

# The critical importance of an ecological conscience

Daniel Lunney<sup>1</sup>, Harry F. Recher<sup>2</sup>, and Pat Hutchings<sup>3</sup>

<sup>1</sup> Office of Environment and Heritage NSW, PO Box 1967, Hurstville, New South Wales 2220, Australia, and School of Veterinary and Life Sciences, Murdoch University, Western Australia 6150.

<sup>2</sup> Australian Museum, Sydney, NSW 2010, and School of Veterinary and Life Sciences, Murdoch University, Western Australia 6150.

<sup>3</sup> Australian Museum, 6 College Street, Sydney NSW 2010.

## ABSTRACT

In the plenary sessions of the Royal Zoological of NSW forum *Science under siege: zoology under threat*, Charles Krebs and Gordon Grigg expressed the view that scientists should speak up about the crisis in biodiversity. Indeed, they asserted that scientists should act as the ecological conscience of a nation. Their opinion became the organising theme of this book. The importance of this idea emerges clearly from the writings of Aldo Leopold: "If we grant the premise that an ecological conscience is possible and needed, then its first tenet must be this: economic provocation is no longer a satisfactory excuse for unsocial land-use (or, to use somewhat stronger words, for ecological atrocities)." Since Leopold's initial publications in the late 1940s, his powerful ideas have affected thinkers in a variety of fields, including theology, agriculture, journalism, philosophy, and psychology. This paper examines how thinkers in these fields have engaged with the idea of an ecological conscience. It also examines media coverage of environmental issues in early 2013, and shows that although media stories are valuable in publicising issues which may otherwise receive little attention, these stories rarely convey the idea of an ecological conscience. Although the grumpy scientists in this book belong to a variety of disciplines, they share a belief in the critical importance of an ecological conscience. They contend that we need a shift in values away from human exceptionalism – the belief that humans are superior and in control of a passive world – and towards the acceptance of human responsibility for environmental degradation. The collective voice of the grumpy scientists adds valuable weight to the already compelling case for the urgency of developing an ecological conscience.

**Key words:** Aldo Leopold; biodiversity crisis; economic growth; environmental ethics; flying-foxes; hunting; science communication; science education; ecological conscience; wildlife and the media

## Introduction

<http://dx.doi.org/10.7882/FS.2013.021>

In the third plenary of the Royal Zoological Society of New South Wales forum *Science under siege: zoology under threat*, ecologist Charles Krebs (2012a: 130) commented that "retired people – university professors in particular, and government people – are really the conscience of an ecological nation." This epigrammatic phrase was vital in shaping the current forum and this book. In making that remark, Krebs referred to a similar comment by Gordon Grigg (2012: 126) in the same plenary. Grigg had stated his strong belief in the importance of scientists assuming advocacy roles, and in the continuing relevance of retired scientists to public debates concerning environmental issues. This is a powerful reiteration of the view that scientists should speak up – that, indeed, they should be the ecological conscience of a nation.

In Krebs' perspective, this responsibility does not diminish after retirement; rather, it grows. Yet there is also a subtle message in his statement. He noted that "retired people... are really the ecological conscience of a nation." What is so special about being retired? Does retirement generate more insight because it allows one to stop and reflect on a lifetime of study? Does it generate more knowledge, derived from decades of research, more wisdom, or a level of intellectual freedom that is not available to people still

at work? If it is the latter, then we have a major problem. If a young researcher identifies an impact on a population of animals, a habitat, or an ecosystem, do others have to wait until that researcher retires before they can learn of the problem? Does the researcher publish the work in a timely manner so that others can act, or do they write the material to be published in so careful a manner as to avoid causing alarm or drawing attention to the problem? More importantly, does this lead to the study of a particular population or place being curtailed, and the researcher directed to another area that does not clash with the dominant paradigm of economic progress?

Krebs' (2012b) paper is devastating in its critique of the dismantling of the CSIRO Division of Wildlife and Ecology. In his view, the demise of the Division left a large gap in the research agenda for biodiversity in Australia. CSIRO had been one of the premier research organisations in the world, but a series of questionable decisions by politicians and managers, which displayed a lack of vision, had catastrophic impacts on its functioning, and greatly reduced the ability of CSIRO scientists to study biodiversity. He noted that increasing public interest in Australia's iconic flora and fauna was matched by decreasing governmental support for it, in the apparent

belief that Mother Nature will take care of herself. Krebs' bitter irony is more than apparent. If the CSIRO Division was an isolated case, its dismantling might have its own internal causes, but the downsizing of the groups and organisations which research biodiversity, whether as ecologists or as members of the critical group of associated disciplines, is happening across the nation, including at State level. Their loss diminishes our capacity to identify and study a problem, and propose and test solutions. In short, the destruction of such vital organisations as the CSIRO Division decreases our chance of reducing the losses to our fauna and flora, and of making the best use of the scarce resources available for conserving biodiversity.

Krebs used the term 'ecological conscience' before, in the preface to his ecology textbook *The Ecological World View* (Krebs 2008). His opening lines are graphic. He posits that, in the twenty-first century, two views of the world dominate our thinking; the ecological world view, and the sharply contrasting economic world view, to which governments and business leaders subscribe. He also states that if one understands how the natural world works, one is far more equipped to think with an ecological conscience. Krebs does not derive the term from the famous American naturalist Aldo Leopold, although its origins can be found in Leopold's writings. Krebs acknowledges Leopold as the father of wildlife management in the USA (2008: 407), and Leopold's work is seminal to the contemporary conservation ethic. In a speech in 1947 entitled 'The Ecological Conscience', Leopold stated that "the practice of conservation must spring from a conviction of what is ethically and aesthetically right, as well as what is economically expedient" (Leopold 1995: 58). Leopold argued that a thing is right "only when it tends to preserve the integrity, stability and beauty of the community", defining the boundaries of this community as including not only people, but also soil, waters, fauna, and flora. Most significantly, he contended:

*"If we grant the premise that an ecological conscience is possible and needed, then its first tenet must be this: economic provocation is no longer a satisfactory excuse for unsocial land-use (or, to use somewhat stronger words, for ecological atrocities). . . . decent land-use should be accorded social rewards proportionate to its social importance."* (Leopold 1995: 58)

These views crystallised into Leopold's *A Sand County Almanac*, which stands as one of the most venerated and significant environmental works of the 20th century. The book was little noticed when first published in 1949, but during the environmental awakening of the late 1960s a paperback edition (Leopold 1968) turned into a surprise bestseller. It still sells thousands of copies per year, and continues to provoke reflection and analysis.

## **An ecological conscience: a unifying idea**

An ecological conscience radiates through a fascinating array of disciplines. In this section, we examine the work of five individuals who share an interest in the idea of an ecological conscience and its application in the contemporary world. Interestingly, these individuals belong to distinctly different professions - theology, farming, journalism, philosophy, and psychology.

### **a) Theologian**

In an early essay for the *Catholic Worker*, the famous theologian Thomas Merton explored the idea of an ecological conscience and its historical roots. In his view, the American frontier mythology is characterised by considerable ambiguity (Merton 1968). On one level, the pioneer, the frontier cult hero, is a product of the wilderness; simultaneously, he is a destroyer of the wilderness. His victory consists in reducing the wilderness to something different - a farm, a village, a road, a canal, a railway, a mine, a factory, a city - and, at the apex of the process, an urban nation. Bitterly, Merton opines that much of the stupendous ecological damage was done in first half of the 20<sup>th</sup> century is irreversible: industry and the military, especially in America, are in his view firmly set on policies that make further damage inevitable. Merton bluntly adds that when a choice has to be made, it is almost invariably made with a view to a quick return on somebody's investment, disregarding the long-term ecological and societal consequences.

