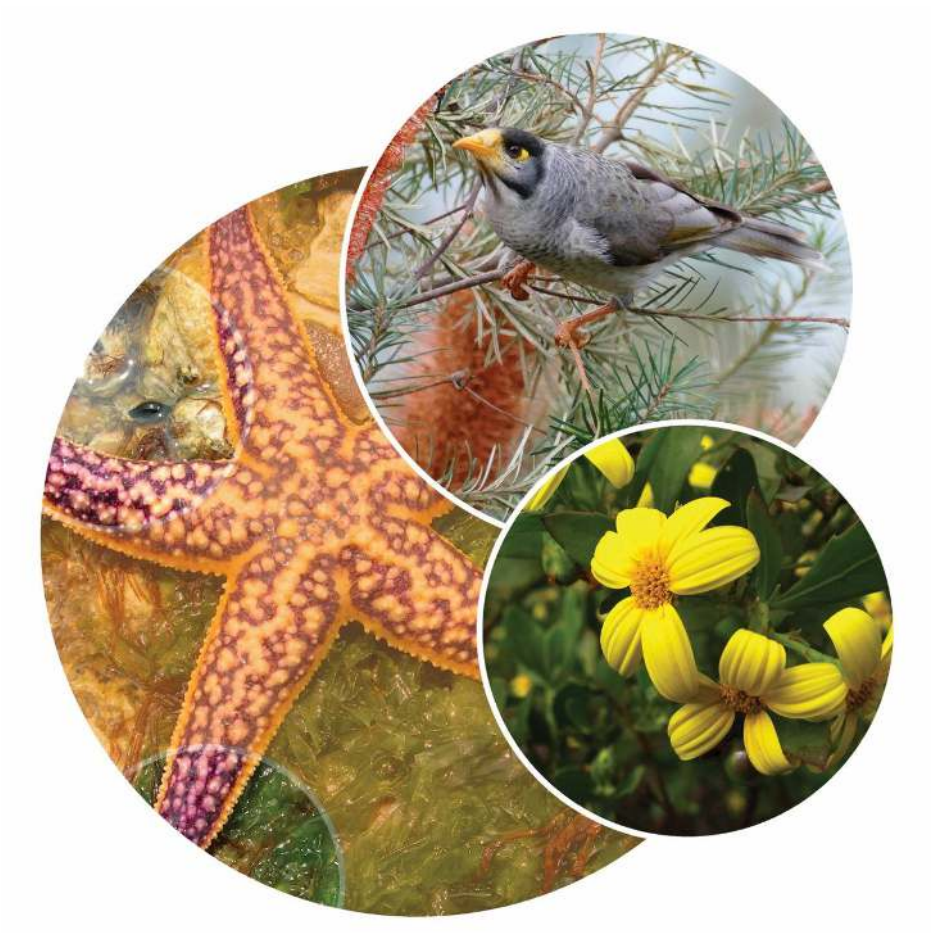
SECURING ADEQUATE FUNDING FOR ABATING THREATS TO NATURE IN AUSTRALIA

INVASIVE SPECIES COUNCIL



THREATS TO NATURE PROJECT

Briefing Note

About this paper

Invasive Species Council. 2021. Funding for abating threats to nature in Australia. Briefing note. February 2021.

This discussion paper has been produced by the Invasive Species Council's Threats to Nature project to generate interest in and gather more information about how Australia can secure the funding needed to safeguard biodiversity from current and future threats.

We welcome any comments. Please send to isc@invasives.org.au.

About the Invasive Species Council

The Invasive Species Council was formed in 2002 to advocate for stronger laws, policies and programs to keep Australian biodiversity safe from weeds, feral animals, exotic pathogens and other invaders. It is a not-for-profit charitable organisation, funded predominantly by donations from supporters and philanthropic organisations.

About the Threats to Nature project

The Invasive Species Council is working to reform Australia's national threat abatement system under the EPBC Act.

It is not possible to recover all Australia's threatened species one by one through species-focused efforts. We also need a concerted national focus to overcome the major threats our native plant and animals have in common – in particular, invasive species, habitat destruction and degradation, adverse fire regimes, changes to natural flow regimes and climate change.

Australia's threat abatement system needs to be much more ambitious and collaborative, nationally coordinated, and adequately funded.

Table of Contents

1. Introduction

Many actions needed to improve biodiversity outcomes across Australia require substantial increases in financing.

OECD Environmental Performance Reviews Australia 2019[1]

The major barrier to saving threatened species in Australia is a lack of funding. We don't know exactly how much is spent on this in Australia, nor how much is needed, but the rapidly growing number of threatened species (and threatened ecological communities) indicates that the funding gap is substantial. This has been the consistent message of researchers, conservation NGOs, state of the environment reports and parliamentary inquiries over many years. The 10-yearly review of Australia's national environmental law (the EPBC Act) in 2020 found that:[2]

> *Australia is losing biodiversity at an alarming rate and has one of the highest rates of extinction in the world.*
>
> *Populations of threatened birds, plants, fish and invertebrates are … continuing to decrease, and the list of threatened species is growing.*
>
> *Since the EPBC Act was introduced, the threat status of species has deteriorated… only 13 animal species have been removed from the Act's threatened species lists, and only one of these (Muir's Corella) is generally considered a case of genuine improvement.*

Globally, the funding deficiency for biodiversity conservation (including for measures such as protected areas) is an estimated AU$830–1,150 billion a year, with spending in 2019 some 5–8 times less than what was needed for countries to meet their biodiversity commitments under the UN Convention on Biological Diversity.[3] Recent research suggests that the funding gap in Australia is likely to be proportionally even higher than this global gap.[4]

Securing adequate funding in Australia for abating the major threats to nature and recovering threatened species should be one of the conservation sector's highest priorities. Most threatened species face several major threats in common – particularly invasive species, habitat destruction, adverse fire regimes and climate change – and their recovery will often not be feasible unless these threats are abated (Box 1). This paper provides a basis for seeking expert economic and policy assistance to build a compelling case for Australian governments to increase investment in threat abatement.

