



The United Nations has declared 2010 the International Year of Biodiversity

All things bright and beautiful

Beyond ourselves, our pets, and the plants and birds that fill our gardens, we may not realise what an extraordinary variety of life exists on this earth. From the tiniest micro-organism, to the largest and most complex eco-system, life exists in a delicate balance.

We are an important part of this balance, not only because we, too, are one of the billions of species on earth, but because we have a unique power to impact upon other species and ecosystems.

As ecological issues have emerged into the social consciousness over the past decades, our views on humanity's relationship with the rest of Creation has evolved. We no longer think of it as our role to dominate and subdue the creatures on earth, but rather to protect, and act as stewards of Creation.

This shift in attitude reflects a timely development in our understanding of how our actions impact upon other species and ecosystems. We now know that the human-accelerated phenomenon of climate change, amongst other human activities, is having an enormous impact on the earth's biodiversity.

In the International Year of Biodiversity, this issue of **Watermark** will explore what's at stake and what we can do to help.

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Why biodiversity?

You may be wondering why the United Nations chose biodiversity to be the focus for a whole year of activities. Is it really *that* important? It's easy to see how we rely on a variety of plants and animals in our daily lives, be it in the food we eat, the air we breathe or our means of transportation or labour. There are, however, many less obvious ways in which we depend on biodiversity in our modern lives.

When we talk about traditional alternatives to western medicine we often hear about "herbal remedies", and there is an assumption that modern medicine is divorced from the natural world. However, medicines derived from plants ("phytomedicines") actually comprise a large part of the treatments prescribed in the western world today.

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Don't it always seem to go...

...that you don't know what you've got 'til it's gone?

These famous lyrics from Joni Mitchell's environmental folk anthem 'Big Yellow Taxi' are more relevant today than ever, particularly in the work of Professor Lesley Hughes. Professor Hughes works as the Head of the Department of Biological Sciences at Macquarie University. She studies the impacts of climate change on those species and environments struggling to survive since we "paved paradise". Professor Hughes also authored part of Australia's contribution to the last Intergovernmental Panel on Climate Change (IPCC) assessment report. In the following interview she shares her experiences in studying biodiversity, and how we can all be involved in helping to protect it.



**Professor
Lesley
Hughes**

What is biodiversity?

Biodiversity is the sum total of all the variety of life on earth. From the genetic level to the ecosystems that those genes eventually contribute to. It's all life on earth. The variety and the interactions.

What is the importance of biodiversity?

It's different things to different people. We are part of biodiversity. All the food we eat is from some species which is growing in a community of other organisms which is growing in an ecosystem of interacting organisms and interacting communities. So, without some biodiversity we cannot exist.

Some people take a rather economic rationalist view of biodiversity, and believe that we should conserve biodiversity because species provide us with services and goods - from food to clean water and clean air. Other people regard genes and species as things that should be allowed to exist in their own right - they have intrinsic value. There's another viewpoint that connects the first two, which argues that there may be a whole lot of species out there whose value and importance we may not yet know about. So there's another argument to conserve biodiversity because you don't know what impact something's had until you've actually lost it. All of those arguments to me have validity. The value of biodiversity is a combination of all those things.

How would you compare the value of our built environment to that of biodiversity?

It's a question of replace-ability for me. Once a species has become extinct you can't get it back. You could build the Opera House again, you could probably build it cheaper the second time and with better acoustics! However, the technology is not there to create a new Tasmanian Tiger no matter how many people try. Nature can do things that humans can't.

For example, we still use beagles at the airport to sniff out drugs. There is no technology that can do that even one millionth as well as a dog can.

Where do humans fit in the biodiversity spectrum?

We are the dominant part of the system. In ecology we have a term called "keystone species". Keystone species are those species that dominate the functioning of the ecosystem around them - disproportionately to their biomass or their numbers. Humans are the absolute classic keystone species. We're not the most abundant organism on earth, but we certainly have the greatest impact. That's because, unlike most species, we can control our environment, and we can destroy it.

"Nature can do things that humans can't"

How can we redress this imbalance?

We have to learn better to live within our means. We're all familiar with the term "carbon footprint" but we can also talk about about an "ecological footprint", which not only measures our carbon dioxide (CO₂) emissions, but things like our water use as well. If you visit the website <http://www.epa.vic.gov.au/ecologicalfootprint/default.asp> you can work out your own ecological footprint. You can also see different footprints on a national level. If everyone in the world had the ecological footprint of the average Australian, how many planets worth of resources would we need? It's nice to think that everyone on earth could have the same standard of living, but at our present rate of resource use the earth couldn't afford that.

Do you see the issues of biodiversity loss and climate change as intrinsically linked?

Yes I do. I think this is gaining attention in the media as well. For example, when you see an article about climate change in Australia they'll

often mention the Great Barrier Reef. There is very good recognition that it is already suffering from the impacts of climate change, and everybody recognises that there's value in preserving the biodiversity of the Great Barrier Reef - even if only for bringing in tourist dollars.

What are some issues affecting biodiversity loss that are not the product of climate change?

There are lots of stresses on biodiversity without climate change. Habitat loss and fragmentation is one of them; exploitation; overfishing; pollution; taking water flows away from natural areas and putting them into agriculture. The major issue is habitat loss due to clearing. And that's always been the major cause of ecosystem degradation and species extinction. It's basically just loss of area where species can live. Climate change is just a new stress on top of that.

Just as climate change adds another stress on top of these existing factors, can our efforts to mitigate climate change also benefit biodiversity?