The work of Aldo Leopold strongly influenced Merton's thinking. In Merton's view, Leopold "brought into clear focus one of the most important moral discoveries of our time - the ecological conscience" (Merton 1968). For Merton, the ecological conscience is also essentially a peace-making conscience. Given that Merton was writing in 1968, this is unsurprising. As he notes, the Vietnam War - characterised by widespread crop poisoning, the defoliation of forest trees, and the incineration of villages and their inhabitants with napalm - reminds us that environmental destruction and war work in tandem. Catholic theology, Merton concluded, ought to urgently incorporate Leopold's philosophical perspective into its framework. We agree, although we would add that a discussion regarding the complex problem of population growth and the role of the Catholic Church in resolving this issue is a challenge for those operating with an ecological conscience.

The sobering issue of the cost of war is germane to our discussion of the present problems facing those with an ecological conscience. In an article for London's *Telegraph*, journalist Peter Foster reported that the cost of the Iraq and Afghanistan wars for America alone is approaching as much as \$US6 trillion (Foster 2013). This calculation, Foster contends, shows how America's future at home and abroad has been mortgaged to the two conflicts that the Bush administration entered in 2001 and 2008. Foster then cited the conclusion of a Harvard University report that "there will be no peace dividend" from these wars (Foster 2013). In both of these conflicts, Australia has been one of America's staunchest allies. In our view, the costs to Australia of our participation in these wars include the sacrificed alternatives, such as funding for biodiversity research and the now defunct CSIRO Division of Wildlife and Ecology. Merton's moral point is clear; the ecological conscience, as a response to considerable, if not irreversible, environmental damage, is the only ethical response to an exploitative economic and military model that dominates decisions regarding land use and the allocation of resources. While Merton concluded that Catholic theology ought to integrate Leopold's idea of an

ecological conscience into its framework, we vastly expand that suggestion to include all Australians, especially those in decision-making positions in government and business.

### b) Farmer

One of the most probing works examining contemporary agricultural practices in the context of ecological consciousness is Fred Kirschenmann's *Cultivating an Ecological Conscience: Essays from a Farmer Philosopher* (Kirschenmann 2010). A third-generation farmer, as well as a theologian and philosopher, Kirschenmann has developed and explored the principles of ethical and sustainable agriculture, often labeled 'new agrarianism', for decades. An excellent review of *Cultivating an Ecological Conscience* by writer Brent Aldrich distils his ideas. Aldrich's review opens with a quotation from Leopold's *A Sand County Almanac* that echoes throughout Kirschenmann's book:

*"A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity"* (Leopold 1968: 258).

Aldrich (2010) explains that Kirschenmann, who has been farming organically in North Dakota on his family's land since the 1970s, brings a perspective to the sustainability conversation that is "rooted in significant farming experience and the current critique of industrial agriculture". In some ways, he acknowledges, this is nothing new for anyone familiar with the work of such prominent supporters of sustainable agriculture as Wendell Berry, Wes Jackson, and Bill McKibben. However, Aldrich identifies that what is interesting about Kirschenmann is his ongoing dialogue with philosophy and science, aimed at developing solutions for the future of agriculture. Aldrich emphasises that for Kirschenmann, these solutions must involve "a comprehensive transformation of the mind", beyond just fixing techniques or modifying the scale of farming operations (Aldrich 2010). As Aldrich contends, an agricultural practice that aims for sustainability will work for the health of the entire community. Kirschenmann's example of good farming, as theorised and described in his essays, is a positive indication that attaining this goal is a possibility.

### c) Journalist

In an opinion piece for the *Philippine Daily Inquirer*, the journalist Randy David made an urgent call for the widespread adoption of an ecological conscience. He defines ecological consciousness as "the growing awareness that the planet Earth is a finite place we share with [...] all living creatures, and that if, by our ignorance and carelessness, we destroy it, we thereby also destroy ourselves" (David 2009). He laments that, "as a result of our furious effort to improve the conditions of human existence", we have carelessly released dangerous levels of greenhouse gases into the atmosphere, leading to the process of global warming. However, instead of blaming others for failing to modify their behaviour in accordance with this damage, he makes a crucial point

about communication: "What seems obvious to scientists [...] is never always obvious to the rest of us." In his view, this is primarily due to the inability of the environment "to directly communicate with humans". As "nature and man do not share a common language", humans can interpret environmental issues "only in their own human languages", that is to say, with reference to the culture, society, and belief system to which they belong. David also comments that the science curriculum in schools does little to encourage the germination of an ecological conscience; instead, it "tends to lull us into a form of complacency that blinds us to ecological problems" by presenting nature as wholly self-regulating (David 2009).

David also connects the inability of many people to think with an ecological conscience to the position of the environment in contemporary politics. He contends that environmental issues "do not have the same resonance" in spheres such as law, religion, economics, and politics, as they often do in science. In his view, there is a strong discrepancy between politicians and businessmen, on one hand, and scientists, on the other, with regard to their appreciation of the urgency of global warming. We have also arrived at the same conclusion (Lunney and Hutchings 2012; Recher 2012; Lunney 2012c). For David, this points to the manipulation of environmental problems for political and economic ends with the environment becoming a political football. Climate change, for example, "is routinely used by countries as a proxy in the global struggle for political and economic supremacy" (David 2009). Importantly, this does not make the adoption of an ecological conscience a futile task. Rather, "it only highlights the need for every nation and every individual, as citizens of this planet, to examine their respective ways of life with a view to altering those practices that destroy the earth's long-term viability as a place in which to live." David concludes on an emotive note rarely registered in contemporary journalism:

*"The earth is a dying planet, but, alas, we cannot hear its gasping or recognize its morbid state except through the narrow bounds of our all-too-human sensibilities. There is no cure for this, other than to allow the earth's tears to flood our consciousness. Then, hopefully, we may see that the environment is not the other; it is us"* (David 2009).

### d) Philosopher

The idea of an 'ecological conscience' has attracted much philosophical attention. One commentator, academic Aaron Lercher, has conceptualised the idea in terms of liberty. In reframing ecological consciousness in this way, he allows us to approach the practice of conservation in a new light. Interestingly, his justification for environmental conservation draws upon the standard basis for individual negative rights, as upheld by the liberal philosophical tradition of John Locke, John Stuart Mill, and John Rawls. In Lercher's view, the right to the liberty of an ecological conscience is analogous to the right to religious liberty, and is worthy of the same recognition as that of fundamental liberty. Like religious liberty, Lercher writes, the liberty of ecological conscience is a negative right against interference. Within this framework, the destruction of an object of current or potential natural value is analogous to destroying a site of religious and cultural significance.

Lercher opens his paper by considering the human capacity to conceive of a place or thing as possessing 'natural value', and the pursuit of this concept as a human end. He calls this capacity our "ecological conscience" (Lercher 2006: 315). In his view, it is reasonable to assume that each person has an ecological conscience. While Lercher contends that the ecological consciences of most individuals are not very active, he argues that each person can develop his or her ecological conscience further by learning more about nature. This idea recalls Krebs' position, but what is unusual about Lercher's framework is that he believes that the ecological conscience of each person is fallible. He extends this idea to include the notion that each person recognises the fallibility of his or her judgment about 'natural value', and is interested in correcting his or her mistakes. These assumptions, Lercher contends, are necessary for any ethical environmental view.

To make his point, Lercher asks us to consider three people who have active, but different, ecological consciences - a hunter, an animal advocate, and a wildlife manager for a park in which the hunter hunts deer. Each of these individuals has a definite idea, derived from their experiences, about which aspects of nature are valuable. The hunter's values are aligned with those of the predator. He or she seeks to "embrace the forest" and establish "a connection with the prey that is as intimate as life and death" (Lercher 2006: 316). The animal advocate has a different set of values. In seeking the fair treatment of all animals, their goal is "to put all animals on an equal footing". By extension, this involves limiting the power the hunter has gained from human technology (Lercher 2006: 317). In contrast, the manager seeks to preserve the integrity of the forest ecosystem as a whole, and does not focus on specific animals. All are willing to take the most efficient means to achieve their end. However, Lercher continues, if we assume that our ecological consciences are fallible and can develop as we learn more about nature, unforeseen changes in perspective can occur. Lercher pursues this hypothesis in detail.