Initially, we cite preliminary estimates of the level of funding needed in Australia to achieve abatement of major threats and recover threatened species, and compare this with recent levels of government funding. These estimates are intended only to approximate the scale of funding needed.

We then identify options for increasing government funding and outline some benefits (conservation, economic and employment) of doing so. Although scaling up conservation funding from both public and private sources is essential, our focus here is government funding because this is where the majority of funding currently comes from and is likely to come from for the foreseeable future.[1]

We mostly assume here that readers will already be convinced that abating threats to nature should be a high government priority – for ethical reasons and to meet our international obligations (see Box 1 for conservation benefits). There are also several other justifications – for threats to nature are often also threats to industries and human wellbeing, and conservation programs often yield great economic and social benefits. These collateral costs and benefits need to be clearly defined and quantified to demonstrate a solid economic and social (as well as conservation) return on investment in threat abatement.

We conclude this paper by identifying research questions that need to be answered to build a compelling case for a substantial increase in government funding for threat abatement.

Box 1. The conservation benefits of an effective national threat abatement system

Australia appears to be the only country in the world with a formal threat abatement system. The EPBC Act enables the listing of major threats to species and ecological communities as 'key threatening processes' and

the development of ‘threat abatement plans’. This should be one of Australia’s most powerful mechanisms for protecting biodiversity – for saving threatened species from extinction, preventing the decline of more species, and returning ecosystems to health and resilience.

But the system is poorly applied – the 21 threats currently listed under the EPBC Act are not comprehensive of the major threats to nature (adverse fire regimes, for example, is not listed), many threats lack a threat abatement plan or other national response, and many abatement plans are poorly implemented.

In consultation with environment groups and experts, the Threats to Nature project has developed recommendations to greatly strengthen the threat abatement system (see URL). We need much greater ambition, systematic listing of threats, flexible response options (including legal and policy options), collaboration across governments and sectors, systemic monitoring and reporting, greater accountability – and substantially more funding.

The conservation benefits of this bolstered system will be immense:

- It is essential for the recovery of most of Australia’s almost 2,000 nationally threatened species and ecological communities. Many species threatened by feral cats and foxes, for example, will be forever confined to islands and fenced reserves unless these invasive predators can be more effectively controlled.
- It will protect declining species, including those whose conservation status is unknown, and prevent ever-more species becoming threatened.
- It will improve Australia’s ecological health, prevent further ecosystem degradation and improve the resilience of species and ecological communities to climate change and new threats.

The benefits of a strong threat abatement focus have been demonstrated. The threat abatement plan for seabird bycatch by longline fishing has resulted in a drop in seabird bycatch from many thousands of albatrosses and other seabirds a year in the 1990s to fewer than 50 currently. Another abatement success has been the eradication of invasive animals from many islands, creating safe havens for threatened wildlife and breeding seabirds.

2. Funding needed

There is no publicly available detailed information about how much it will cost to abate Australia's major threats to nature and recover threatened species and ecological communities. In an ideal system – with threats and threatened species comprehensively listed under the EPBC Act and subject to abatement and recovery responses under which priority actions and costs are specified – estimating total costs would be in large part a simple mathematical endeavour. But Australia lacks listings and national plans or strategies for many threats to nature and threatened species, and the budgets within existing plans are often not robust.[5]

Four studies provide a starting point for estimating costs: (a) 3 CSIRO-led studies identifying threat management priorities and estimating the costs to secure species of conservation significance in the Brigalow Belt, the Pilbara and the Kimberley and (b) a study by researchers from the National Environmental Science Program estimating the funding needed for threatened species recovery by extrapolating from spending in the United States.[4,6–8]

2.1 Regional threat abatement assessments

The CSIRO-led studies of the costs of priority threat management in 3 regions provide probably the best assessments in Australia of what can be achieved with specified levels of funding for threat management.

For the Brigalow Belt (Queensland), the2016 assessment found that 21 plant and animal species were likely to be functionally lost from the region within 50 years unless threats were effectively managed. An estimated annual investment of $64 million (2020 dollars) over 50 years would likely avert the loss of 12 of these species, while the 9 other species would likely also require species-specific management to prevent functional extinction.[7] In this highly transformed region, the most costly management needs are protecting remnant and important regrowth vegetation, managing pollution, and managing invasive animals (Table 1).

For the Pilbara (Western Australia), the 2014 assessment found that 53 conservation-significant species could probably be secured with an investment of about $20 million a year (2020 dollars) over 20 years.[8] Most of the cost would be for managing weeds, fire and invasive animals, and protecting and restoring vegetation (Table 1).

For the Kimberley (Western Australia), the 2011 assessment found that 45 species at risk of functional extinction within 20 years could probably be secured with an initial investment of about $100 million and an ongoing $38 million (2020 dollars) a year over 20 years.[6] Most of the cost would be for managing fire and introduced herbivores (e.g. domestic and feral cattle, donkeys, horses) (Table 1).

Extrapolating from average yearly per-hectare costs in these 3 regions (ranging from $1.10 in the Pilbara to $1.80 in the Brigalow Belt) and assuming comparable average costs across mainland Australia, about $1.1 billion a year would be needed to manage high-priority terrestrial threats in Australia. The validity of this extrapolation is limited by the large variation in costs between less-modified regions (mainly in northern and central Australia) and highly modified regions in the intensely farmed and settled regions (mainly in southern Australia).

