Published in *A Year in the Life of Australia* in 2014 by The Conversation and Future Leaders (www.futureleaders.com.au)

PART TWO
COUNTRY AND CONSERVATION

'Dreamtime' and 'The Dreaming' — an introduction

Christine Nicholls

In 2002, Jeannie Herbert Nungarrayi, formerly a Warlpiri teacher at the Lajamanu School in the Tanami Desert of the Northern Territory, where I worked for many years first as a linguist and then as school principal, explained the central Warlpiri concept of the *Jukurrpa* in the following terms:

> To get an insight into us — [the Warlpiri people of the Tanami Desert] — it is necessary to understand something about our major religious belief, the Jukurrpa. The Jukurrpa is an all-embracing concept that provides rules for living, a moral code, as well as rules for interacting with the natural environment.
>
> The philosophy behind it is holistic – the Jukurrpa provides for a total, integrated way of life. It is important to understand that, for Warlpiri and other Aboriginal people living in remote Aboriginal settlements, The Dreaming isn't something that has been consigned to the past but is a lived daily reality. We, the Warlpiri people, believe in the Jukurrpa to this day.

In this succinct statement, Nungarrayi touched on the subtlety, complexity and all-encompassing, non-finite nature of the Jukurrpa.

The concept is mostly known in grossly inadequate English translation as "The Dreamtime" or "The Dreaming". The Jukurrpa can be mapped onto micro-environments in specific tracts of land that Aboriginal people call "country".

As a religion grounded in the land itself, it incorporates creation and other land-based narratives, social processes including kinship regulations, morality and ethics. This complex concept informs people's economic, cognitive, affective and spiritual lives.

Everywhen

The Dreaming embraces time past, present and future, a substantively different concept from populist characterisations portraying it as "timeless" or having taken place at the so-called "dawn of time". Unfortunately, even in mainstream Australia today, when and where we should know better, schmaltzy, quasi-New Age notions of "The Dreaming" frequently still hold sway.

The Australian anthropologist W.E.H. Stanner conveyed the idea more accurately in his germinal 1956 essay *The Dreaming*, in which he coined the term "everywhen":

"One cannot 'fix' The Dreaming in time: it was, and is, everywhen" wrote Stanner, adding that The Dreaming " … has … an unchallengeable sacred authority".

Stanner went on to observe that: "We [non-Indigenous Australians] shall not understand The Dreaming fully except as a *complex of meanings*" (my emphasis).

It isn't possible here to offer more than an introductory glimpse into that constellation of meanings, any more than it would be to convey anything approaching a comprehensive understanding of other world religions in a brief article.

Words in Aboriginal languages for and about the concept of "The Dreaming"

B.C. ("Before Cook") there were approximately 250 separate Aboriginal languages in what is now called Australia, with about 600–800 dialects.

It is apposite and relevant to map Australia's considerable geographical and environmental diversity onto this high level of linguistic and cultural diversity. Therefore, it won't be surprising to learn that there is no universal, pan-Aboriginal word to represent the constellation of beliefs comprising Aboriginal religion across mainland Australia and parts of the Torres Strait.

Unfortunately, since colonisation, this multiplicity of semantically rich, metaphysical word-concepts framing the epistemological, cosmological and ontological frameworks unique to Australian Aboriginal people's systems of religious belief have been uniformly debased and dumbed-down — by being universally rendered as "Dreaming" in English — or, worse still, "Dreamtime".

Neither passes muster as a viable translation, despite the fact there's an element or strand in Aboriginal religion that does relate to dreams and dreaming.

As Maggie Fletcher (now visual art curator at the Adelaide Festival Centre) wrote in a 2003 Master's thesis — for which I was the principal supervisor — *"Dreaming" Interpretation and Representation*: "… an entire epistemology has been reduced to a single English word".

Not only that, words from many different languages have been squished into a couple of sleep-related English words — words that come with significantly different connotations — or baggage — in comparison with the originals.

As noted earlier, the Warlpiri people of the Tanami Desert describe their complex of religious beliefs as the *Jukurrpa*.

Further south east, the Arrerntic peoples call the word-concept the *Altyerrenge* or *Altyerr* (in earlier orthography spelled Altjira and Alcheringa and in other ways, too).

The Kija people of the East Kimberley use the term *Ngarrankarni* (sometimes spelled Ngarrarngkarni); while the Ngarinyin people (previously spelled Ungarinjin, inter alia) people speak of the *Ungud* (or *Wungud*).

"Dreaming" is called *Manguny* in Martu Wangka, a Western Desert language spoken in the Pilbara region of Western Australia; and some North-East Arnhem Landers refer to the same core concept as *Wongar* — to name but a handful.

Satellite terminology for understanding "The Dreaming"

As with other world religions such as Christianity and Judaism, there is an extensive, closely affiliated ancillary vocabulary complementing the central Indigenous term — that is, accompanying each specific Aboriginal language group's name for their religion.

In the case of the Christian religion, word-concepts such as *Holy Trinity, Advent, Ascension, Covenant, Pentecost, apostle, baptism* and so forth, ideas with which many readers will be familiar, are also germane to coming to a deeper understanding of that religion.

So it is with Aboriginal religious belief. The Warlpiri religion, the Jukurrpa, has a host of word-concepts that are important adjuncts to the core concept. Included among these is *kuruwarri*, defined in the Warlpiri dictionary as:

> visible pattern, mark or design associated with creative Dreamtime (Jukurrpa) spiritual forces: the mark may be attributed to these forces, or it may symbolise and represent them and events associated with them; mark, design, artwork, drawing, painting, pattern.