As each of these characters in Lercher's framework recognises the fallibility of their ethical understanding, they share an interest in preserving the opportunities to develop his or her ecological conscience. Crucially, "none of the characters knows whether he or she will need the insight provided by the aspects of nature beloved by the others" (Lercher 2006: 318). Their openness to these insights - and, by extension, to other ideas of what constitutes 'natural value' - allows their ecological and ethical understanding to deepen. The hunter, for example, may learn to recognise the beauty - in addition to other positive qualities - of animals other than deer. Lercher uses the example of wolves, the reintroduction of which necessarily involves the wildlife manager and animal advocate. In this dialogue, the animal advocate has the opportunity to learn about predation. At least theoretically, Lercher posits, the animal advocate can learn through observation how hunting is not inherently wrong, even if it is at times conducted unethically. Both the hunter and the animal advocate could learn from the

manager that there is more to the forest than the animals on which they focus. In turn, the manager's perspective may be broadened by coming into contact with the hunter and advocate, who may encourage him or her to view forest animals as more than parts of an ecological mechanism (Lercher 2006: 318).

Lercher's argument develops a new approach to the bitter standoffs we see over animal rights issues (Lunney 2012a,b). In his view, tolerating the ecological consciences of others is rational, for it allows us to preserve "opportunities for learning and revising [our] ethical understanding" (Lercher 2006: 318). This is a valuable perspective which, in encouraging us to view our ecological conscience as dynamic, challenges us to be more receptive to other views of which aspects of nature deserve protection.

### e) A psychologist

As psychologist Irina Shmeleva acknowledges, the intensification of research into ecological consciousness has resulted from the aggravation of global ecological problems and the need for the realization of the 'sustainable development' ideal. It is generally accepted, she contends, that the contemporary ecological crisis has resulted from "deformations" in the ecological consciousness of humans. These deformations manifest in our interaction with the environment, and in decision-making regarding environmental issues in such fields as industry, economics, education, health, and politics (Shmeleva 2009: 620). In her view, ecological consciousness is "multidimensional". Not only is it informed by one's political, professional, and religious consciousness, but it is also firmly tied to the physical world, and to one's relationships with others (Shmeleva 2009: 627). She argues that the analysis of three types of attitudinal behaviour is central to understanding ecological consciousness: our attitude toward and relationship with nature; our attitude toward global environmental problems; and our attitude toward social and moral responsibility for our actions (and inaction) concerning the environment. Crucially, this involves the analysis of whether one is aware of "the role of the anthropogenic factor" in causing, worsening, mitigating, or preventing environmental problems (Shmeleva 2009: 629).

Shmeleva stresses that the international scientific community recognised the value of the psychological approach to the task of solving environmental problems in the mid-1990s, seeking to identify psychological barriers to the perception of these problems (Shmeleva 2009: 620-621). Indeed, the issue of the perception of environmental problems is complex, and our understanding of it is crucial to developing effective strategies of public engagement. Shmeleva comments on two characteristic ways in which we respond to environmental problems; ecological optimism and ecological pessimism. She believes these behaviours result from "inner convictions about the possibility of solving the problem", in addition to attitudes fostered by the mass media, such as alarmism and anxiety. These negative responses can also result from the misrepresentation or suppression of an environmental issue in the media (Shmeleva 2009: 630). Shmeleva also

argues that one's evaluation of the significance of an environmental problem in terms of the threat it poses to human society is conditioned "by past collective experience" as well as by one's level of knowledge and understanding of the problem. In both Russian and Japanese research into ecological consciousness, participants were found to view nuclear weapons as the most pressing threat to human survival, despite not experiencing the Hiroshima bombings or Chernobyl catastrophe personally (Shmeleva 2009: 630). These findings are fascinating, and illustrate the value of the psychological approach in illuminating the scope and depth of an individual's ecological consciousness.

## A lack of judgment

In March 2013, journalist James Robertson interviewed New South Wales (NSW) Police Commissioner Andrew Scipione for *The Sydney Morning Herald*. He reported that alcohol-related crime consumes about 70 per cent of a frontline police officer's time (Robertson 2013). An accompanying article, by the Headmaster of the Kings School in Sydney, Tim Hawkes, places this problem in a new light. Hawkes notes that when incidents of alcohol-related violence occur, the "hackneyed solution of more education is invariably trotted out" (Hawkes 2013). In his view, it is not education but judgement that is lacking.

We see a parallel here with environmental matters. In our view, what is needed most is judgment derived from an ecological conscience. Of course, an advanced level of education is required for a professional ecologist, but it is important to recognise that most decisions that affect our native wildlife will not be made by professional ecologists. Politicians and bureaucrats will make the vital decisions, and it is here that judgment is necessary, not more knowledge. One would expect that the research of professional ecologists would form an essential ingredient in any decision, but it is not the key. In our opinion, it is judgment that is needed, and that judgment needs to be based upon a strong ecological conscience.

Having examined the idea of an ecological conscience in more depth, we now turn to its relevance in the Australian context. In this section, we consider contemporary news articles in the context of an ecological conscience. We examined a series of articles in late March 2013 as we were drafting this paper and we admired the calibre of the scientific research they described, in addition to the deftness of the journalism. However, we were concerned by what appears to be a widespread lack of understanding of the basic process of extinction, and of the role individuals and groups can play in reducing the threatening processes to Australian fauna. We turn now to the articles.

### a) A daring close encounter

On the front page of *The Sydney Morning Herald* (28 March 2013), under the headline, "The sound of one tail flapping", there was a striking photo of the tail of a diving whale. The photo's caption reads: "An Australian-led international team has used ground-breaking acoustic devices to track Antarctic blue whales. Using the

technique, scientists can hear the mammals calling from 1100 kilometres away." Journalist Andrew Darby described the research in more detail on page three, writing that the sonar listening devices, which were developed from anti-submarine warfare, allowed the researchers to get close to their subject. "In a hazardous operation in icy waters, a team on a small boat sped within metres of the fast-moving mammals, which can weigh up to 100 tonnes, to dart them for scientific data" (Darby 2013: 3). In the middle of the article, which valuably carried the names of various research scientists, Darby provides the following information. "Commercial whaling killed about 340,000 Antarctic blues in the last century, reducing their estimated population to a few hundred by the 1970s." He adds that "today, perhaps a couple of thousand of the endangered animals roam the ocean" (Darby 2013: 3). In our view, this is a good science story; not only does it highlight how a skilled team of scientists works, but it also throws the terrible plight of these mammals into the mainstream media. However, the reader is left wondering whether there are any threats remaining for this population, or new threats, such as climate change, developing? What is clear, at the very least, is that this animal came very close to extinction for commercial gain.

### b) A stuffed wombat

The weekend edition of *The Sydney Morning Herald* (29-30 March 2013) carried an article by reporter Julie Power on the subject of taxidermy. Power (2013) explains that sales of taxidermic pieces have "shot up" across Sydney, prompting auction house Lawsons to increase the frequency of its natural history auctions from two to four per year to meet the demand. Power interviewed Martin Farrah, the managing director of Lawsons, on the latest auction. He commented on the quality of the pieces available for sale, stating proudly that the tiger and bear were in "impeccable" condition - "we normally get heads and not whole bodies." Power surmises that tough Commonwealth import rules, which require a taxidermy licence to import taxidermy, are a possible cause of the increased demand. She concludes on an interesting note. "After a stuffed wombat sold for \$900, Mr Farrah quipped 'Goodness me, everyone's going to be out tonight looking for roadkill'" (Power 2013).