Additional funding would be needed for abating threats in marine habitats and on islands, as well as species-specific recovery actions (as required for several species in the Brigalow Belt).

Threat abatement also requires a strong focus on research. The 3 regional assessments were mainly based on applying existing techniques for threat management rather than developing more-effective methods such as new baits or biological control agents for invasive species and habitat restoration techniques. Investing in the development of more-effective and less-costly abatement techniques should be a high priority for additional funding.

Based on our extrapolation from the 3 regional studies ($1.1 billion) plus additional funding needed for marine regions and for research, we estimate that at least $1.5 billion a year is needed for threat abatement.

2.2 Threat abatement activities

The regional studies considered above cover most of the threat abatement activities needed on land across Australia (see Table 1 for the estimated costs):

- eradicating and controlling invasive species (plants, animals, pathogens)
- managing fire regimes
- protecting and restoring habitat
- protecting and restoring natural flow regimes
- managing stock grazing.

Priority threat abatement activities in marine habitats would include:

- preventing overfishing and harmful bycatch
- cleaning up marine debris
- managing invasive species.

As exemplified by the 2019–20 Black Summer fires, climate change is likely to considerably complicate and elevate the costs of threat abatement.

Table 1. Threat management priorities and costs for the Brigalow Belt, Pilbara and Kimberley regions

Brigalow Belt strategies	$m/year [A]	Pilbara strategies	$m/year [B]	Kimberley strategies	Initial cost	$m/year [B]
Manage fire	0.6	Manage fire[C]	3.1	Manage fire & introduced herbivores	77.4	30.3
Manage weeds	1.7	Manage weeds	4.9	Manage weeds	7.6	3.4
Manage invasive animals	14.1	Manage cats[C]	2.5	Manage predators	16.8	4.2
Manage grazing	4.6	Manage grazing	1.4			
Manage hydrology	1.3	Manage hydrology	0.4			
Protect remnant vegetation & important regrowth	18.2	Identify, protect & restore habitat	4.5			
Restore key habitats	4.1	Manage feral ungulates	0.4			
Establish key biodiversity areas	3.3	Establish sanctuaries	1.0			
Manage pollution	20.2	Manage cane toads[C]	1.8			
Combined strategies	**63.6**		**19.9**		**101.8**	**37.8**

Sources: Carwardine et al (2011),[6] Carwardine et al. (2014),[8] Ponce Reyes et al (2016)[7]

Notes: A. Average cost ($million) per year for 50 years (converted to 2020 dollars). B. Average cost ($million) per year for 20 years (converted to 2020 dollars). C. These include costs for research as well as management.

2.3 An extrapolation from the United States

The United States has a much better record of species recovery than Australia. For example, 85% of birds listed as threatened in the US have stabilised or recovered.[4] The main reason for this success is that funding for actions specified in recovery plans is mandated under the US *Endangered Species Act 1973*. From 2011 to 2016, the US Government spent an average AU$1.2 million a year on recovery actions for each of its approximately 1,700 listed threatened species (about the same number as Australia).

Based on spending in the US, Australia would need to spend $1.8 billion a year to achieve recovery of threatened species, an average of about AU$1 million a year per listed species.[4] This was extrapolated by Wintle et al (2019) from the mean US funding allocations for each taxonomic group (plants, mammals, birds etc) for species that had been independently assessed as having adequate

funding (Table 2).[4] The annual funding in the US for each taxonomic group ranged from AU$0.17 million per plant taxa to AU$4.77 million per bird taxa.

For several reasons, the $1.8 billion estimate is likely to be conservative: (a) it is based only on US Government funding, and the expenditure by NGOs, individuals and businesses in the US on threatened species recovery is considerably higher than in Australia;[4] (b) the impacts of invasive species in Australia is greater than in the US and abating these impacts is particularly costly;[4] and (c) the current national list of threatened species is not comprehensive. Furthermore, additional funding is needed for the recovery of threatened ecological communities.

Table 2. Funding allocated for US threatened species extrapolated for Australian threatened species

Taxa	Mean US allocated funding 2018 (AU$/taxa)[A]	Number of listed threatened species, EPBC Act	Extrapolated expenditure needed to recover
Plant	0.17 million	1,336	233.19 million
Invertebrate	0.45 million	65	29.04 million
Fish	2.92 million	58	169.24 million
Amphibian	1.57 million	37	80.98 million
Reptile	2.79 million	61	170.09 million
Bird	4.77 million	134	641.34 million
Mammal	3.37 million	107	467.42 million
	Total	**1,798**	**1,768.36 million**

Source: Wintle et al. (2019)[4]

Notes: A. Converted from $US to $AUD on 5 November 2020. Conversion rate: US$1 = AUD$1.40

2.4 A preliminary cost estimate

In the absence of more-specific costings, we proceed here on the basis that effective threat abatement and species recovery will require targeted funding of at least $1.5–2 billion a year. This range encompasses the $1.8 billion estimate for threatened species recovery and the $1.5 billion estimate for threat abatement. The level of funding needed would decrease over time as species recover and major threats are abated.

The estimate should be regarded as conservative not just because threats in Australia such as invasive species will be costly to abate but because the abatement of some threats will require changes in industry and societal practices likely to have economic consequences. The estimate also comes with the caveat that climate change is likely to massively escalate threat abatement costs unless greenhouse gas emissions can be rapidly reduced.

