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Dr Damian Michael - An Ecological Pragmatist

The recent book launch of 'Rocky Outcrops in Australia' by two of the world's most respected ecologists, ANU Professor David Lindenmayer and Dr Damian Michael shines a spotlight on the cultural, biological, economical and historical significance on those seemingly barren rocky island formations that pepper our farmlands and natural reserves.

By Joanne Leila Smith | April 2018

As a budding Olympic gymnast in his youth, Senior Ecologist at The Australian National University Dr Damian Michael had a natural affinity for rock climbing. After migrating to Australia from the UK when he was seven years old, Michael says he has always held a fascination for all things reptilian, which led him on a marvellous journey through the world of Australia's vertebrates.

While most bushwhackers might argue that a good snake is a dead one, Michael has devoted the past two decades trying to convince people otherwise.

"We had a pond in our backyard, which was full of newts and I was always bringing them into

the house much to mum's horror. Growing up, my family spent a lot of time camping, hiking and rock climbing. When I finished school, I ended up doing an environmental science degree after meeting my now wife, Tracy, while grape-picking in Victoria in 1996. We moved to Albury [NSW] and the degree ticked all the boxes for me. I thought, environmental science, outdoors, wildlife, it was a no brainer. I thought I'd become a park ranger. There was a romance about it as we have some amazing national parks, but I soon realised that a lot of the interesting stuff that I wanted to do was being outsourced by the Government. So, the idea of being a ranger became less attractive. However, I was fortunate enough to do a postgraduate

degree through Charles Sturt University which involved the examination of reptiles in a threatened grassland ecosystem in the northern plains of Victoria. This basically re-triggered my love for reptiles," says Michael.

According to Michael, reptiles are still a poorly understood group of animals, with 19 percent of the world's reptiles having formal classification, conservatively speaking. However, with the rapid increase in molecular and genetic technology over the past decade, scientists have been able to better closely study and re-categorise animals into groups with greater accuracy.

“Twenty years ago, there were 700 reptile species described in Australia. Due to technological advancement, we have now described over a 1,000-reptile species. We know a lot about warm fuzzy mammals because we have a natural affection for them, but invertebrates aren’t as charismatic as these, so we don’t have nearly enough people working on them! However, there is a renewed interest in frogs and reptiles, so it’s now ‘fashionable’ so to speak... I’ve been trying to sell snake conservation in Australia for twenty years! It’s a hard sell,” laughs Michael.

Increased efficacy in technology has also meant that the resolution of mapping the kind of rocky outcrops Michael, and co-author Professor David Lindenmayer study is now so fine grain, that scientists are discovering previously unknown data about the kinds of animals who feed, breed and shelter on rocky outcrops – particularly with formations that were previously inaccessible due to remoteness.

“Research by scientists from James Cook University have shown that over time, reptiles tend to become restricted to rocky outcrops and then diverge. So, a rocky outcrop that is only one to two kilometres away can have a completely different species of gecko even though they share a common ancestor, they have been isolated

for long enough that they can no longer breed,” says Michael.

In 2008, Michael started his research on agricultural landscapes in South Eastern Australia, colloquially known as the Wheat Sheep Belt; where most of Australia’s wool and cereal crops are grown. This belt spans the breadth from the Western Plains of Victoria, including all inland slopes through New South Wales right up to Queensland. The belt encompasses critically endangered woodland species, with 85% of that land now cleared for agriculture.

“We look at the small patches of endangered animals that remain after land-clearing. I noticed that there were these rocky outcrops that had been cleared of vegetation. I spoke with David [Lindenmayer] to see what animals were living on them, as these rocky outcrops are effectively islands of habitat embedded in a hostile matrix of farmland. This was when I really started to investigate their ecological roles - and from a reptilian perspective - as they were my original focus,” says Michael.

Five years later, Michael and Lindenmayer released their latest book, ‘Rocky Outcrops in Australia: Ecology, Conservation and Management’ published by CSIRO Publishing in February 2018.

While Michael says this book covers general themes which are applicable across all of Australia – he also argues that it is just as relevant to human agricultural landscapes anywhere else in the world.