Wildlife roadkill is a vexatious subject (Lunney 2013b) and becomes even more complex when we consider it in the context of ecological conscience. This perspective shifts our focus from the individual dead animal lying on the road or hanging above the mantelpiece to the species to which the animal belongs. The matter here is the total context in which an animal, or more importantly, a population of animals, lives and dies. We are not critical of the practice of taxidermy, which is a trade with a long tradition that forms a vital part of museum education programs and displays. Rather, we seek to encourage reporting that places animals in their ecological context. While it is not Power's responsibility to comment on the ecological dimensions of taxidermy or roadkill, it does matter if readers are to develop an ecological conscience. If we make judgements out of context, then it is easy to stray into indifference.

### c) A valid artistic project

*The Sydney Morning Herald* (17 March 2013) ran a testing article by Andrew Taylor on a controversial photography project that seeks to document female hunters from the Dubbo region of Central Western NSW. The opening lines were graphic. “Dressed in cowboy boots, shorts and a midriff top, Katrina Byrnes stands next to a dead kangaroo she has just shot. Her arm and leg are smeared with blood, while a gun clip lies on a log behind her kill” (Taylor 2013). Taylor interviewed photographer Emma Thomson, who views her project as a valuable means of challenging the public perception of hunting as a male-only sport. Thomson states that “none of the animals are specifically killed for her to photograph”; rather, she photographs the women – locals who have responded to her advertisement in the town paper – after they have conducted their regular hunt. Unsurprisingly, Taylor reports that Thomson’s project has received criticism from animal rights advocates, who are outraged that the work has received government funding through Museums and Galleries NSW. Taylor quotes Lynda Stoner, the chief executive of Animal Liberation who asked “I wonder if the ‘artist’ will be privy to four and five dogs ripping a pig to pieces, will she hear the screaming of that animal?” (Taylor 2013).

Taylor’s article taps into a deep-seated debate in NSW surrounding the sports shooting of wildlife, most recently centred on national parks. However, there are many gaps in his reportage. Where does the shooting take place? Were there motives for the shooting other than sport? Most importantly, what was the status of the local populations of these animals? Some, such as foxes, are recognised as a key threatening process; others, such as kangaroos, can only be shot under licence because they are native fauna, including commercial harvesting (Cooney *et al.* 2012). Thus, context is crucial in evaluating Thomson’s work from the standpoint of an ecological conscience.

### d) Australia’s first climate change victim

In *The Sydney Morning Herald* (24 March 2013), science journalist Nicky Phillips reported that endangered species experts plan to save the mountain pygmy possum from becoming the continent’s first climate-change victim. Phillips reports that University of NSW naturalist and palaeontologist Professor Mike Archer, Dr Linda Broome from the Office of Environment and Heritage NSW, and their PhD student Hayley Bates want to establish a colony away from the species’ present habitat. They have their sights set on an environment where the species once thrived - low-lying, temperate rainforest, as confirmed by evidence from fossil deposits. Phillips notes that the team are awaiting government approval to establish the colony at the Secret Creek Sanctuary near Lithgow, where the sanctuary’s owner “will build a rock wall that mimics the boulder fields and keeps the temperature about 4 degrees during winter” (Phillips 2013a).

Crucially, Phillips places the team’s project in the context of a diminishing pygmy population and key threatening processes such as climate change. She writes that, as a result of global warming, the Snowy Mountain’s blanket

of winter snow – which “serves as a possum refuge from freezing temperatures when [the possum] hibernates for six months” – has contracted. She lets Archer connect the dots for the reader, quoting him as saying “It’s possible that just a couple of years of no snow could wipe out the possums left in the wild.” Phillips (2013a) then states the bleak reality that “Estimates suggest there are just 2600 possums living in three distinct genetic populations throughout Kosciuszko National Park and alpine regions of Victoria”.

This is a fascinating story. It illustrates the cooperation of members of related disciplines, including biology and palaeontology, to alleviate the impacts of climate change on a threatened species. We have followed details of this story in Royal Zoological Society (RZS) publications (Broome *et al.* 2012; Schulz *et al.* 2012) and welcome this level of publicity. The article not only showcases the far-sighted and innovative work of Australia’s biologists, but also the importance of students versed in both fieldwork and critical analysis. What, you might ask, is the relevance of this article here? In our view, the overriding editorial interest seems to lie with good stories, not ones which demonstrate our failure as a society to recognise the drastic position of our fauna. It is worth considering how many species are sliding into extinction because they do not have a skilled team devoting time and effort to addressing the threats which face their survival. Most species are in that category, and in our view, this is also worthy of reportage.

### e) Back from the dead

*The Sydney Morning Herald* (29-31 March 2013) carried a substantial article with the contrary headline “Alive as a dodo”. Journalist Nicky Phillips began her article with the statement that “For more than 3 billion years since single-cell organisms first appeared on the planet, life has evolved in one direction only. When a plant or animal becomes extinct, there is no coming back. Or so we thought.” Phillips then reports on the progress of the aptly named Lazarus Project group, a team of researchers led by Mike Archer. The team has revived the genome of the extinct gastric brooding frog, and may have it “hopping back to life in the next few years” (Phillips 2013b). Phillips notes that although the precise motivation for reviving a species – a process called de-extinction – differs among its supporters, a central theme exists. She quotes Archer, who states: “scientists hope their attempt to turn science fiction into reality will help conserve the world’s ever-diminishing biodiversity.”

Unsurprisingly, Phillips reports that de-extinction has its critics, with some conservationists fearing that attempts to revive extinct species will distract from efforts to rescue the vast numbers of endangered living creatures. Phillips interviews Corey Bradshaw, an ecologist from the University of Adelaide. In his view, attempts to resurrect extinct species fail to solve the drivers of extinction, and thus constitute “a massive financial distraction” (Phillips 2013b). Bradshaw makes important points that transcend this current debate. Most importantly, he points to the urgent need to solve the causes of extinction. If we

stand back from the details of the debate surrounding de-extinction, we can see that both parties are interested in the same goal: preventing extinction and conserving extant species. The major point of contention concerns the preferred method. Phillips does not elaborate on this key point, nor on Archer's crucial statement concerning the grim state of the world's biodiversity. That the Lazarus scientists, among others, have developed such a complex and highly technological solution to the problem of extinction should send a strong message that theirs is a desperate action, and it should point to the terrible plight of so many species. This message emerges 'against the grain': it is not the focus of the article, but it can be found in it if one reads carefully. Although Phillips (2013b) notes that "thousands of species" are "under threat" due to "habitat destruction and disease", it functions as an aside. In our view, the article would have gained considerable strength from a deeper engagement with the problems which animate Archer and his colleagues: diminishing biodiversity and threats to the world's fauna.

### **The necessity of an ecological conscience**

We are deeply concerned by the dismal lack of resources for conservation, especially for such a rich nation. It is clear that in this regard Australia's decision-makers are not lacking in education but are lacking in judgment. Australians need to develop an ecological conscience: a strong awareness of the critical position of Australia's fauna, and of our responsibility to conserve and protect it. Above all else, Australians need to develop a sense of empathy with other species and be prepared to share the continent's resources with them.

We are also most interested in the presentation of ecological ideas, and how reporters translate these ideas into marketable journalism. It appears to comprise a formula of innovative people, conflicting ideas, technological breakthroughs, charismatic fauna, and striking photographs (Lunney *et al.* 2003; Lunney and Moon 2008, 2012). In the articles we examined, the scientific research was accurately and fairly presented. The articles succeeded, at the very least, in arousing the public's interest in areas of science that they may not have otherwise encountered. Yet the heartbreaking state of our fauna and biodiversity, and the appalling state of public knowledge and sense of caring concerning these issues, is what is lacking in the articles. It may not be in the editorial interest to stress these areas, especially if one course of conservation action conflicts with the nation's economic interests. But it is at this juncture that we need an ecological conscience: not just for the media, but for all parties who are part of the decision-making sequence.