Pirlirrpa is defined as "the spirit, the soul, the person's essence", and is believed to reside in the kidneys; *yiwiringgi* is a person's Conception Dreaming, defined in the Warlpiri dictionary as an individual's:

> life-force or spirit which is localised in some natural formation and which may determine the spiritual nature of a person from conception and the relation of that person to the life-force.

Or, in lay terms, closely related to the place where the mother believes she conceived the child. As Warlpiri man Harry Nelson

Jakamarra — also in the Warlpiri dictionary — further elucidates, a child's Conception Dreaming derives from the location where the mother believes her child to have been conceived:

> … Kurdu kujaka yangka palka-jarri, wita, ngapa kuruwarrirla marda yangka wiringka, ngula kalu ngarrirni kurdu yalumpuju Ngapa-jukurrpa. Yalumpu ngapangka kuruwarrirla kurdu palka-jarrija.
>
> [When a baby is conceived, it might be in an important Rain Dreaming place, then they call that child Rain Dreaming. The child came into being in that Rain Dreaming site.]

Another key word in relation to the Jukurrpa, *kurruwalpa* has been defined by the Polish-French anthropologist Barbara Glowczewski as: "the spirit-child which, returning to the site where it had entered its mother, waits to be reincarnated into another child-to-be-born".

There are numerous other associated word-concepts too, all relating to the central idea of the Jukurrpa, some of which are too sacred or gender-specific to reveal.

A challenge for all Australians

Also akin to mainstream world religions, while these geographically and doctrinally diverse Indigenous Australian religious concepts do have a level of commonality — as is demonstrably the case with different denominations and branches of Christianity, Judaism, Islam, and so forth — these Aboriginal religions cannot be regarded as monolithic entities.

Analogous with Christianity, in which there are doctrinal differences affecting the beliefs and practices of those who adhere to Protestant, Catholic, Orthodox or Coptic branches of Christianity, Indigenous regional and cultural differences need to be taken into account in order to develop a real understanding of the religion known in English as "The Dreaming".

But what differentiates Aboriginal religion from other religions is its continuity with local landscapes, or what Indigenous artist Brian Martin has described as "countryscapes".

Dreamings, founded upon the actions of Dreaming Ancestors, Creator Beings believed responsible for bringing-into-being localised geographical features, land forms such as water-holes and springs, differ across the length and breadth of Australia. (For obvious reasons, there's no Oyster, Stingray, Shark, Octopus, Squid or Saltwater Crocodile Dreaming in Central Australia.)

The universal translation of these terms as "Dreaming" needs to be questioned. If Australia is to grow as a nation, to make right the relationships between Aboriginal and non-Aboriginal Australians, it's time to start using the original terminology from Indigenous languages, to learn how to pronounce the words, and to talk about the Manguy, Jukurrpa, or Ngarrankarni, in place of the catch-all "Dreaming".

It's a more difficult path, but could also teach the rest of us a thing or two about Indigenous cultural, linguistic and religious diversity.

"Dreamings" and place — Aboriginal monsters and their meanings

Christine Nicholls

A rich inventory of monstrous figures exists throughout Aboriginal Australia. The specific form that their wickedness takes depends to a considerable extent on their location.

In the Australian Central and Western Deserts there are roaming Ogres, Bogeymen and Bogey women, Cannibal Babies, Giant Baby-Guzzlers, Sorcerers, and spinifex and feather-slippered Spirit Beings able to dispatch victims with a single fatal garrote. There are lustful old men who, wishing to satiate their unbridled sexual appetites, relentlessly pursue beautiful nubile

young girls through the night sky and on land — and other monstrous beings, too.

Arnhem Land, in Australia's north, is the abode of malevolent shades and vampire-like Wind and Shooting Star Spirit Beings. There are also murderous, humanoid fish-maidens who live in deep waterholes and rockholes, biding their time to rise up, grab and drown unsuspecting human children or adults who stray close to the water's edge. Certain sorcerers gleefully dismember their victims limb by limb, and there are other monstrous entities as well, living parallel lives to the human beings residing in the same places.

The existence of such Evil Beings is an unremarkable phenomenon, given that most religious and mythological traditions possess their own demons and supernatural entities. Monstrous beings are allegorical in nature, personifying evil.

In the Christian tradition, we need to look no further than Satan. In the Tanakh, "The Adversary", as a figure in the Hebrew Bible is sometimes described in English translation, fulfils a similar role. Often, akin to many of the Monstrous Beings that inhabit Aboriginal Australia, these evil supernatural entities are tricksters, shape-changers and shape-shifters.

The trope of metamorphosis is evident in the real-life stories and media representations in Australia's dominant culture: consider the image of the kindly old gentleman next door or the devoted, caring parish priest, who shocks everyone by metamorphosing into a child-molester — creepy, predatory, though ever charming.

As the celebrated British mythographer and cultural historian Marina Warner has noted:

> Monsters are made to warn, to threaten, and to instruct, but they are by no means always monstrous in the negative sense of the term; they have always had a seductive side.

Warner also observes that mythical, malevolent beings are found the world over. Think of Homer's Cyclops, the Night-Hag of

Renaissance legend or the German Kinderfresser, which snatches and eats its young victims. Such beings embody people's deepest anxieties and fears.