3. Funding allocated

3.1 Targeted funding for threatened species recovery

In 2018–19, the Australian Government allocated about $50 million directly for 'improving outcomes for threatened species' and the states and territories about $70 million (Table 3).[4] This includes some threat abatement but not government operating costs. Averaging just $70,000 per nationally listed species, this is less than a tenth of the per-species spending by the US Government.[4]

Other types of government funding also likely to contribute to threatened species recovery. Wintle and colleagues (2019) estimated that about $340 million (20%) of the $1.67 billion federal environment budget (2018–19) may have indirectly benefited threatened species (Table 4). In addition, funding from other departments, such as biosecurity funding by the agricultural department, contributes to threat abatement. This would also apply to state and territory government funding, and some local governments also contribute to threat abatement.

However, these other sources of funding likely to benefit threatened species were not relevant to the $1.8 billion estimate for threatened species recovery (based on US funding) because only targeted threatened species funding in the US was used for the extrapolation. In the US, as in Australia, there would be additional funding that would indirectly benefit threatened species. And, as noted, non-government funding of threatened species recovery is considerably higher in the US than it is in Australia.[4]

The Australian Government allocations targeting threatened species recovery came from 5 main programs: the Landcare Environmental Stewardship Program ($10.0 million), Reef 2050 Plan ($5.3 million), Commonwealth marine reserves ($3.5 million), Commonwealth national parks ($7.9 million) and the National Environmental Science Program ($8.4 million) (Table 4). These constituted just 0.01% of the total federal budget, an average of $1.94 per Australian resident.[9,10]

The total per capita spending on threatened species recovery by all governments was $4.76, ranging from $22.45 per resident by the Northern Territory Government to $1.36 by the Queensland Government (Table 3).

3.2 A preliminary estimate of the funding gap

Based on estimated funding needs of $1.5–2 billion and allocations of $120 million, we conclude that Australian federal, state and territory targeted funding for threat abatement and threatened species recovery needs to increase by an order of magnitude, in the range of 12–17-fold.

Table 3. Australian government (federal, state and territory) direct budget allocations for threatened species recovery in 2018–19

Australian government	Allocation, 2018–19	Spending per capita
Australia	$49.6 million	$1.94
Australian Capital Territory	$2.8 million	$6.51
New South Wales	$24.5 million	$3.00
Northern Territory	$5.5 million	$22.45
Queensland	$7.0 million	$1.36
South Australia	$9.8 million	$5.55
Tasmania	$3.5 million	$6.49
Victoria	$11.3 million	$1.70
Western Australia	$8.1 million	$3.05
TOTAL	**$122.0 million**	**$4.76**

Source: Wintle et al (2019) for budget allocations[5], Australian Bureau of Statistics (2020) for population data[11]

Table 4. Australian Government environmental budget allocations 2018–19, with a breakdown into spending directly for ('direct') and perhaps beneficial for ('relevant') threatened species recovery

Program or appropriation	Allocation $'000	Direct[A] $'000	Relevant[B] $'000
National Landcare Program: Natural Heritage Trust	176,518	121	160,631
National Landcare Program: Environmental Stewardship Program	9,980	9,980	0
Reef 2050 Plan	80,709	5,325	60,582
Commonwealth Marine Reserves	20,837	3,473	10,419
Improving your Local Parks and Environment	5,436	76	1,439
Payments to corporate entities [Director of National Parks]	47,434	7,906	23,717
National Environmental Science Program	25,520	8,422	9,442
Australian Biological Resources Study	2,030	0	0
Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining	1,035	0	0
MDB Environmental Knowledge and Research	1,900	0	1,900
Commonwealth Environmental Water Office	33,292	0	33,292
Australian Heritage Grants Program - establishment	5,347	0	2,674
Giant Pandas	1,284	0	0
Environment Protection and Biodiversity Conservation Act - Water Resources Amendment	259	259	0
National Environment Protection Council	496	0	0
Biofuels - Monitoring, Compliance and Enforcement of Fuel Quality	100	0	0
Surf Life Saving Cleaner Outboard Engines Scheme	375	0	0
Independent Scientific Committee in Wind Turbines	15	0	0
Solar Programs	423	0	0
Implementing the Finkel Review	1,950	0	0
Ordinary annual services (Appropriation Bill no. 1) [Renewable Energy Agency]	2,463	0	0
Australian Renewable Energy Agency Act 2011	310,943	0	0
Expenses not requiring appropriation in the Budget year	12	0	0
Ordinary annual services (Appropriation Bill No.1)	658,894	0	0
Aboriginal Land Rights (Northern Territory) Act 1976	155,441	0	0
Aboriginals Benefit Account Ranger Agreement	1,013	0	0
Payments to corporate entities	18,511	0	9,256
Sydney Harbour Federation Trust	18,806	0	0
Great Barrier Reef Marine Park Authority	41,772	0	27,570
TOTAL	**1,670,229**	**49,561**	**340,921**

Source: Wintle et al (2019)[5]

Notes: A. 'Direct' spending is that directly targeted at improving outcomes for threatened species. B. 'Relevant' spending is that likely to have positive indirect impacts on threatened species but is not specifically designed to benefit threatened species – for example, generic habitat restoration, sustainable land management, and research related to, but not focused on, improving threatened species outcomes.

4. Potential sources of additional funding

Governments can apply 'fiscal tools' to benefit nature – for example, by allocating more of existing revenue or generating more revenue to spend on conservation, or by using taxes, subsidies and tradeable permits to encourage conservation or discourage harmful behaviours.[3] Here, we focus on allocation and revenue-generating options.

4.1 Increased government budget allocations

Option 1: Increase the federal budget for threat abatement from existing revenue

Threat abatement should be funded jointly by federal and state/territory governments under an agreed funding formula (as is the case for other jointly funded endeavours). Only by contributing the major proportion of funding under an intergovernmental agreement is the Australian Government likely to be able to motivate state and territory governments to undertake the work needed. However, to simplify matters here, we assume that all funding will come from the federal budget.