### **Grumpy scientists with an ecological conscience**

Each of the scientists who spoke at the Grumpy Scientist forum cares deeply for the future of humanity and the other species with which we share planet Earth. They are grumpy because they are witness to the destruction of all those things they value most in life and know that the losses

of species and ecosystems happening before their eyes are not only irretrievable, they are preventable (Lunney 2013a). Speaker after speaker recognised that we have the knowledge, the technology, and the ability to stabilize and reverse the downward spiral of environmental destruction that has characterized human endeavour for more than 10,000 years. They concurred that what is missing is the will to change, and to work with an ecological conscience.

All speakers shared an underlying concern for the future of civilization and other species. Harry Recher and Paul Ehrlich opened the Forum. Recher's (2013) primary concern and source of grumpiness was the survival of other species. Ehrlich (2013) voiced concern for the future of people and the survival of human civilization. According to Ehrlich, both are threatened by the loss of ecosystem services on a global scale as a consequence of uncontrolled growth of the human population, excessive consumption of resources, and climate change. These place massive pressure on agricultural production to feed ever more people at time when agricultural production itself is threatened by changes to regional climates and urban expansion. Recher also attributed the threats to species and ecosystems to human population growth, excessive consumption, and climate change. Recher and Ehrlich were grumpy because the consequences of continuing growth for the planet were clear, but the vast majority of people failed to act in meaningful ways to protect global environments and other species. For Recher, this group included fellow scientists and the conservation movement, who in his view acted with as much self-interest as politicians and developers.

Andy Beattie (2013) described the dependence of agriculture on microbes and invertebrates, organisms scarcely acknowledged by either conservationists or economic policy. These small organisms are at the base of all ecological processes and therefore essential for the ecosystem services that provide us with food, clean air and water, and sustain the plants and animals that most of us think of as 'biodiversity' (Beattie 2013). Beattie was grumpy because this important link between feeding people and sustaining life on Earth was largely unrecognized by either the general public or the scientific community. In his view, the outlook for the conservation of biodiversity in Australia and globally is 'grim'. Beattie took the position, as did Recher and Ehrlich, that conservation science and policy is too narrowly defined and focused on a small number of threatened species, almost all of which are vertebrates and higher plants. In his perspective, the importance of biodiversity to industry and human welfare has not been adequately explained. This is especially visible with regard to those biodiversity-based industries, such as farming, that see conservation management as an intrusion.

In broad alignment with Beattie, Marie Herberstein (2013) also takes issue with what she sees as the narrow focus within the biological sciences on model species. She contends that such species as the mouse (*Mus*), the worm (*Caenorhabditis*), the fish (*Danio*), and the fly (*Drosophila*) have dominated research efforts to the detriment of our understanding of other species, and of

the diversity of behavioural phenomena. She notes that the assumption that these species are representative leads to limitations with regard to evolutionary and behavioural biology, which are concerned with explaining variation. As a result of the focus on model species in these areas, research efforts have been further skewed towards a small group of species, discouraging broader species selection and limiting research potential. Herberstein recommends that we broaden our vision and strike “a balance” between “uncovering more detail of one species versus discovering new phenomena and mechanisms in different species” (2013).

In his paper, Frank Talbot (2013) provides a personal view of the phenomenon of grumpiness among the scientific community. He reminisces about the early years of his professional life, writing that he and his colleagues shared an “unbounded optimism” and a broad range of opportunities: “I found in my 20s that scientific jobs were many and they were not hard to get. You could turn down good jobs if they did not quite suit your personal scientific odyssey and with perseverance you could go where you wanted” (2013). But over the past 6 decades, he continues, “the setting has fundamentally changed” as new generations have grown up amidst increasing knowledge of environmental degradation. For them, it is increasingly difficult to sustain an optimistic view of the world and their future in it – an attitude that Talbot views as crucial to changing the Earth’s course. Talbot identifies what he considers to be “the biggest grump of all”: that individuals today are more highly informed about their impact on the environment than their predecessors, but that “in spite of this clear knowledge we are not changing our actions” (2013). Despite the bleak implications of this inaction, Talbot warns young scientists not to give up, but to “be optimistic” and “fearless”: “brave people who can face the future with clarity and honesty are essential in this war against collapse” (2013).

As Pat Hutchings (2013) shows, however, this will be an increasingly difficult challenge for young scientists who have few opportunities for employment ahead of them – particularly those skilled in systematics. Hutchings details the appalling decline in state and federal funding for systematics research and the employment of research scientists in government museums. Despite the centrality of their work to understanding the relationships between species, Hutchings contends that systematists receive little support from their peers in the scientific community, who appear to view them as just “stamp collectors” (2013). She notes that universities are unwilling to appoint systematists, as generally they do not receive large grants or publish in high-profile journals. Compounding this problem, she continues, their colleagues often fail to acknowledge systematists’ work in their own papers. Obviously, these problems do not encourage young graduates to pursue systematics in their careers, nor do they inspire an interest in the field in those still at university. To address these issues, Hutchings suggests that we need to raise the profile of systematics by working with university departments, participating in field trips and life science courses, and acting as mentors for the next generation of systematists.

In her paper, Nicola Markus (2013) addresses the challenges which face those organisations in which many Australians invest their hope for environmental change: non-government organisations (NGOs). Markus examines the expectations of the four key stakeholders in NGOs: the general public, financial donors, boards of directors and NGO staff. She contends that the public view NGOs as “the last resort of all hope” and expect to gain “a clearer conscience” from donating to their cause. However, their donations regularly fall short of what is required to meet the long-term goals that NGOs set themselves. The public’s support is complemented by that of financial donors, including wealthy individuals, Trusts and Foundations, and corporate bodies. These groups expect “that their financial contributions will produce substantial results in a short period of time” (2013), and are often dismayed by the realities of incremental and long-term change. Boards of directors often share the corporatist outlook of these groups and their tendency to manage NGOs along the lines of a business model can lead to clashes with NGO staff. Markus draws out the contradiction in their approach, stating that “there is a fundamental difference between not-for-profit conservation projects and the clear growth trajectories of the corporate business world – landscapes degraded over hundreds of years cannot be recovered in one or two” (2013). She contends that the problems facing NGOs largely derive from their high aspirations and the unrealistic expectations placed on them, in conjunction with the public’s tendency to view NGOs as a panacea. As she states, “NGOs have a limit as to what they can achieve. The rest is up to us” (2013).

The idea that positive change is up to us – the public – is integral to Dan Lunney’s (2013a) paper and, indeed, animates much of his grumpiness. Lunney argues that the societal tendency to prioritise economic growth over environmental conservation is not only madness, but “a tragic statement” given our extensive knowledge of environmental problems and our ability to identify ways to resolve them (2013a). What makes the losses tragic is that they are, as Lunney points out, preventable. Compounding this issue is the lack of public knowledge regarding pressing ecological issues in Australia. Analysing the 2012 *Who Cares About the Environment?* report, produced by the Office of Environment and Heritage NSW, Lunney shows that the disturbing level of public ignorance about ecological issues is matched by a perception that the environment is improving. This perception largely derives from the visibility of small-scale actions, such as recycling and using green bags instead of plastic bags. He argues that for Australia’s fauna, the situation is not improving but is instead worsening, a fact of which the public is largely unaware. Lunney contends that increasing the public presence of scientists and their research is critical in challenging these misconceptions.