Monstrous beings are also depicted in many visual art traditions. Goya's works of giants and child-eaters, including, for example, his gruesome rendition of Saturn devouring his own child, exemplify this.

All cultures, it seems, have fairytales and narratives that express a high degree of aggression towards young children. There are many reasons for this, but ultimately it reflects the special vulnerability of the very young with respect to adults and the exterior world.

Monstrous beings in "Dreaming" narratives and art

A terrifying pantheon of monstrous beings is one subject of visual artworks and traditional Aboriginal Dreaming narratives that merits inclusion in any typology of Aboriginal cultural and artistic traditions.

All of these figures materialise fear, bringing it to the surface. At the psychological level, the stories about these entities are a means of coping with terror. To this I would add that such monstrous beings also attest to some of the least palatable aspects of human behaviour, to the nastiest and most vicious of our human capabilities.

Importantly, in Aboriginal Australia, these figures and their attendant narratives provide a valuable source of knowledge about the hazards of specific places and environments. Most important of all is their social function in terms of engendering fear and caution in young children, commensurate with the very real environmental perils that they inevitably encounter.

The desert regions: cannibal country

The monstrousness of many, although not all, of these monstrous Desert Beings lies in their particular disposition towards cannibalism.

In the farthest reaches of the Western Desert, in the Pilbara region, the brilliant although largely unheralded Martu artist and animator Yunkurra Billy Atkins creates extraordinarily graphic images of cannibal beings, including babies.

These ancient, malevolent *Ngayurnangalku* (Cannibal Beings) have sharp pointy teeth and curved, claw-like fingernails. They reside beneath a salt lake, *Kumpupirntily* (Lake Disappointment). In those environs they have been known to stalk and to feast on human prey — to be precise, Martu people.

Of Kumpupirntily, ANU researcher John Carty writes:

> it is a stark, flat and unforgiving expanse of blinding salt-lake surrounded by sand hills. Martu never set foot on the surface of the salt-lake and, when required to pass it by, can't get away fast enough. This unnerving environment is grounded in an equally unnerving narrative. Kumpupirntily is home to the fearsome Ngayurnangalku, ancestral cannibal beings who continue to live today beneath the vast salt-lake.

And if that isn't enough, *malpu* (devil-assassins) inhabit the same vicinity.

As Billy Atkins avows: "It's dangerous, that country. I'm telling you that that cannibal mob is out there and they are no good."

The principal *Ngayurnangalku* (meaning something along the lines of "they'll eat me") narrative centres on two distinct groups of ancestral people, one that wishes to maintain the Ngayurnangalku practice of cannibalism, while the other contingent is vehemently opposed to it.

Martu man Jeffrey James, relating the narrative to John Carty, had this to say:

> [One] night there was a baby born. They asked, "Are we going to stop eating the people?" And they said, "Yes, we going to stop," and they asked the baby, newborn baby, and she said, "No". The little kid said, "No, we can still carry on and continue eating peoples", but this mob said, "No, we're not going to touch".

There isn't any evidence that the Martu people ever practised cannibalism, but given the aridity and sparse distribution of vegetation and fauna on that very marginal and far-flung country, at times, in theory only of course, it must have been tempting.

In this respect, monstrous figures reflect what could be described as the potential vulnerabilities and fault-lines of specific Aboriginal societies and locations. This is so the world over.

Travelling further east into Pitjantjatjara Yankunytjatjara (Anangu) country, but staying in the Western Desert, the fearsome Mamu, also cannibals, hold sway.

With large protruding eyes, they're sometimes bald and in some cases hirsute. Their long hair stands upright, and they're equipped with sharp fang-like teeth capable of stripping off their victims' flesh. Dangerous shape-shifters, they are able to assume humanoid shape, but they're also associated with sharp-beaked birds, dogs and falling stars. The Mamu, who also figure in Warlpiri and other desert groups' narratives, typically reside underground, or live inside the hollow parts of trees.

The anthropologist Ute Eickelkamp has written persuasively about Mamu from a largely psychoanalytic perspective, but also argues in a 2004 article that Western and Central Desert "adults commonly use the threat of demonic attacks [by Mamu] to control the behaviour of children".

The belief system relating to Mamu activity has extended into the post-contact lives of older Anangu people. This is demonstrated by the elderly Pitjantjatjara people who accounted for the mushroom cloud released by the 1956 British program of testing atomic bombs at Maralinga on Anangu land as evidence of Mamu wrath and fury at being disturbed in their underground dwelling places and therefore rising up in a huge, angry dustcloud.

Trevor Jamieson recounts his family's experience of the Maralinga testing program in the theatrical work *Ngapartji Ngapartji*.

Among other sorcery figures that feature in *Anangu Tjukurpa* ("Dreamings") is *Wati Nyiru* ("The Man Nyiru", the Morning Star). Wati Nyiru chases the Kungkarangkalpa, the celestial star sisters comprising the constellation known to the ancient Greeks as the Pleiades, through the night sky, with sexual conquest (among other things) on his mind.

The formidable artist Harry Tjutjuna, who paints at the Ninuku Arts Centre in northern South Australia, has become feted for his renditions of the Wati Nyiru and also for his Barking Spider Dreaming Ancestor, Wanka.