The estimated funding needed, $1.5–2 billion a year, is a minor proportion of the federal budget – just 0.3–0.4% of the 2019–20 budget, about $90–120 per taxpaying entity[9,10] – so it is reasonable to expect the Australian Government to increase the funding allocation for threat abatement and threatened species recovery (and for the state and territory governments to do the same). Information about the collateral social and economic benefits of threat abatement work is essential to help persuade governments to increase investment.

Box 2. $1.5–2 billion in context

To provide some context, the estimated funding need is roughly equivalent to the following proportions of items in the 2019–20 budget:[9]

- 5–6% of the defence budget ($32.2 billion)
- 12–16% of subsidies for medicines ($12.7 billion for the pharmaceutical and benefits scheme)
- 20–27% of the fuel tax credit scheme ($7.5 billion)[12]
- 27–36% of spending on road transport ($5.6 billion)
- 100–150% of spending on broadcasting ($1.5 billion)

4.2 Biodiversity levies

Option 2: Impose levies on economic activities harmful to nature or on users of nature-based services

Levies are a common way for local, state and federal governments to raise funds for specified purposes or to modify behaviours. Environmental examples include levies by local governments to fund bushland purchases, environmental grants and invasive animal control, and levies by state governments for waste disposal and water management (see Table 4 for a few state and federal examples).[13] South Australia levies landowners and commercial water users to pay for landscape management, including threat abatement, and the Northern Territory levies mining companies to fund rehabilitation of legacy mines. State governments also often impose levies for non-environmental purposes – for example, to fund emergency services and training in the building industry.

At the federal level, the Australian Government imposes a 'product stewardship levy' on oil producers and importers as an incentive for recycling used oil.[14] In 2019, the Australian Government proposed a new levy on all cargo imported by sea to boost funding for underfunded aspects of biosecurity, including environmental biosecurity, but withdrew the proposal due to industry opposition.[15] The Australian Government's taxation of tobacco and alcohol provides an excellent precedent for levying harmful activities and raises substantial revenue: Australia's fourth largest tax revenue (after personal

income tax, company tax and GST) comes from tobacco, which was predicted to generate $17.4 billion in 2019–2020. Taxes on alcohol were predicted to raise $5.9 billion.[16]

International examples of environmental levies include Costa Rica's levies on fuel and water use to fund forest protection, the European Union's energy, transport, pollution and resource taxes, and Fiji's levies on tourism services, luxury vehicles, plastic bags and high incomes to fund conservation and climate adaption (see Box 3).

The 2010 *Australia's Future Tax System Review* (by Ken Henry) said that levies implementing the 'polluter-pays' principle (e.g. a waste levy) are preferable to others for efficiency and equity reasons, but where this is impractical – e.g. it is difficult to identify the polluter or the costs of imposing a levy are too high – a 'beneficiary-pays' principle (e.g. a tourism levy) could apply.[17]

Given the wide range of economic activities that harm nature, there are likely to be a wide range of justifiable targets for levies. Table 4 provides examples of human activities that contribute to major threats to nature in Australia and could potentially be subject to levies, consistent with the polluter-pays principle. Whether they are realistic is not considered here, but any new levy is likely to be contentious, and several (probably most) options listed in Table 4 are likely to be politically not feasible. It is important to assess all potential consequences of levies, including potential iniquities (e.g. an industry-wide levy that doesn't distinguish between levels of risk), the extent to which they will modify harmful behaviours and the potential for creating perverse incentives (e.g. if a levy undermines the political incentive to strengthen regulation to reduce harmful activities). It may be inadvisable to levy activities such as land clearing when the focus should instead be on strengthening regulation to prevent it.

Table 5. Examples of environmental levies in Australia

Levy type	Levy payer	Purposes
AUSTRALIAN GOVERNMENT		
Product stewardship levy[14]	Purchasers of oil	Create an incentive for recycling oil (benefits are paid to oil recyclers)
STATE & TERRITORY GOVERNMENTS		
Landfill levy (Vic)[18]	Ratepayers & waste disposal businesses	Encourage recycling, fund core activities of environmental agencies, provide sustainability grants for resource use, waste & climate change projects
Parks charge (Vic)[19]	Ratepayers	Develop, manage and maintain metropolitan parks, gardens, trails, waterways, and zoos
Environmental mitigation levy (Vic)[20]	Some Melbourne landowners	Mitigate impacts on biodiversity caused by the development of Melbourne's growth corridors
Waste levy (Qld)[21]	Landfill operators	Reduce landfill waste & encourage waste avoidance, improve resource recovery practices, facilitate industry investment in resource recovery
Waste levy (NSW)[22]	Some waste facilities	Increase waste avoidance and resource recovery
Climate change fund levy (NSW)[23]	Electricity distributors	Improve energy efficiency & environmental resilience to climate change.
Waste levy (SA)[24]	Waste depot licence holders	Reduce waste, promote recycling, reduce carbon emissions, manage contaminated sites
Regional landscape & water levies (SA)[25]	Landowners Commercial water users	Manage landscapes by NRM boards, eg pest and weed control, threatened species work
Mining levy (NT)[26]	New mines	Rehabilitate legacy mine sites
Waste levy (ACT)[27]	Commercial disposers of waste	Improve waste management & recycling

Box 3. International examples of environmental levies

Costa Rica's forest protection levies

In 1995, Costa Rica established a National Forestry Financing Fund to provide funding for farmers and landowners to protect and restore forests and to safeguard watersheds and natural water supplies.[3] The revenue comes from a range of sources, including a 3.5% tax on fuel and a water use tariff.[28] These have been characterised as payments for ecosystem services. Payments from the fund have helped protect or restore 1.25 million hectares of forest, about a quarter of Costa Rica, dramatically reversing forest clearing and degradation.[3]