The necessity for greater communication between scientists and the public was a common theme throughout the forum (Ehrlich 2013; Hutchings 2013; Kingsford 2013). Mike Calver’s (2013) presentation addressed the communication problems that arise from the self-interest of academics. Supported by a cast comprising Brad Law,



Tessa Lunney, Pauline Ross, and Noel Tait, Calver used a play with witty dialogue to explore the unrealistic assumptions which underpin the growing use of citation indices by universities and government to evaluate the importance of research publications. These indices are then used to evaluate staff for promotion, tenure, and research support. Calver contended that the increased use of citations to judge the merits of academic work has serious consequences for the communication of research findings and for the survival of certain journals. This in turn has distressing implications for biodiversity conservation, the exchange of knowledge between researchers and resource managers, and the ability of scientists to inform the public of their findings. Along with Calver (2013), all contributors to the forum were critical of the failure of the scientific community to speak directly to the public so as to most effectively inform them of the urgency of changing our attitude towards economic growth and material acquisition.

While Calver challenged the value of citation indices, Mike Augee (2013), as the editor of *Proceedings of the Linnean Society (NSW)*, was grumpy because he felt that the pressure to publish had degraded the quality of research and research publications. In his experience, as “career progression and funding have come to be under the control of bean-counters” who think in terms of quantity and not quality, researchers are publishing shorter papers in order to meet the terms of their contracts. The results are “fragments of research” that contain “little data” but “much review and discussion” (Augee 2013). Augee points to a key problem: how will these minor papers be systematised and evaluated “in fields that are growing more and more specialised?” In short, he asks, “Who will put these fragments together?”

Augee’s observations complement those of Paul Adam (2013), who laments that science has become a “cult of the instant” – that is, of instant, electronic communication. While the rapid exchange of information has considerable merit, in Adam’s view it means less time is given to thought and reflection. It is, therefore, inimical to good science. Adam discusses many other challenges facing science in his paper. He observes that, within the wider community, the understanding of his discipline, ecology, derives largely from the amorphous definitions circulated in the 1960s with the advent of the environmental movement. In some cases, these definitions of ecology take on quasi-religious connotations, leading Adam to worry whether the credibility of professional ecologists’ activities may be undermined by public misunderstandings of what constitutes their discipline. Beyond ecology, Adam also addresses sweeping changes in the institutional culture of the universities within which many scientists work. He describes the transition to a business model run by an expanding base of middle-managers, in which success depends on “vulgar careerism” (2013). He contends that the managerialist culture of contemporary universities has had, and will continue to have, far-reaching implications for the way in which scientists work and conduct research. With regard to their working environment, he argues that the growth of central administrations “has seen a decline in the importance of collegiality in the day-to-day

governance and management of universities”, resulting in “a sense of powerlessness amongst academics and a decline in morale” (2013). Although, as Adam states, “the role of the administration should be to serve their institutions rather than to control every part of their activities”, researchers are increasingly finding themselves constrained by the administration’s focus on a short timeframe with regard to both performance appraisals and project funding (2013).

Adam’s views complement one of Calver’s (2013) themes: that the ranking of journals by government, and consequently universities, puts pressure on scientists to publish only in the most highly ranked international journals. One important consequence of this pressure is a decline in support for regional journals, registered by a decline in submissions and subscriptions. Indeed, as Calver (2013) notes, much research is now published in inappropriate journals – that is, journals that do not reach a target audience of people most likely to apply the research findings to regional problems. Adam (2013) warns that this resurgence of ‘cultural cringe’ among scientists could have adverse consequences not only for the survival of Australian journals, but the survival of the professional societies that support them.

There are other consequences of the pressure to pursue high citation indices, and as Graham Pyke (2013) stated in the plenary following Calver’s presentation, these pressures are unlikely to go away. One significant consequence is the difficulty in initiating and continuing long-term ecological research (LTER). LTER has always been difficult and requires a level of institutional support and research funding that may no longer exist in Australia. By its very nature, LTER research is unlikely to result in ‘quick’ publications, nor does it necessarily possess the charisma of computer modeling, theory testing, or problem solving. Most LTER is descriptive and unlikely to be published in top-level journals. This does not mean it lacks value or application, as attested by Richard Kingsford’s long-term monitoring of waterbird populations in inland Australia (Kingsford *et al.* 2011). His work has proven instrumental in developing water management policies for the Murray-Darling system that will not only benefit wildlife, but will sustain agriculture and provide a recreation resource for future generations. Such descriptive studies provide the foundational observations from which theory is developed, and then tested. Yet, as Adam (2013) argues, there exists little incentive to pursue LTER in an environment which prioritises short-term products over long-term progress. As he puts it, “There is recognition, in an arm waving sense, of the need for long-term environmental monitoring, but little concrete action to establish and maintain long-running programs” (2013).

Descriptive studies require skilled and experienced staff, and Hutchings’ (2013) account of the loss of research staff at museums is disturbing. What she described as happening at the Australian Museum is being repeated across Australia as governments devalue environmental and ecological research in efforts to balance budgets. Picking up on Beattie’s (2013) argument that agriculture is an essential industry wholly reliant on biodiversity to produce the food needed by ever-growing numbers of

people, it is remarkable that Australian governments are so ignorant of this relationship. That our governments wilfully destroy the research potential of the museums on which we depend for describing and cataloguing the world's biodiversity shows not only an incredible short-sightedness, but a callous disregard for our future.

In his paper, Richard Kingsford (2013) illuminates some of the factors that have produced our politicians' short-sightedness in this area. Crucial among these are the fields of tertiary education and training which have shaped their skill sets. Kingsford collated data pertaining to the qualifications of Australian parliamentarians serving in both cabinets and shadow cabinets. At the time of his research, there were 824 politicians in national, state, and territory governments. Of these, 54.9% held a degree, and of this percentage only 9.2% held science degrees. If one includes shadow parliamentarians, this number drops to 5% (Kingsford 2013). If this wasn't disturbing enough, Kingsford also points out that of all the environment ministers holding office in September 2012, only one had a science degree. In Kingsford's view, it is therefore unsurprising that politicians "find it difficult to understand the dependency of human civilisation on global or continental ecosystems and the impact that human activities have on ecosystems" (2013). Yet he maintains that "knowledge about biodiversity is not really the problem"; rather, in his view, it is "the policy implementation and political will that are wanting" (2013). As a result, he concludes that scientists – particularly those in the area of conservation science – must improve the accessibility of their research and their communication to non-specialist audiences, particularly with regard to their use of the media.

Kingsford's recommendations are all the more salient given that even the most prestigious scientific organizations in Australia are eviscerated by government cutbacks. The destruction of the CSIRO Division of Wildlife Research, as documented by Krebs (2012), is just one of many examples of the loss of the keystone Australian research institutions and staff that had previously led Paul Ehrlich to commend Australia in interviews and seminars for its international leadership in ecology and conservation biology (Recher, pers. obs.). With the loss of ecologists and wildlife biologists, in disciplines as diverse as fisheries, forestry and wildlife, in both Commonwealth and State government departments, departs not only a body of knowledge and expertise built up over generations, but also LTER programs established at the start of their careers. These are studies that are only now beginning to unravel the long-term effects of weather, fire, logging, and other disturbances or recovery programs on Australia's flora and fauna from the arid zone to the marine environment. Even if governments change their policies, the studies themselves will have been diminished, perhaps irretrievably.

Whether Australia will have the specialists in a decade or longer to pick up the studies now halted is questionable. As Hutchings (2012, 2013) explains, there is at present a hiatus in the training of biologists interested in whole animals or plants. The absence of jobs does not encourage

young people to look for education in the biological sciences. Even more worrying is the failure of universities to offer programs that would educate a new generation of systematists, ecologists, botanists and zoologists. The absence of whole organism studies at universities has deep roots. Adam (2010, 2013) was grumpy over the decline in natural history instruction in primary and secondary schools. Ehrlich (2013) argued that natural history studies should begin in kindergarten, but noted it was now too late to expect a rapid awakening of an ecological conscience from re-introducing this program in schools. It takes two decades for an age cohort to enter public life and exert an impact on political processes. As many speakers at the forum emphasised, it is imperative that concerned scientists communicate more widely and clearly with the community. This requires learning how to communicate, something few schools and universities in Australia teach (Recher and Ehrlich 1999; Recher 2012) or teach well.