Further north in Warlpiri country, the Pangkarlangu is one of a number of frightening *Yapa-ngarnu* (literally "human-eating" or "cannibal", or more colloquially "people eater") figures that recur in certain Warlpiri *Jukurrpa* ("Dreaming") narratives. Pangkarlangu are huge, hairy, sharp-clawed, neckless baby-killers, physically described in similar terms to popular representations of Neanderthals or perhaps Denisovans (see the recent work of Adelaide University's Alan Cooper, who has established Denisovan DNA in populations east of the Wallace Line).

The Pangkarlangu's physical attributes were first described to me in the early 1980s by a now deceased Warlpiri woman who spoke little English, could neither read nor write and had never seen a visual representation of a Neanderthal, but her pencil drawing bore a striking resemblance to a Neanderthal.

The Warlpiri Pangkarlangu, which extends further across the Central and Western Deserts, usually wears a woven hair-string belt around his middle. This accoutrement is closely connected to his foul purposes.

Pangkarlangu, huge lumbering bestial humanoids, roam the desert in search of their desired quarry. In their spare time, they fight one another. They are classic representations of what has in recent years been described as "Otherness".

Lost human babies or infants who've crawled or wandered away from the main camp are Pangkarlangus' preferred food source, being juicy, tender and easy to catch. Pangkarlangu grab

their prey by their little legs, upending them quickly, head down, tiny arms akimbo.

Warlpiri adults who are successful hunters use a similar technique to seize good-sized goannas or bluetongue lizards by their tails, in order to prevent them from inflicting deep scratches or painful gashes on the arms or hands of their captors. The Pangkarlangu models his baby-execution method on those human hunters of small game, killing the infants swiftly and expertly — by dashing their brains out on the hard red earth, in a single blow.

After slaying his defenceless victim, a Pangkarlangu will string its little body around his waist, tying its legs onto his hairstring belt, so that its head dangles and bobs up and down as he strides along. The Pangkarlangu will continue on his roving quest for more chubby little babies who've strayed from the care of adults, and goes on catching them until his hairstring belt is full, and he's completely circled by lifeless dangling babes. Then the Pangkarlangu makes a fire, chucking the dead tots onto the ashes, after which he settles down to gorge himself on a mouth-watering meal of slow-roast baby.

On one memorable occasion, in my presence, Lajamanu artist and storyteller extraordinaire Molly Tasman Napurrurla, in blood-curdling language and with hair-raising vocalisation (although if it were possible to appreciate the dark, gothic tenor of the situation, at another level it was hilarious, owing to the brilliant use of black humour in Napurrurla's performance) described and mimed the actions of the Pangkarlangu to an audience of deliciously terrified little children at the Lajamanu School.

Napurrurla reenacted the Pangkarlangu's ape-like ambulatory motion as it clumsily thumped around the desert, with the heads of little babies attached to his hair-string waistband bouncing up and down and swinging about when the large, ungainly creature changed direction.

There was no doubt in my mind that such narratives are first and foremost about social control with respect to the specific

dangers of the desert where, in the summer months, people can die horribly tormented deaths from thirst within a matter of hours. Such monstrous beings and their attendant narratives exist to impress upon and to inculcate into young children the need for obedience to older members of the family, and especially not to wander off into the desert alone, lest they meet a fate perhaps worse than that of encountering a ravenous Pangkarlangu.

Pangkarlangu, like other monstrous beings in Aboriginal Dreaming narratives, whether male or female, are more often than not depicted in figurative form (a rare occurrence in Central and Western Desert art, which is primarily iconographic) with grossly oversized genitals — their enormous members providing surefire evidence of malevolent intent.

Several years ago when I was negotiating with a publisher to write a children's book about monsters in Aboriginal Dreaming narratives, all was going well until I showed him Pintupi artist Charlie Tjararu's beautifully executed and evocative painting of a Pangkarlangu. As I explained the significance of the figure's monstrously-proportioned genitalia, the man turned to me and said: "But, ah, Christine, but how are we going to explain the 'third leg' to the kiddies?"

Monstrous figures in Arnhem Land

As in the case of the desert regions, the repertoire of monstrous figures in Arnhem Land in the wet tropical monsoon-prone far north of Australia, speaks to the inherent dangers of particular environments. This is also reflected in artworks and narratives.

At one level, Yawk Yawks could be described as Antipodean mermaids — except for the fact that they are not benign. These fish-tailed maidens, young women Spirit Beings, with long flowing locks of hair comprised of green algae, live, or perhaps it would be more accurate to say "lurk", in the deep waterholes, rockholes and freshwater streams of Western Arnhem Land in particular.

Children and young people particularly fear them, because they are believed to be capable of dragging people underwater and drowning them. Like most Aboriginal Spirits, they have the capacity to metamorphose, and can sometimes assume a presence on dry land, before morphing back into water spirits.

There are a number of celebrated artist-exponents of Yawk Yawks in Arnhem Land, including Luke Nganjmirra, a Kunwinjku painter working from Injalak Arts & Crafts, Maningrida-based brothers Owen Yalandja and Crusoe Kurddal (carvers), the sons of the late Kuninjku ceremonial leader Crusoe Kuningbal (1922–1984), and Anniebell Marrngamarrnga (a weaver who fashions Yawk Yawk maidens from pandanus) who also works with the Maningrida Arts and Cultural centre.

Also in Arnhem Land are Namorroddo Spirits.