The European Union's environmental taxes

In 2018, EU governments collected environmental taxes worth €324.6 billion, equivalent to 2.4 % of the EU gross domestic product and 6% of the EU total government revenue from taxes and social contributions.[29] Environmental tax categories include those for energy, transport, pollution and resources (resource taxes can include those for water abstraction, harvesting of timber and fish, extraction of raw materials, landscape changes and tree cutting).[30] About half the tax revenue is paid by households and half by corporations.[29]

In July 2020 the EU governments agreed to impose a plastic tax on non-recyclable plastics to encourage recycling. It is expected to raise €6–8 billion a year.[31]

Environmental taxes are used to influence the behaviour of producers and consumers. These instruments 'provide a flexible and cost-effective means for reinforcing the polluter-pays principle and for reaching environmental policy objectives'.[29]

Fiji's environment levy

The Fijian Government introduced the Environment and Climate Adaptation Levy in 2017–2018 to fund work in conservation and climate change mitigation and adaptation.[32] It consists of levies from 5 sources:

- 10% on prescribed services (many associated with tourism)
- 10% on importation of luxury vehicles
- 20 cents on plastic bags
- miscellaneous (including 10% on super yachts)
- 10% on incomes >FJ $270,000

In 2019–20, the levy raised about 5% of total government revenue (the equivalent of $AU115 million).[33] Some of the funding is allocated to a Climate Change Relocation Trust Fund to help raise donor funding to relocate low-lying coastal communities facing the brunt of climate change.[32]

Table 6. Examples of activities that exacerbate threats to nature that could be subject to levies – from a logistical (but not political) perspective

Key threat	Economic activities contributing to threat	Examples of levy potential
Invasive species	Importation and sale of invasive species (eg weedy plants for gardens or pastures, invasive animals as pets or stock). Importation and sale of goods with biosecurity risks (eg cut flowers).	Imported goods (eg a container levy) Sales of non-indigenous species that exceed a specified risk rating
Habitat destruction & degradation	Land clearing (for farming, urban development, mining) and agricultural use of fertilisers & pesticides.	Per hectare of land cleared (additional to offsets) Fertilisers & pesticides
Climate change	E.g. use of fossil fuels, land clearing	Carbon emissions
Marine debris	Manufacture and sale of plastic bags	Plastic bags
Stock grazing (e.g. overgrazing, trampling)	Pastoralism	Meat sales
Altered hydrological regimes	E.g. extraction of water for irrigation & mining	Water use
Overfishing and bycatch	Commercial fishing, particularly using trawl nets, gillnets & longlines	Sales of fish caught by harmful methods

4.3 Biodiversity lottery

Option 3: Establish a national nature lottery

National lotteries can generate substantial revenue.[3] The Heritage Lottery Fund is probably the most significant non-government funding source for conservation in the United Kingdom.[34] It was set up in 1994 to support projects benefiting national, regional and local heritage. In just over 2 decades, the fund spent £775 million ($AUD1.4 billion, 10–13% of total lottery grants) on nature projects.

In 2015, the Turnbull Government said it would investigate the feasibility of adopting the UK's national lottery model to raise funds for protecting heritage sites.[35] However, the proposal was scrapped because of opposition from state governments.[36]

4.4 Biodiversity trust fund

Option 4: Establish a trust fund to leverage other sources of funding

The 2020 independent review of the EPBC Act is likely to recommend that the Australian Government establish a biodiversity trust fund 'that links government and philanthropic investments, as well as enabling developers to meet their offset obligations'.[37] A trust fund 'can be a vehicle to drive additional

resources from donors, national governments, and the private sector, as well as from private citizens through providing assurances'.[37] It could be structured either as an endowment fund (the income from investments is used to finance activities) or as a revolving fund (the funds are regularly replenished).[37] The funds could come from a variety of sources: any of the options mentioned here, donations, and from offsets for development approvals, as exemplified by the Pilbara Environmental Offsets Fund (Box 4).

Box 4. The Pilbara environmental offsets fund

Established in 2018, the fund pools money from offset payments required under state and federal environmental laws to enable larger, more strategic and beneficial projects than individual offset projects. So far, the conditions for mines approved by the Western Australian Government since 2012 require $90 million to be paid into the fund for projects over the next 40 years.[38]

The 5-year implementation plan for the offsets fund specifies 3 priority areas for offset projects, where ease of land access and security for offset outcomes intersect with high biodiversity values. Projects must 'lead to tangible improvements' for the offset targets and be additional to what is already required to manage or rehabilitate land in the Pilbara. It is intended that the projects will be 'co-designed and co-delivered with Traditional Owners, and implemented wherever possible with Aboriginal people and ranger groups'.[38]

4.5 A preliminary view on sourcing adequate funding

Conservation commitments are meaningless unless there is funding to implement them. For this reason, it has been recommended that each party to the Biodiversity Convention develop a national biodiversity funding plan that addresses 'opportunities to mobilise resources at all levels—local, national, and global—as well as from all sources—public, private, and philanthropic' and that each party mobilises 100% of the resources needed to fully implement their national biodiversity strategies and plans.[3] To achieve this, Australian governments should investigate the potential for new sources of funding.

The estimated funding needed for effective threat abatement and threatened species recovery in Australia represents just 0.3–0.4% of the federal budget, so our federal, state and territory governments can well afford to provide this from existing revenues. But given the current economic situation and competing social priorities for public funding, it is unlikely to occur unless supplemented by new sources of funding.

