of observations from enthusiastic citizen scientists. Every observation adds to our knowledge of nature. Fantastic citizen science projects like these keep us engaged with nature and provide vital information on how plants and animals are adapting to a changing world.

NatureWatch species monitoring project.

To help nature adapt to a new climate

- We are observing plants and animals and recording changes in our local area.
- We are joining nature-based, citizen-science programs.
- We are advocating for long-term monitoring and research.

9. PROMOTE BIODIVERSITY IN ALL THAT WE DO

The waters off the Victorian coast contain all sorts of sea life. You may see a sea-horse, a sea-star, a sea-urchin or sea-squirt, definitely some seagulls, sea-shells, sea lettuce and seaweed. And, if you wait long enough, you may even see a sea-cucumber, sea-turtle, sea-lion and seal.

We value this diversity in its own right. With our children, we gaze in rock pools at a spectacle that took millions of years to evolve.

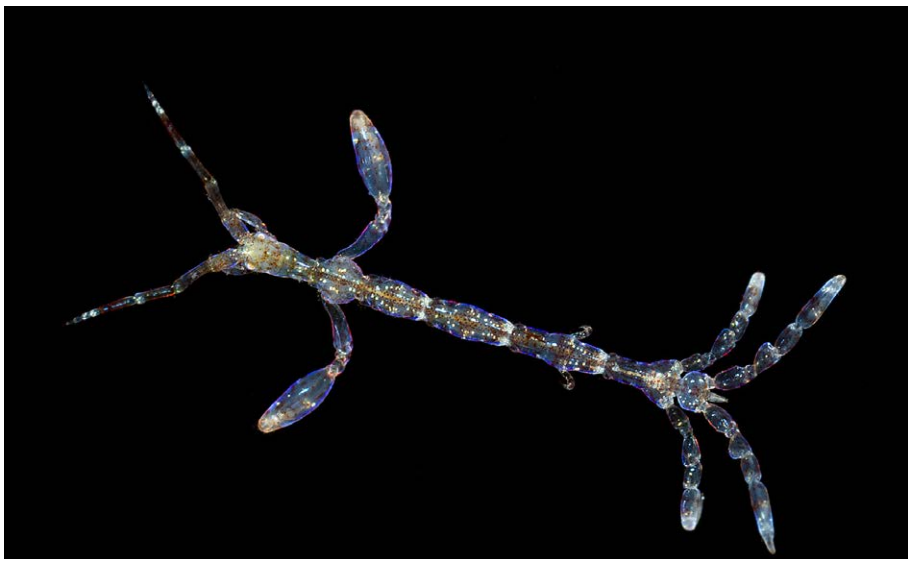
We also value diversity for practical reasons. Diverse ecosystems are more stable and productive than poor and degraded systems. They are better at resisting invasion by unwanted exotic species. Diverse ecosystems provide ecosystem services that benefit humans, like filtering water and storing carbon. And diversity – from invisible genes to gigantic ecosystems – is the seed of future adaptation and evolution. Diversity begets diversity.

In helping nature adapt to a new climate, our fundamental goal is to ensure that all of our actions create diverse, self-sustaining ecosystems. This sounds obvious, but some practices we considered useful under a stable climate – such as restoring historical ecosystems and planting local species and local genetic stock – may constrain or reduce diversity under a new climate.

DIVERSITY IN ACTION

We can inject diversity into our activities in many different ways. As described earlier, a key way to promote diversity is to work with people with different values, backgrounds and skills.

There will always be a lot of uncertainty about how the climate will change in each region, and how society and nature will respond to a new climate. Given this uncertainty, we should always strive to do things in more than one way instead of putting "all our eggs in the one basket".



Marine life is wonderfully complex: a marine amphipod (*Phtisicidae vassilenko*). Photo: David Paul/ Museum Victoria

And of course we want "no regrets" approaches that don't paint us into a corner and reduce options in the future. We really don't know how lots of things will work out, so we need to keep as many options open as we can.

GENETIC DIVERSITY

When animals from one isolated population of the endangered Mountain Pygmy Possum were crossed with animals from another population, their genetic diversity increased, the females had more offspring and the size of the population increased.

New research on Australia's threatened mammals has shown that isolated groups of animals tend to have distinctive genes. This distinctiveness came about when the populations became isolated and could no longer inter-breed; the genetic diversity within the isolated populations declined. Each population now has less potential to adapt and evolve in the future; which is a big problem under a changing climate.

We can promote genetic diversity in isolated populations of animals and plants by connecting habitats so that animals and plants (and their seeds and spores) can move across landscapes. We can also introduce plants and seeds from nearby hotter and drier areas into local areas, to create "climate-ready" populations. We can maintain distinctive habitats in each region by selecting species from close to the planting area instead of using plants from other parts of Australia or the world. Diverse, self-sustaining populations and ecosystems are a key to helping nature adapt to climate change.

Mountain Pygmy Possum. Photo: Glen Johnson

To help nature adapt to a new climate

- **We are doing things in more than one way instead of "putting all our eggs in one basket".**
- **We are connecting landscapes so animals and plants can move and inter-breed.**
- **We are planting species from nearby places so we keep our regions distinctive.**
- **We are increasing (and never decreasing) the genetic diversity of plants and animals.**

10. WE ARE KEEPING POSITIVE, INFORMED AND ENGAGED

An ex-Prime Minister of Australia once called climate change, "the great moral, economic and environmental challenge of our generation". That's a big challenge to cope with.

We can all help nature adapt to a new climate, in ways that suit every one of us: whether through political or personal action, at local or global scales. We need them all.

We can't rely on other "special people" – this is a job for everyone. But we do have to take special care of ourselves, because our greatest strength will always be our ability to stay positive. Whatever the task, positivity inspires us to keep going and others to join in.

If that sounds glib, it shouldn't. Sometimes, keeping positive will be really, really hard. We and our children will see the natural areas we love change in ways that will never be reversed. We will see society respond in ways that, in the long run, cannot be helpful. Yet, positivity will lie at the heart of all the great things we achieve.

This report reminds us of the many practical things we can do to help nature adapt to a new climate. We can reluctantly accept the changes we cannot stop and devote our energy to the things we can influence. We can celebrate every success, no matter how fleeting or small. We can continue to learn and grow.

And every so often, we can take time out to reflect and recharge. As we re-charge we rejuvenate ourselves and those around us. In the big scheme of things, the things we achieve are invaluable but the things we inspire others to achieve are superlative.

Volunteers take part in grassland monitoring near Melbourne. Photo: It's a Wildlife

> 'We can ... **devote our energy to the things we can influence.'**

To help nature adapt to a new climate, we need to take special care of ourselves. We will always need more than that, but we cannot get by with less.

Never doubt that a small group of thoughtful, committed, citizens can change the world. Indeed, it is the only thing that ever has."

– Margaret Mead

Bunyip State Park community day. Photo: Christine Connelly

To help nature adapt to a new climate

- We are striving for a positive future.
- We are focusing on the things we can influence.
- We are celebrating our successes and sharing new knowledge.
- We are pausing to reflect, re-charge our batteries and learn new skills.
- We know that every small action inspires others to do more.

Alpine Marsh Marigolds. Alpine ecosystems are highly vulnerable to climate impacts. Photo: Colin Totterdell

VICNATURE 2050

To learn more about the VicNature2050 project visit www.vicnature2050.org or email us at vicnature2050@vnpa.org.au