They have long claws and at night fly through the air, long hair streaming, to prey on human victims. Parents control children by cautioning them not to run around outside at night, particularly when there is a high wind, which echoes the sound that the Namorroddos make as they whistle and swish though the night sky, their skeletal bodies held together only by thin strips of flesh.

Namorroddos are somewhat akin to vampires, in that they suck out their human victims' life juices, after killing them first by sinking their long sharp claws into them. In turn, their victims are also transformed into Namorroddos.

And sorcerers abound, none more feared than the Dulklorrkelorrkeng, genderless, or rather, capable of assuming the characteristics of either gender, malignant Spirit Beings with faces similar to those of flying foxes, and that eat poisonous snakes with relish — to no ill effect.

Dulklorrkelorrkeng are known to go around with a whip snake tied to their thumbs, and they live in forests that have no ground water. In many respects they resemble the Namande spirits of western Arnhem Land. The late Arnhem Land artist Lofty Bardayal Nadjamarrek, of the Kundedjinjenghmi people, was

esteemed as possibly the greatest living limner of the sorcerer-spirit Dulklorrkelorrkeng.

This account given here barely touches the surface of this vast topic. It points nevertheless to the extensive reach of Aboriginal Dreamings, culture, and visual art, which have the capacity to portray every aspect of human life, and the lives of other species too.

Ultimately, these monstrous beings and their narratives serve a critically important social function that contributes to the maintenance of life: that of instilling into young and old alike a healthy respect and commensurate fear of the specific dangers, both environmental and psychic, in particular places.

To save Australia's mammals we need a change of heart

John Woinarski

Peter Harrison

John Woinarski
and Peter Harrison

Twenty-nine Australian land mammals have become extinct over the last 200 years, and 56 are currently facing extinction. These losses and potential losses represent over a third of the 315 species present at the time of European settlement. We recently published the first review of all Australian mammals, finding that Australia has the worst rate of mammal extinctions in the world, and the situation isn't improving thanks to feral predators such as cats.

In response, Environment Minister Greg Hunt has proposed investing in research for a cat-killing disease as a form of biological

control. But while biological control will be part of the solution, it is not the silver bullet. The real solution will have to involve a change of heart.

Not a thing of the past

Most Australians know of and regret the extinction of the thylacine — but few recognise that this one extinction is symptomatic of a much more pervasive loss. Twenty-eight other mammals have become extinct since 1788, and we suspect that few would know their names, let alone of their loss.

It is still happening. In 2009, the Christmas Island pipistrelle (a tiny bat) became extinct, and the Bramble Cay melomys may have suffered a similar fate recently, thanks to neglect.

These species are or were not obscure marginalia or predestined for oblivion. Instead, many were common and played important and irreplaceable roles in our country's ecology. These species were part of the fabric of this land. The Australian mammal fauna is the most distinctive in the world: 86% of our 315 land mammal species are found nowhere else.

Since the 1840s we have lost mammals at the rate of one species per decade. On current trends, there will be many more extinctions of Australian mammals in the next one or two generations: we found 56 land mammal species (more than 20% of our land mammals) are now threatened with extinction.

Out to sea, the situation is a little less bleak, but more opaque. Of 58 species reported from Australian waters, six are threatened, but 35 are considered Data Deficient — they may or may not be in trouble, but we don't have enough information to be sure.

Feral cats the greatest threat

It may sound all doom and gloom — and in many respects it is — but it's important to note that conservation can work. Both Gilbert's potoroo and the Bridled nailtail wallaby have been brought back from the brink through dedicated effort.

So, how do we go about saving the rest of Australia's threatened mammals?

Some consider this an economic question — with X amount of dollars, we can save X number of species, but which ones? This is the argument of medical triage, a sharp prioritisation that directs funds only at the most savable and valuable species.

But this is a defeatist mentality. To advocate for species' extinctions by choice or through disinclination is unconscionable. Triage was born on the battlefields of Napoleonic Europe, where life and death choices had to be made in minutes. It is an inappropriate analogy for biodiversity conservation.

A better analogy is with the education system. Our society accepts the obligation that all children should be schooled, and recognises the benefit to society from that premise. So, too, with conservation: we should recognise the obligation to attempt to safeguard all species. In a nation as affluent as ours, this can and should be a realistic objective. But to do so we have to target our resources at the right problems.

Cats are the greatest threat to Australia's mammals. Like many other threats, they are now a pervasive and deeply-entrenched problem, and we recognise that it will not be solved simply or quickly.

There are some measures we can implement immediately: translocating threatened species, establishing a network of cat-proof enclosures, and better management of dingoes and wild dogs (which can help control cat populations).

But we also need to look at long-term solutions. This has formidable challenges. Current trials in cat-baiting are promising, but we don't yet know if they will work on a large scale. Biological control (such as a disease) may take decades to develop, and has to overcome concerns from cat owners, and risks to other Australian wildlife and cat species overseas.

Even so, controlling cats is likely to do more for the conservation of Australia's biodiversity than any other single action.

Learning to care for our country

But we have concluded that we will not solve the mammal extinction crisis simply by repeating the same actions over and over. The problem is far more fundamental.

Conservation is not just an environmental problem; it also charts a moral landscape. How does our society fit into this land? What do we consider is important? Is it reasonable that we gift our descendants only a faint shadow of our country's extraordinary nature?