Our preliminary view is that Australia's federal, state and territory governments should develop a biodiversity funding plan that includes the following: a revolving biodiversity trust fund funded by (a) agreed allocations from each government (involving a substantial increase in current budgets for biodiversity), (b) new sources of funding, including biodiversity levies and a biodiversity lottery, and (c) private and philanthropic contributions.

5. The benefits

5.1 Meet national and international conservation commitments

More funding is essential to enable Australia to make progress on its national and international commitments to abate threats to nature.

Article 8 of the Convention on Biological Diversity commits Australia to 'Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings'. The Aichi Biodiversity Targets committed Australia, by 2020, to prevent the extinction of threatened species and improve their conservation status and to abate particular threats such as habitat loss and invasive species (Box 4).[39] New international targets will be agreed in 2021.

Our international obligations are reflected in the objective under the EPBC Act to 'prevent the extinction, and promote the recovery of, threatened species' and objectives under *Australia's Strategy for Nature 2019–2030* to 'Maximise the number of species secured in nature' and 'Reduce threats and risks to nature and build resilience'. Currently, the trends are in the opposite direction – the numbers of threatened species and threats to nature are growing.

One of the challenges in Australia and globally is to quantify the conservation and other outcomes that can be achieved by different levels of funding – 'financing decisions are hindered by considerable uncertainty over the likely impact of any conservation investment'.[40] A 2017 paper in *Nature* demonstrating a model of how 'conservation spending quantitatively reduces the rate of biodiversity loss' found that spending by 109 countries reduced the median average decline in bird and mammal species by almost a third (29%) per country from 1996 to 2008.[40] More than half the recorded declines during that period were concentrated in just 7 countries, one of which was Australia. Under that model, an increase in the Australian conservation budget of i$5 million (international dollars)[1] would have reduced bird and mammal species decline by 8.2%.[40] Such a model may be useful to help Australian decision-makers predict the conservation outcomes of different levels of investment.

Box 4. International commitments – Aichi Biodiversity Targets relevant to threat abatement[39]

Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6: By 2020 … fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

[1] A hypothetical unit of currency that has the same purchasing power that the US dollar had in the United States at a given point in time.

5.2 Sustain industry assets and ecosystem services

More effective abatement of threats to nature offers enormous collateral economic benefits – to industries such as agriculture and tourism and by helping to maintain ecosystem services. These benefits have not been collated or costed, but for agriculture they include the following:

- habitat protection and restoration will reduce the costs to agriculture of erosion, salinity and acidification (in Victoria alone, soil acidity reduces the net value of agricultural yield by about $470 million a year and salinity reduces it by about $18 million a year [2004 figures][41])
- more effective weed management will reduce agricultural control costs (weed control on farms costs about $5 billion a year[42])
- improved cat control or eradication will reduce the spread of sarcosporidiosis and toxoplasmosis to livestock (the costs to livestock production are an estimated $12 million a year, and the costs to human health of toxoplasmosis and cat scratch disease are $6 billion a year[43]).

The standout exemplar of the benefits of threat abatement for tourism is the Great Barrier Reef, worth more than $6 billion a year in tourism revenue and threatened by excessive nutrients, sediments and contaminants, climate change and coastal development.[44] An exemplar of the benefits of threat abatement for ecosystem services is climate regulation. Australian seagrasses alone are estimated to provide $45 billion a year in carbon-dioxide-absorption services.[45]

These few examples indicate that the collateral economic benefits of threat abatement are likely to be worth manyfold more than the recommended investment of $1.5–2 billion a year. Estimating the return on investment in threat abatement is a priority research question.

5.3 Create jobs

Effective threat abatement requires the services of a dedicated workforce with a wide range of skills. In April 2020, more than 70 conservation, farming and NRM groups proposed a $4 billion stimulus package to create 24,000 jobs. It was based on estimates that each $100 million investment in conservation land management would support about 1,000 full-time jobs (including salaries, on-costs, operational and capital expenditure). An assessment of a stimulus package in the United States found that coastal restoration projects generated 17 jobs per US million dollars, which is much higher than in other industry sectors.[46] A high research priority is to calculate the potential employment outcomes of investment in threat abatement.

A major focus of improved threat abatement would be increasing the capacity of Indigenous land and sea ranger groups. Currently, close to 3,000 rangers are employed in over 800 full time equivalent jobs, with an 84% employee retention rate.[47] Analysis of the social returns on investment in ranger programs (commissioned by the Department of Prime Minister and Cabinet) found that every dollar spent returned up to $3.40 in social, economic and environmental value. The benefits include better health and wellbeing, improved alcohol and substance misuse outcomes, fewer interactions with the justice system and improved governance capacity of Indigenous organisations.[48]

6. Research questions

We have outlined here a case for substantially increasing, by more than 10-fold, government investment in abating threats to nature. This could be funded from existing government revenue, but is likely to depend on generating a new source of revenue such as a biodiversity levy or a nature lottery.

There are many precedents for levies, with environmental levies imposed by all Australian federal, state and territory governments, particularly to reduce waste and encourage recycling. There is also a strong economic rationale for a levy – to help compensate for the negative externalities of a wide range of human activities on biodiversity.

Although it is clear that investing in threat abatement will bring many benefits – recovering threatened species (and thus meeting national and international commitments), supporting agriculture and tourism, sustaining ecosystem services, and creating jobs – the case for investment needs further economic analyses. The research questions include the following.

Funding needs and outcomes

1. What level of funding over the next 20 years is needed to abate the major threats to nature in Australia? Is $1.5–2 billion a year a reasonable estimate? (This question will be substantially answered in the near future by a project under the National Environmental Science Program.)
2. What are the funding priorities and what can be achieved (in terms of government policy objectives and conservation outcomes) with different levels of investment – e.g. $0.5 billion, $1 billion, $1.5 billion and $2 billion a year? What examples of past threat abatement activities demonstrate value for money?