“Managing the conservation of rocky outcrops is not a unique problem to Australia. It is a global phenomenon. From my perspective, there is a public perception that rocky outcrops in farmlands are a barren wasteland with no ecological or economic value. Nothing could be further from the truth. Rocky outcrops are in fact biological hotspots. A hotspot is an area that generally has a disproportionate number of species, relative to its area. It could be only one hectare, but may support a wealth of wildlife, particularly reptiles, and rocky outcrops sustain these populations,” says Michael.

According to Michael, rocky outcrops should be protected because they have important ecological, social, economic and cultural values.

“There were artifacts and old stone wells used by Indigenous peoples. Some farmers have found stone tools around the outcrops like grinding tools where early Australians used to grind flour. Outcrops were also hideouts for bushrangers and many rocky outcrops bear the names of some notorious bushrangers through parts of WA, NSW and QLD. In Albury, we have one outcrop called Morgans Lookout, after bushranger Mad Dog Morgan. He used to hide there from authorities before he was caught, but back in the day, these were refuges for people too. There are also a whole host of plant and animal life. So biologically and culturally they are significant, and then there is the history of them being important economically. For example, in Western Australia, water runs off these large rock

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domes where runways were placed at the bottom of the rock wall to divert water into storage basins. This enabled the opening of a vast area of land where there was no water, so farming could further expand into the interior of the country. This is very common in WA and is a topic extensively covered in Ian Bayly's book 'Australia's Granite Wonderlands,'" says Michael.

According to Michael, a small rocky outcrop one hectare in size will support a viable lizard population. While he says this may lead to inbreeding, which results in mutations, if it's not deleterious to that gene pool, new species emerge.

"All these isolated outcrops are separated only by one or two kilometres. The interesting thing is that because Australia is such a variable landscape, you do get land-bridges of vegetation that connect, so over time, species do interbreed and form hybrids over a geological time scale. We need to have viable populations. When we chop up the landscape and clear it, we leave these fragmented isolated populations and then random things can occur, like a bush fire or a drought which can cause local population extinctions. If this happens the population cannot recolonize as they can't move through the landscape," says Michael.

To combat this, Michael and Lindenmayer work closely with landholders, farmers and other natural resource management groups to help integrate our farming landscapes with biodiversity by making stepping stones - creating

corridors for species to migrate between rocky outcrops.

According to Lindenmayer, long-term research programs can help farmers make a significant difference to the environment and their bottom line, through the adoption of wildlife friendly farming practices.

"We are working closely with the Ian Potter Foundation, the Vincent Fairfax Family foundation and Local Land Services on a visionary new project that aims to show that a farm that is better managed environmentally is better off financially, and substantially improves a farmer's mental health and wellbeing," says Lindenmayer.

Michael elucidates.

"The landholders and farmers understand that the wildlife on their farm has a direct economic impact on the yield of their crops. For example, if you put a shelter belt in, plant trees, it will protect livestock from the extremities of weather, and research has found that doing this increases lambing rates by having these windbreaks. Historically, our farming practices were European, which was to clear all the land, put the livestock in the open, improve the pastures by removing native grasses and fertilising the land, and introduce exotic grass. That's all fine if you have a consistent climate, but Australia does not. So, the fathers of the farmers we work with, cleared the land, but their sons are now putting green back into the land. Within one generation, we have witnessed a major turnaround. Landcare Australia, which was a grassroots organisation that started in 1980s was driven by landholders

to enact environmental change to combat dry land salinity. It became a huge issue in the 1980s. Once the trees went, the water table rose, and with the rising table, it brought all the salts to the surface, and that's where it sat. Putting trees back into the landscape reverses this and increases pasture growth, so it's a win-win for vegetation and the farmers," says Michael.

According to Michael, this network of rocky outcrops across Australia are 'nodal points' in the landscape and their restoration should be high on the national agenda.

"The framework is there – the rock, some have been quarried, but we need to put a buffer around our rocky outcrops by planting them back out again, which has the same benefits regarding lowering the water table, providing shelter belts for livestock by putting the trees and shrubs back into these landscapes as 'islands'. This will also attract a whole host of insects that will then pollinate canola crops. There have been independent studies that shows an increase in crop yields by having shelter belts and nodes of planted areas in the landscapes," says Michael.