I think there are real potential benefits of doing carbon mitigation effectively for biodiversity as well. If you preserve forests to prevent carbon emissions, you also preserve the habitat. However, if you simply say "I've got this abandoned land, I'm going to grow fast-growing plantation pine trees" you will get the carbon sequestration, but you won't necessarily get much of a biodiversity benefit. There are potential things that you can do to have a win-win situation.

What is being done to preserve biodiversity in Australia?

I think the Non-Government Organisations like World Wildlife Fund (WWF) are doing a lot of very big and very good programs. There are two main strategies being employed at the moment. Firstly there is agitation to get more area - both marine and terrestrial - formally protected in national parks. Australia has about 12% of its land area in reserve, which of course means that it has 88% not in reserves. So the second strategy is to provide incentives for private landholders to manage their land to conserve biodiversity. There's a growing

recognition that this "off-reserve" conservation is needed, because there'll always be more land that's off reserve than on reserve.

How do you feel about the role of research currently in this field?

I think that there's some very good research going on, but I think that it's not translated very well into policy. I've learnt over the last 10 years that in order to make an *actual* difference you have to be very proactive as a scientist. I think there is increasing recognition that we've got a pretty good idea of what the impacts of climate change *might* be, what we need now is more research on, a) the technology to stop the emissions, b) human behaviour and its impacts, and c) adaptation research.

"We know what to do. We just have to do it"

What is adaptation research?

Adaptation research basically recognises that there are going to be big impacts whether we're good at mitigating or not. We have to find out how to *adapt* as best we can to those impacts in order to ameliorate the most negative consequences. Adaptation research asks "what are we going to do about it?". "How can we manage things?" There are all sorts of alternative management policies we could bring into place, how do we research how to get the best one? It's easy to make projections and predict the impacts of climate change, but I think the real pointy end of research now is the question "what do we do about it?"

That question applies to all of us - what are we as individuals or communities, going to do about it?

There are many many things. There is potential for personal behavioural change, There is potential for political advocacy. Unless our politicians understand that we are willing to make *personal sacrifices* in our way of life, for the greater good or for the future of our children, then they won't act. So there's no silver bullet, there's no single thing, and there's nothing that people haven't already come up with. We know what to do. We just have to do it. Stop thinking about it, stop wringing your hands. Just do it.

If you are looking for helpful tips on ways you can reduce your ecological footprint, Professor Lesley Hughes recommends the CSIRO book 'Climate Change: What You Can Do About It' by Paul Holper and Simon Tok (2008).

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Indeed, the majority of traditional uses for medicinal plants and herbs have been retained in western medicine, to treat not only minor ailments, but also life-threatening illnesses such as cancer, heart disease and asthma.

Many pharmaceutical companies dedicate a large amount of time and money to gathering samples of plants from remote locations, in order to test them for medicinal potential. As the diversity of plant life on earth shrinks, so too does the possibility of finding new treatments for those diseases that ail our society. As Professor Hughes noted, we must value biodiversity not only for the variety of life we have seen and studied, but for all of those species we are yet to discover.

Caring for people and planet

While we must do our best to slow climate change in order to prevent biodiversity loss, there are certain species that are already adapting to the changes in our atmosphere. Unfortunately not all adaptations are good.

Cassava is the main source of nourishment in poor communities in Africa, and it is also widely eaten across East Asia. Unfortunately, increased levels of CO₂ in the atmosphere has led to an increased concentration of hydrogen cyanide (HCN) in the cassava plant. Ingesting too much of this poison can lead to problems with paralysis of the legs - a condition reportedly affecting 9% of people in Nigeria.



This example illustrates the interconnectedness of some of the biggest problems facing our planet and its peoples. Climate change and biodiversity loss not only directly threaten plants and animals, but also people, particularly those already struggling with poverty. Fighting climate change and promoting biodiversity are key challenges if we are to protect not only our way of life, but our very lives themselves.

Reflection

When British scientists first examined the platypus, they thought the bizarre specimen must have been a fake. Such is the uniqueness of Australia's marine and terrestrial wildlife. The sheer variety and beauty of life has always inspired awe and wonder in us - and will continue to - as an estimated three quarters of Australia's biodiversity has not yet been identified.

When we observe the birds in our gardens, the flowers in our vases or even the food on our

dinner plates, let us remember the intricate web of genes, species, communities and ecosystems from which these simple features of our daily lives have sprung. Let the beauty and the nourishment that these living things provide us encourage us to act to protect their very existence.

Of course, struggling to *sustain* life reminds us that there was a time *before* life. Our creation stories tell us that when God made this earth, He looked upon the creatures He created and "saw that it was good".

From the smallest gene, to the tallest tree, to the most complex ecosystem, may we always protect those bright and beautiful lives that God created. May we, too, see that they are good.

Web Links



Biodiversity in Australia

A great site with lots of links to more information.

<http://www.environment.gov.au/biodiversity/>

BushBlitz

Find out more about this survey of Australia's National Reserves and see Australia's top 10 new species!

<http://www.bushblitz.org.au/>

Eco-footprint calculator

See how your lifestyle compares!

<http://www.wwf.org.au/footprint/>

World Environment Day

An A-Z of ways to live a more eco-friendly life.

<http://www.unep.org/wed/2010/english/A-Z.asp>

Australian Wildlife Conservancy

Read more about Australia's threatened species.

<http://www.australianwildlife.org/Wildlife-and-Ecosystems/Australias-Biodiversity-Crisis.aspx>

Put your money where your mouth is

Donate to the ACF's campaign to save Australian species.

<https://support.acfonline.org.au/SSLPage.aspx?pid=276&eid=12855>

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