We have worked extensively in remote Australia. We have shown old Aboriginal men and women stuffed museum specimens of now-vanished mammals, and been struck to our core by their responses: singing the song of that animal, stroking it, telling its story, crying at its loss. Here is an affinity to nature, a deep connection to our land, an ache of responsibility, that we settler Australians have not yet felt or learned. To become part of this country, to care for it properly, we need to grow some of that sense of belonging and affinity. Otherwise, extinctions will continue to be viewed as inconsequential.

Our review of the fate of Australian mammals reflects uncomfortably on our society. Without understanding of our country, without linkages to, and affinity to, its nature, and without a corresponding commitment to its wellbeing, our society will fit poorly in this land and these seas, and we will continue to erode the most remarkable fauna in the world.

We must accept that biodiversity conservation is not only an obligation of government, but a shared societal responsibility.

This article was co-written by Dr Andrew Burbidge, who is a co-author of the action plan. He is a Research Fellow with the WA Department of Parks and Wildlife.

Australia courting danger with the Great Barrier Reef

Barbara Norman

The Great Barrier Reef Marine Park Authority has announced it will allow the dumping of three million cubic metres of dredge spoil from the Abbot Point port redevelopment within the marine park's boundaries, despite other options being available to them.

In doing so, the authority ignored the pleas of a wide coalition of interests that went well beyond the environment movement. The Queensland Tourism Industry Council, the Association of Marine Park Tourism Operators, Whitsunday Charter Boat Industry Association and Dive Queensland had all expressed "grave concerns" about the effects of the dredge-dumping plan on their industry.

So why are so many people concerned? In part, because Australia is now a step closer to seeing the reef being added to a list of World Heritage sites "in danger", possibly as soon as June this year.

While some may dismiss that "in danger" listing as symbolic, it could affect reef tourism, which Deloitte Access Economics has estimated brings in A$6.4 billion a year to Australia in direct spending and employs more than 64,000 people.

So what happens next? And is there anything Australia can do to avoid being added to that "in danger" list?

Protecting our reputation

The federal government is due to report by tomorrow to the World Heritage Centre about what Australia is doing in response to global concerns about the impacts of climate change and rapid coastal development pressures on the reef.

In June, the World Heritage Committee will then consider whether to add the Great Barrier Reef to its list of iconic global sites officially considered to be "in danger".

The committee's principal concerns include the "cumulative" impacts and risks to the reef — that is, the combined effects of several individual developments, including continuing coastal urban development and large-scale port expansions such as the Abbot Point project.

It has asked the Australian government for commitments to "ensure that the legislation protecting the property remains strong and adequate to maintain and enhance its 'outstanding universal values'".

Between now and June, if the Australian government can answer the committee's concerns then there is still a chance that the reef will stay off the "in danger" list — or at least have that decision be deferred. However, the Abbot Point dredge dump decision has undoubtedly made the task much harder.

Meanwhile, the committee has also asked Australia to prepare a long-term sustainability plan, which is due to be completed by February 2015.

As a signatory to the World Heritage Convention, Australia has pledged to implement world's best practice in protecting the reef for future generations.

International concern

The World Heritage Committee has previously raised concerns about the state of the reef, particularly concerning the dredge-dumping proposals. In its review of the health of the reef it recommended:

> A clear and target-driven framework to support planning and assessment of development proposals to protect outstanding universal value, and restore it where necessary, and to ensure resilience of the site, including the consideration of cumulative impacts.

In spite of that international concern, the federal government has made several decisions within the past two months that arguably erode safeguards for the reef, including:

- 10 December 2013 — granting approval for the Abbot Point port expansion (although it was the Great Barrier Reef Marine Park Authority that took the decision on where to dump the spoil);
- 13 December 2013 — reaching a revised agreement with the Queensland government (signed by Prime Minister Tony Abbott and Premier Campbell Newman) for a "one-stop shop" on environmental approvals, including decisions about "actions on state land and state waters that impact on the Great Barrier Reef Marine Park";
- 20 December 2013 — approving the Galilee Coal and Rail Project, allowing for six new mines and a railway from the mine sites (400km inland) to Abbot Point.

Those are all significant decisions to be making, which will have long-term ramifications for the health and tourism value of the reef.

Seeing the bigger picture

On a more positive note, Federal Environment Minister Greg Hunt has promised that the Australian government will be "examining the cumulative effect of human activities and natural forces rather than looking at impacts in isolation".

Late last year, the Great Barrier Reef Marine Park Authority also expressed concern over "cumulative impacts of coastal development activities on ecosystem function". The key question is how will this be achieved given the development decisions that have already been taken.

In November last year, former deputy prime minister and Nationals leader Tim Fischer told a Queensland planning conference that more lateral thinking was needed on ports and coastal development. Mr Fischer suggested that instead of five individual

ports along the Queensland coast, each with their own railway line, another option could be one "super port" away from the Great Barrier Reef.

It's a great idea — but it's the kind of big-picture thinking that has been sadly lacking in planning for the reef and coastal Queensland to date.

What is really needed to rescue the reef is an integrated regional plan. That would take into account the environmental impacts both on land and on water, from port development and associated infrastructure, coastal urban development, agriculture and tourism. It should also factor in impacts such as farm run-off and climate change.

Without such a plan, decisions such as those taken about Abbot Point are piecemeal and premature.