For Michael, ecology represents the interaction between plants and animals at multiple spatial scales and over time, and, humans are not removed from that equation.



ANU Professor David Lindenmayer has published 45 books and over 1,100 scientific papers covering conservation biology, landscape and forest ecology and woodland conservation.

"I see us as a species within the same network. So rather than saying, what the farmers do is wrong, or lock up the forest, which is a counterargument for biodiversity conservation in human-modified landscapes, I'm from the school of thought that we are all part of the same system. We don't want to stop forestry, farming, or major industry, we want to work together by using ecological principles to ensure that these systems are going to be sustaining in a 1,000 years' time," says Michael.

We asked Lindenmayer why he thinks collaboration between farmers is so integral to the success of conservation management.

"Farmers are the decision makers and so long-term partnerships using field-based staff are required to ensure the science is delivered directly to help guide on ground

environmental and farming decisions. Our experience with working with farmers is that win-win solutions to solving environmental and productivity problems can be achieved, with adoption being driven by farmers demonstrating positive financial gains from environmental works. Triple bottom-line benefits to biodiversity, the economy and rural mental health can't be ignored," says Lindenmayer.

According to Lindenmayer, arresting biodiversity loss will be the biggest conservation challenge facing Australia over the next decade.

"Stemming biodiversity loss in agricultural regions of Australia is a massive conservation challenge as 66 percent of the nation's land has been converted to farming enterprises. Conservation in these areas is not seen as traditional

because it's outside of the National Reserve system. We are tackling this problem by forging long-term partnerships with landholders and natural resource management agencies to ensure the most up-to-date science is communicated to a broad audience," says Lindenmayer.

Michael puts his take on the situation a bit more bluntly.

"We get shit thrown from us from both sides of the fence. The greenies don't like us and neither do the browns. We try to forge a win-win outcome. We don't want to kick landholders off the land because humans need to eat too. We don't want to stop industry or lock up forests either. While it's hard to find a win-win solution, we believe it can be done. In the agricultural sector, there is a big push to intensify landscapes even further by using GM crops

and maximising yields through intensification. Small farmers are selling up to major corporations which are buying up massive farms. They're knocking down fences, they are getting rid of natural assets, they can still clear vegetation, (which is quite controversial in Australia), which means we end up with these large-scale farms that are intensively managed to become monocultures. They don't want biodiversity on their land, they want it elsewhere. Our argument is that it doesn't have to be mutually exclusive. We are trying to appeal to them and demonstrate that they can be financially more secure by increasing biodiversity and pass on their farm to the next generation that will be a more sustainable, rather than a high-risk farm. That's what we try to do," says Michael.

If ever there was a team-terrific, Lindenmayer and Michael fit the trope. After working closely together for the past 18 years, Lindenmayer has emerged as one of the world's leading conservation biologists and landscape ecologists.

With a team of eight on-the-ground ecologists who run long-term biodiversity monitoring programs throughout different parts of SE Australia, Lindenmayer's team's programs are partly funded by local and state governments, in particular, the Australian Government's National Environmental Science Program, Threatened Species Recovery Hub and the Australian Research Council.

"David spends an awful amount of time trying to raise funds to keep these really crucial programs running. He's been lobbying very hard to get the great forest national park in Victoria up and running which takes into account all the water catchments east of Melbourne. It's a very special part of the landscape, with lots of stuff going on there in terms of the logging industry, water catchment, old growth forest and animals like the endangered Leadbeater's Possum," says Michael.

According to Lindenmayer, the interaction between biodiversity, finance and mental health in rural Australia has not been adequately addressed.

Michael also claims that there is a correlation between farmers who experience better mental health are those who participate in increasing biodiversity on their land; i.e. they are more financially competitive, and therefore experience less struggle, which makes them mentally healthier.

"We have worked with landholders for the past twenty years. We don't do a hard sell, we just want to disseminate our findings in as many formats as possible. We work with the natural resource management agencies directly who take this information to a state and local level. We act as a bridge between natural resource management organisations and the farmers by being passive observers; we collect data, put together our findings and share it with the relevant stakeholders with recommendations to improve the landscapes for all today, and in the future," says Michael.

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