As Pauline Ross and Philip Poronnik (2013) show, the challenges facing science education in Australia are formidable. At the secondary school level, enrolments in science in Year 12 have dropped by over 40% since the early 1990s. In part, Ross and Poronnik explain, this is due to the emphasis on 'rote learning' formulas, laws, and facts, in itself a function of the unrealistic expectations placed on teachers, who are instructed to cover an enormous amount of content in a short period. As a result, those students who do study science in Year 12 are generally not afforded sufficient time to develop an understanding of fundamental scientific concepts, and are often alienated from pursuing science at the tertiary level. Those who do go on to study science at university find that their first two years of undergraduate study is focused on learning facts, leading many bright students to switch to more stimulating, inquiry-based courses. Ross and Poronnik also address the key problems facing academics, namely workload pressures, competition for funding, and the difficulties of balancing a teaching workload with research in an institution which values the latter over the former. Although the introduction of Massive Online Open Courses (MOOCs) offer the potential to transform the way in which science is taught at the tertiary level, Ross and Poronnik are right to approach the model with caution. They show us that what is needed is a paradigm shift in the way science education is understood, which encompasses a shift in values above all else.

Deborah Rose's (2013) paper compels us to consider exactly what this shift may entail. As an anthropologist, she argues that "if we are to understand the complexities of the problems the earth faces, we must understand the complexities of human culture". She proceeds to examine the structure of thought which underpins human activities, particularly the dichotomies (such as mind/matter, self/other) which institute a set of power relations. In her view, the modern Western world's conception of human progress rests on these dichotomies, which she labels 'hyper-separations'. These hyper-separations "work to place western (male) humanity at the apex of a structure of domination and control that is represented as if it were the natural order of things" (2013). Under

humanity's control, of course, are the environment and the non-human animals which depend on it for survival. At the root of this structure of power is the idea of human exceptionalism – the belief that humans are superior and in control of a passive world. Despite mounting critique of this idea, and of the impact of human behaviour on the natural world, Rose asserts that “not enough is happening” to develop the changes in values required of us if we are to prevent ecosystem collapse (2013). To illustrate her ideas, Rose offers a local example: the treatment of flying-foxes. She contends that the widespread revulsion and hatred displayed towards them shines a spotlight on our own “ugly self-righteous[ness]”, as it “revolves around the proposition that anything that impinges on humans and their projects, on their comfort, and indeed on their desire to take up all the space under the sun, will have to be eliminated” (2013). One can only hope that, as Rose writes, the extent of our impact on the environment “may finally become so evident to us that we will no longer be able wish away matters we should be confronting, or bury them beneath the rhetoric of progress and mastery” (2013).

That many individuals gladly suppress such knowledge points to the discomfort which results from having an ecological conscience. Indeed, it is to live in a world of nightmares. No matter whether you are concerned for the future of other species, of human civilization, or of nothing more than the world of nature as you knew it when a child, the world is changing far more rapidly than ecological and evolutionary processes can handle. Almost all speakers at the Grumpy Scientist forum detailed a litany of change, from the ever-increasing loss of biodiversity to the appalling lack of contact with nature experienced

by children now growing up in increasingly monotonic urban landscapes. Although cities are among the world's most biodiverse ecosystems (Recher 2010), they are not nature as the forum's grumpy old scientists remembered it. The world faces extreme environmental change, not only with regard to climate change and its associated threats of resource wars and mass human displacement, but also with regard to the breakdown of the ecosystem services providing Earth with food, soil, oxygen, and water. These services are reliant on a vast range of organisms that, as Andy Beattie (2013) noted, are barely mentioned in modern society, much less actively conserved. Yet, all may not be lost. Grudgingly and at great political cost, some politicians, governments and industries have begun to accept the threat climate change poses to life as we know it. A lesser number, but some nonetheless, are beginning to understand that biodiversity has critical economic and environmental values beyond tourism. The expansion of a system of protected areas, such as national parks and nature reserves, and the introduction of carbon credits and trading in Europe and Australia, are starting points. However, the world needs to do much more and it needs to act far more decisively before those of us with an ecological conscience can put our feelings of disillusionment aside and stop worrying about our grandchildren's future in an ecologically degrading world.

What the grumpy scientists at the forum made clear is that the choice is ours. We can be involved or we can do nothing. Some of our human neighbours feel they do not have to do anything, or that anything they do would be trivial on a world scale and therefore not worth any personal sacrifice. Humanity can move past that point. Humanity must move past that point if it is to survive.

## Acknowledgements

We are indebted to all the authors for putting their views candidly, for the thoughtful participation of the audience, as is evident in the three plenary sessions, and the council

of the Royal Zoological Society of NSW for supporting the forum and this publication. We are also indebted to Antares Wells for her skilled editing of this paper.

## References

- Adam, P. 2010. The study of natural history - a PPP. Pp. 1-15 in *The Natural History of Sydney*, edited by D. Lunney, P. Hutchings, and D. Hoculi. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Adam, P. 2013. Don't worry - be happy? Pp. 71-87 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Mosman, NSW: Royal Zoological Society of New South Wales.
- Aldrich, B. 2010. 'Working Toward the Flourishing of Creation': A Review of *Cultivating an Ecological Conscience: Essays from a Farmer Philosopher* [Online]. Available at: <<http://erb.kingdomnow.org/featured-cultivating-an-ecological-conscience-by-fred-kirschenmann-vol-3-27/>> [Last accessed 15/05/2013].
- Augee, M. 2013. A grumpy scientific editor. Pp. 69-70 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Beattie, A. 2013. A contemporary view of biodiversity: Bad science and bad policy. Pp. 17-23 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Broome, L., Archer, M., Bates, H., Shi, H., Geiser, E., McAllan, B., Heinze, D., Hand, S., Evans, T. and Jackson, S. 2012. A brief review of the life history of, and threats to, *Burrhamys parvus* with a prehistory-based proposal for ensuring that it has a future. Pp. 114-126 in *Wildlife and Climate Change: towards robust conservation strategies for Australian fauna*, edited by D. Lunney and P. Hutchings. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Calver, M. C. 2013. RAM the PI\_BETA - what the H-STAR happened to my promotion application? Or: The pros and cons of bibliometric evaluations of researchers. Pp. X-X in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Calver, M. C., Lilith, M., and Dickman, C. R. 2013. A 'perverse incentive' from bibliometrics: could National Research Assessment Exercises (NRAEs) restrict literature availability for nature conservation? *Scientometrics* 95: 243-255.