As a maturing developed nation, it's time for Australia to decide what is really important to our future. Protecting the Great Barrier Reef — one of the great wonders of the world and a treasure to be preserved for future generations — must be on that list.

World's largest survey of marine parks shows conservation can be greatly improved

Graham Edgar

This research was a finalist for the 2014 Eureka Prize for Environmental Research.

Marine protected areas have been created across the globe to stem the loss of biodiversity in our oceans. But are they working? Now, thanks to a six-year survey involving over one hundred divers, we

know that the global system of marine protected areas still has much to achieve.

Problems out of sight

The marine environment lies out of sight and is expensive to survey, so its true condition is very poorly known. What we do know is that multiple threats — most notably introduced pests, climate change, fishing and pollution — are pervasive.

We also know that conditions are deteriorating. Numbers of many Australian marine species have collapsed since European settlement. Some species haven't been seen for decades, such as the smooth handfish, which was once sufficiently abundant to be collected by early French naturalists visiting Australia but hasn't been seen anywhere for more than 200 years.

If this were a mammal, bird, reptile, frog or plant, it would be listed under commonwealth and state threatened species acts as extinct. As a marine fish, it has not been considered for any list.

We also know that marine species that build habitat for other species are declining. Coral cover across the Great Barrier Reef has been reduced by about 25% between 1986 and 2004. Global seagrass and mangrove cover has declined by 30% over the past century, with losses accelerating. And oyster reefs have largely disappeared worldwide, as have giant kelp forest ecosystems on the Tasmanian east coast.

Fishery catch statistics also show major population declines in commercially important species such as scallops, rock lobsters, barracouta, trumpeter, abalone, warehou, gemfish and sharks.

These snapshots all consistently indicate major detrimental change in our oceans.

Surveying the threats

Twenty years ago, in a bid to understand the magnitude of this change, I and my Institute for Marine and Antarctic Studies colleague Neville Barrett began regularly surveying rocky reef communities in collaboration with management agencies across

southern Australia. These surveys were focused inside and outside marine protected areas, to disentangle effects of fishing from broader environmental changes.

We found that each marine protected area was different. Recovery within protected areas depended on a variety of local factors, including protected area size and age, how much fishing had occurred prior to regulation, the type of regulations, and whether they were enforced.

To separate these individual factors properly required investigation of tens to hundreds of protected areas, many more than we could logistically cover with our limited scientific resources.

Enlisting citizen divers

This led to the idea of enlisting support from the recreational diving community, and our new study was born.

With pilot funding from the Commonwealth Environment Research Facilities program, and on-ground direction from colleague Rick Stuart-Smith, we sought help from experienced recreational divers across Australia who are passionate about marine conservation.

More than 100 divers agreed to donate their time, learning scientific underwater survey techniques, using their weekends and holidays to collect new data, and spending long hours afterwards identifying species and entering data onto computer spreadsheets.

To facilitate this program, an independent organisation called Reef Life Survey was established. It aimed to train and support member divers during field surveys, and to distribute information collected to improve knowledge and management of marine species. An incredible amount has been achieved over the past six years through the generous efforts of Reef Life Survey divers.

Most importantly, we have established a quantitative baseline describing the current state of inshore biodiversity around Australia. Numbers of more than 2,500 species of fish, seaweeds and invertebrates (such as lobsters, abalone, sea urchins and corals) at more than 1,500 sites have been documented.

This is the largest marine ecological baseline for any continent worldwide. It provides an invaluable reference that can be referred to through the future for tracking impacts of climate change, pollution, introduced species, and fishing.

The Reef Life Survey baseline has also now extended globally through collaboration with scientists in 18 countries, and with additional survey data collected by trained volunteer divers during their overseas holidays.

Parks on paper, not in the ocean

Still the question remains: how effective are marine protected areas at conserving marine life?

We recently analysed data from 40 countries to understand better the underlying factors that make marine protected areas effective as conservation tools, with results published in the journal *Nature*.

We found no difference between fish communities present in most of 87 marine protected areas studied worldwide, when compared with communities in fished areas with similar environmental conditions.

Many protected areas thus seem to be "paper parks" — lines on the map that fail to achieve desired conservation outcomes.

However, some protected areas are extremely effective, with massive numbers of large fish and extremely high conservation value. These effective protected areas are typified by the same recurring features: no fishing, well enforced, more than 10 years old, relatively large in area, and isolated from fished areas by habitat boundaries (deep water or sand).

Protected areas with these characteristics, such as Middleton Reef off northeastern New South Wales, had on average twice as many species of large fish per transect, eight times more large fish, and 20 times more sharks than fished areas.

Getting marine parks right

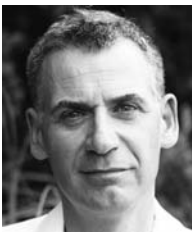
Management agencies around the world clearly need to focus on creating more of these effective protected areas. At the same time they need to alter the design and management of the many existing protected areas that aren't working. The few conservation gems are presently hidden among protected areas that are ineffective because of inadequate regulations or poor enforcement.

We also need to improve broad-scale environmental management more generally, considering how fast our oceans are deteriorating outside of protected areas.

Fishing is one of the last direct connections between humanity and the natural world. As a fisher who supports fishing, I see no incongruity in advocating that 20% of the marine environment be placed in effective no-take protected areas. Leaving 80% open to fishing hardly qualifies as threatening fishers' interests.

Among other benefits, including acting as irreplaceable scientific reference areas, protected areas provide some insurance for future generations against ecosystem collapse.

I have little doubt that 50 years from now fishers will regret the slow pace of developing effective marine protected areas. They will also bemoan consequences of blanket opposition against any protected areas by some politicians and industry lobbyists, and an over-reliance of fisheries managers on computer models that attempt to maximise economic returns with little margin for error in an era of change when model variables increasingly fall outside known bounds.



Is there about to be a dash for Antarctica's resources?

Nick Rowley

Few places have captured the human imagination like Antarctica. It is colder than anywhere on Earth, bounded by rough seas, buffeted by intense winds, home to fauna that are found nowhere else and, as far as we can tell, is a land where no human settlement has ever endured.

A frozen landmass of 14 million square km (almost twice the size of Australia), where only about 4,000 people inhabit scientific bases in the short summer, and a paltry 1,000 in the winter.

It is protected by a historic treaty that safeguards it from mining and development. But as countries, particularly China, expand their presence in Antarctica, this half-century-old agreement is coming under increasing pressure.

Heroic age of exploration

James Cook somewhat egotistically remarked in 1773 that "no man will venture farther than I have done, and … the lands which may lie to the south will never be explored". He was, of course, wrong.

Less than 50 years later, in 1821, the first recorded landing took place and the exploration of the southern continent began. In the late 19th and early 20th centuries, the heroic age of Antarctic exploration gave us stories of men (for they were all men) pushing themselves to the very limits of human endurance. Scott and Amundsen's famous race to the South Pole and the subsequent perishing of Scott and his party is but one example of the publicly and privately sponsored efforts to research and lay claim to the continent.

More than 100 years later, the southern land still remains a hidden and distant frontier. Its remote mystique is the attraction for the more than 25,000 tourists who sailed, flew, or set foot on the continent in the 2012–13 season. Although that is significantly more than the numbers living on scientific bases, it is still only half the number of people who visit Disneyland on a typical day.

And at a time when powerful new technologies are giving us a knowledge and understanding of remote places there is comparatively little interest in the Antarctic. Why be concerned with a place once described by Australian historian and novelist Thomas Kenneally as "the pure and dreadful continent"? After all, it is vast, intensely inclement and not a particularly enticing place for even the most warmly dressed human.

Antarctica on the brink

Yet we should be wary of this complacent, detached mindset. Antarctica may be on the limits of habitability, yet the interest in mining and exploitation is growing.

The Antarctic Treaty itself is an unprecedented agreement to manage human activity and influence over the commons through the principles of peace, cooperation and science. It has proved remarkably robust. In 1991 the treaty's Madrid Protocol banned all commercial mining, with provisions for review in 50 years.

Over recent months and years there has been a steady and growing trickle of news revealing intensifying interest in the place. Discovering diamonds, for instance, is the kind of development that tends to get people excited.

Since the early expeditions, Antarctic research has had the dual purpose of advancing understanding while also signifying national claims on the continent. Now, 50 years after the Antarctic Treaty came into force, under the cloak of scientific research, countries are exploring the potential of the world's last unexploited continent. It has been estimated that under its current polar five-year plan, China is spending around 350m yuan (US$55m) per year on Antarctica.

This funding is going towards significant new infrastructure: a second icebreaking vessel, an ice-capable aircraft, helicopters and a new polar campus in Shanghai. When those trapped aboard the MV *Akademik Shokalskiy* earlier this year were finally rescued, it was notably a Chinese helicopter that transported people to safety.

China in pole position

There is nothing secret about the purpose of this investment. China's leadership is unambiguous about its polar aims. At a Politburo committee conference in July last year, President Xi Jinping emphasised the necessity of polar exploration to "take advantage of ocean and polar resources".

Last month, China opened its fourth research base, a development heralded by President Xi as a further step in scientific understanding and "human development".

Despite the Antarctic Treaty supposedly having put the issue of territorial claims to bed, sovereignty in Antarctica can be seen as somewhat amorphous. States now tend to assert themselves by building research bases, although the colonial-age practice of flag-planting continues.

In 2012, the British Government, without reference to any other party to the Antarctic Treaty, named 437,708 square km of British territory (twice the size of the United Kingdom) as "Queen Elizabeth Land" to mark the monarch's diamond jubilee, despite it overlapping with previous claims by Chile and Argentina. Pull a trick like that anywhere else in the world and it would be tantamount to a declaration of war. But the move received little more than diplomatic rebuke.

Growing political pressure

As the rules of the Antarctic Treaty gradually become less relevant and fit for purpose, established and emerging economies are quietly yet consistently jockeying for position. If China builds its planned fifth research station it will have more than either Britain or Australia, and only one fewer than the United States.

Next month's Antarctic Treaty meeting will go through the standard deliberations conforming to the established diplomatic protocols. Yet the decisions that really matter are increasingly being taken not by delegates to treaty talks, but by the central government agencies of the richest and most powerful countries.

As a country key to the development and strengthening of the Antarctic Treaty, with the largest territory on the continent and a proud history of scientific involvement and exploration, these are matters of huge importance to Australia.

So watch this space. My colleagues and I at the University of Sydney are working to understand and communicate these dynamics, and to address how the intensifying geo-political, economic and environmental pressures will be managed: perhaps through a radical recasting of the Antarctic Treaty, or — more alarmingly — by seeing the treaty replaced with an unseemly dash for resources.