- Cooney, R., Archer, M., Baumber, A., Ampt, P., Wilson, G., Smits, J. and Webb, G. 2012.** THINKK again: getting the facts straight on kangaroo harvesting and conservation. Pp. 150-160 in *Science under siege: zoology under threat*, edited by P. Banks, D. Lunney and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Darby, A. 2013.** True-blue experience for scientists tracking world's biggest mammal. *The Sydney Morning Herald* (28 March): 1, 3.
- David, R. 2009.** Ecological consciousness. *The Philippine Daily Inquirer* (19 December) [Online]. Available at: <<http://opinion.inquirer.net/inquireropinion/columns/view/20091219-242858/Ecological-consciousness>> [Last accessed 15/05/2013].
- Ehrlich, P. R. 2013.** The decoupling of human and natural systems makes me very grumpy. Pp. 9-13 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Foster, P. 2013.** Cost to US of Iraq and Afghan wars could hit \$6 trillion. *The Telegraph* (31 March) [Online]. Available at: <<http://www.telegraph.co.uk/news/worldnews/northamerica/usa/9961877/Cost-to-US-of-Iraq-and-Afghan-wars-could-hit-6-trillion.html>> [Last accessed 15/05/2013].
- Fyfe, M. 2011.** Rich and poor divide underestimated. *The Sydney Morning Herald* (15 May) [Online]. Available at: <<http://www.smh.com.au/money/rich-and-poor-divide-underestimated-20110516-1eoot.html>> [Last accessed 19/06/2013].
- Grigg, G. 2012.** Plenary 3: More inconvenient truths. Transcription of the Plenary Sessions of the 2008 Annual Forum of the Royal Zoological Society of New South Wales held at ANZ Conservation Lecture Theatre, Taronga Zoo on Saturday, 29 November 2008. Pp. 126-130 in *Science under siege: zoology under threat*, edited by P. Banks, D. Lunney, and C. Dickman Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Hawkes, T. 2013.** The price that society pays for heavy drinkers' freedom is a crying shame. *The Sydney Morning Herald* (31 March): 8.
- Herberstein, M. 2013.** Is *Drosophila* the answer? The role of model species in biological research. Pp. 67-68 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Hutchings, P. 2012.** Death of life sciences: a personal perspective. *Australian Zoologist* 36: 242-246.
- Hutchings, P. 2013.** Why are taxonomists often regarded as second class citizens? A misclassification that threatens the basic infrastructure of biodiversity. Pp. 26-30 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Kirschenmann, F. 2010.** *Cultivating an Ecological Conscience: Essays from a Farmer Philosopher*. Lexington, KY: University Press of Kentucky.
- Krebs, C.J. 2008.** *The Ecological World View*. Collingwood, Victoria: CSIRO Publishing.
- Krebs, C.J. 2012a.** Plenary 3: More inconvenient truths. Transcription of the Plenary Sessions of the 2008 Annual Forum of the Royal Zoological Society of New South Wales held at ANZ Conservation Lecture Theatre, Taronga Zoo on Saturday, 29 November 2008. Pp. 126-130 in *Science under siege: zoology under threat*, edited by P. Banks, D. Lunney, and C. Dickman Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Krebs, C.J. 2012b.** What good is a CSIRO division of wildlife anyway? Pp. 5-8 in *Science under siege: zoology under threat*, edited by P. Banks, D. Lunney, and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Kingsford, R., Walker, K.F., Lester, R.E., Young, W.J., Fairweather, P.G., Sammut, J., and Geddes, M.C. 2011.** A Ramsar wetland in crisis – the Coorong, Lower Lakes and Murray Mouth, Australia. *Marine and Freshwater Research* 62: 255-265.
- Kingsford, R. 2013.** Australia's biodiversity conservation crisis - does anyone care? Pp. 31-38 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Leopold, A. 1968.** *A Sand County Almanac: With Essays on Conservation from Round River*. Oxford University Press, Oxford.
- Leopold, A. 1995 [1947].** An Ecological Conscience. *International Wildlife* 25:6 (Nov-Dec): 58.
- Lercher, A. 2006.** Liberty of Ecological Conscience. *Environmental Ethics* 28: 315-322.
- Lunney, D. 2012a.** Wildlife management and the debate on the ethical use of animals. I. Decisions in a wildlife management agency. *Pacific Conservation Biology* 18: 5-21.
- Lunney, D. 2012b.** Wildlife management and the debate on the ethical use of animals. II. A challenge to the animal protection movement. *Pacific Conservation Biology* 18: 81-99.
- Lunney, D. 2012c.** "What's the difference between climate science and climate journalism?" Pp. 23-44 in *Science under siege: zoology under threat*, edited by P. Banks, D. Lunney and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Lunney, D. 2013a.** Is a grumpy ecologist an oxymoron? Pp. 95-105 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Lunney, D. 2013b [in press].** Wildlife roadkill: illuminating and overcoming a blind spot in public perception. *Pacific Conservation Biology*.
- Lunney, D. and Hutchings, P. 2012.** Wildlife and climate change: are robust strategies for Australian fauna possible? Pp. 180-201 in *Wildlife and climate change: towards robust conservation strategies for Australian fauna*, edited by D. Lunney and P. Hutchings. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Lunney, D. and Matthews, A. 2003.** "Throw a koala on the barbie" (Daily Telegraph 15 July 1997): an analysis of wildlife reporting in two daily newspapers. *Australian Zoologist* 32: 288-297.
- Lunney, D. and Moon, C. 2008.** The portrayal of human-wildlife interactions in the print media. Pp 52-64 in *Too close for comfort: contentious issues in human-wildlife encounters*, edited by D. Lunney, A. Munn and W. Meikle. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Lunney, D. and Moon, C. 2012.** Disasters for wildlife: an analysis of media attention. *Australian Zoologist* 36: 5-19.
- Merton, T. 1968.** The Ecological Conscience [Online]. Available at: <[http://www.democraticunderground.com/discuss/duboard.php?az=view\\_all&address=115x180150](http://www.democraticunderground.com/discuss/duboard.php?az=view_all&address=115x180150)> [Last accessed 20/05/2013].
- Phillips, N. 2013a.** Scientists look to past to save possum's future. *The Sydney Morning Herald* (24 March) [Online]. Available at: <<http://www.smh.com.au/environment/animals/scientists-look-to-past-to-save-possums-future-20130323-2gmk1.html>> [Last accessed 15/05/2013].

- Phillips, N. 2013b.** Alive as a dodo. *The Sydney Morning Herald* (29 March) [Online]. Available at: <<http://www.smh.com.au/technology/sci-tech/alive-as-a-dodo-20130328-2gxag.html>> [Last accessed 15/05/2013].
- Power, J. 2013.** Taxidermy the new treat for wall art lovers. *The Sydney Morning Herald* (29 March) [Online]. Available at: <<http://www.smh.com.au/entertainment/art-and-design/taxidermy-the-new-treat-for-wall-art-lovers-20130328-2gx9q.html>> [Last accessed 15/05/2013].
- Pyke, G. 2013.** Third plenary session. Pp. 123 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Recher, H. F. 2010.** A not so natural history: the vertebrate fauna of Sydney. Pp. 125-42 in *The Natural History of Sydney*, edited by D. Lunney, P. Hutchings, and D. Hoculi. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Recher, H. 2012.** Climate change and the social responsibility of scientists: a reaction to Lunney and Hutchings. Pp. 202-207 in *Wildlife and climate change: towards robust conservation strategies for Australian fauna*, edited by D. Lunney and P. Hutchings. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Recher, H. F. 2013.** What makes this elderly scientist grumpy. Pp. 1-8 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Recher, H. F. and Ehrlich, P. R. 1999.** The Essence of Science: The Social Responsibility of Communicating. *Pacific Conservation Biology* 5: 161-62.
- Robertson, J. 2013.** Police Commissioner lays down law over drunken violence. *The Sydney Morning Herald* (31 March): 8.
- Rose, D. 2013.** Grumpy about this dark age of modernity. Pp. 88-94 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Ross, P. M., and Poronnik, P. 2013.** Science education in Australia: Time of change. Pp. 59-66 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Schulz, M., Wilks, G. and Broome, L. 2012.** An uncharacteristic new population of the Mountain Pygmy-possum *Burramys parvus* in New South Wales. *Australian Zoologist* 36(1): 22-28.
- Shmeleva, I.A. 2009.** The Methodology of Psychological Research of Ecological Consciousness. *Psychology in Russia: State of the Art* 2: 619-636.
- Talbot, F. 2013.** The biggest grump of all. Pp. 24-25 in *Grumpy Scientists: The Ecological Conscience of a Nation*, edited by D. Lunney, P. Hutchings, and H. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Taylor, A. 2013.** Outcry over hunting arts project. *The Sydney Morning Herald* (17 March) [Online]. Available at: <<http://www.smh.com.au/entertainment/art-and-design/outcry-over-hunting-arts-project-20130316-2g77c.html>> [Last accessed 15/05/2013].
- World Bank. 2002.** *World Development Index 2002*. World Bank, Washington, D.C., USA.