Potential new revenue sources

3. What are the pros and cons of the proposed new sources of revenue – levies or a lottery? Are there additional potential sources?
4. What are the most feasible targets of a biodiversity levy, from economic and political perspectives, and how much revenue could be generated?
5. What are the justifications for such levies (e.g. polluter pays principle)? What are their potential financial, social and environmental consequences?

Economic and employment benefits

6. What would be the likely returns on increased investment in threat abatement – including collateral economic benefits to industries, improved ecosystem services and job creation?
7. Conversely, what are the economic and social costs if investment in threat abatement continues at the current level?

7. References

(1) OECD. *OECD Environmental Performance Reviews Australia 2019*; OECD Publishing, 2019.

(2) Samuel, G. *Independent Review of the EPBC Act. Interim Report*; Australian Government Department of Agriculture, Water and the Environment, 2020.

(3) Deutza, A.; Heal, G.; Niuc, R.; Swanson, E.; Townshend, T.; Lic, Z.; Delmard, A.; Meghjid, A.; Sethid, S.; de la Puented, J. *Financing Nature: Closing the Global Biodiversity Financing Gap*; The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability., 2020.

(4) Wintle, B. A.; Cadenhead, N. C.; Morgain, R. A.; Legge, S. M.; Bekessy, S. A.; Cantele, M.; Possingham, H. P.; Watson, J. E.; Maron, M.; Keith, D. A. Spending to Save: What Will It Cost to Halt Australia's Extinction Crisis? *Conserv. Lett.* **2019**, *12* (6), e12682.

(5) Garnett, S.; Luck, L.; Zander, K.; Pandit, R.; Gunawardena, A.; Pannell, D. *Improved Budgetary Planning for Threatened Species and Ecological Community Recovery Plans*; Threatened Species Recovery Hub, National Environmental Science Program, 2020.

(6) Carwardine, J.; O'Conner, T.; Legge, S.; Mackey, B.; Possingham, H.; Martin, T. Priority Threat Management to Protect Kimberley Wildlife. **2011**.

(7) Ponce Reyes, R.; Firn, J.; Nicol, S.; Chades, I.; Stratford, D. S.; Martin, T. G.; Whitten, S.; Carwardine, J. *Priority Threat Management for Imperilled Species of the Queensland Brigalow Belot*; CSIRO, 2016.

(8) Carwardine, J.; Nicol, S.; Van Leeuwen, S.; Walters, B.; Firn, J.; Reeson, A.; Martin, T. G.; Chades, I. Priority Threat Management for Pilbara Species of Conservation Significance. **2014**.

(9) Budget sliced and diced: Where every dollar comes from, and how it's spent https://www.abc.net.au/news/2019-04-03/federal-budget-2019-sliced-and-diced-interactive/10959808 (accessed Sep 15, 2020).

(10) Australian Taxation Office. Taxation statistics 2017-18 https://www.ato.gov.au/About-ATO/Research-and-statistics/In-detail/Taxation-statistics/Taxation-statistics-2017-18/?anchor=alltaxreturns (accessed Oct 12, 2020).

(11) Australian Bureau of Statistics. National, state and territory population, March 2020 https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release (accessed Oct 12, 2020).

(12) Deans, J.; Laidlaw, H. Fuel, energy and industry. Budget Review 2019–20 Index https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/BudgetReview201920/FuelEnergyIndustry (accessed Oct 12, 2020).

(13) Ward, A.; Lassen, M. *Expanding Finance Opportunities to Support Private Land Conservation in Australia*; Australian Land Conservation Alliance and Trust for Nature (Victoria), 2018.

(14) Aither. *Third Independent Review of the Product Stewardship (Oil) Act 2000. A Report Prepared for the Department of the Environment*; Australian Government Department of the Environment, 2013.

(15) Department of Agriculture, Water and the Environment. Onshore Biosecurity Levy https://www.agriculture.gov.au/biosecurity/biosecurity-imports-levy (accessed Oct 12, 2020).

(16) *Budget Strategy and Outlook. Budget Paper No. 1 2019-20.*; Australian Government, 2019.

(17) Henry, K.; Secretariat, A.; Crescent, L.; Henry, D. D. Australia's Future Tax System Review. *Canberra Aust. Gov.* **2010**.

(18) Victorian Auditor-General's Office. *Managing the Municipal and Industrial Landfill Levy*; 2018.

(19) Parks Victoria. Parks charge http://www.parks.vic.gov.au/about-us/parks-charge (accessed Oct 7, 2020).

(20) What's that "new" levy on my title? https://www.gadens.com/legal-insights/whats-that-new-levy-on-my-title/ (accessed Dec 28, 2020).

(21) About Queensland's waste levy https://www.qld.gov.au/environment/pollution/management/waste/recovery/disposal-levy/about/overview (accessed Dec 27, 2020).

(22) Waste levy https://www.epa.nsw.gov.au/your-environment/waste/waste-levy (accessed Dec 27, 2020).

(23) Department of Planning, Industry & Environment. *NSW Climate Change Fund Annual Report 2018–19*; NSW Government, 2019.

(24) SA Commits to $103 Waste Levy by 2019/20. *Waste Management Review*, 2016.

(25) Landscape Levy https://www.landscape.sa.gov.au/saal/about-us/Landscape-levy (accessed Dec 28, 2020).

(26) Environmental levy to be imposed on Northern Territory mines https://www.claytonutz.com/knowledge/2013/july/environmental-levy-to-be-imposed-on-northern-territory-mines (accessed Dec 28, 2020).

(27) Waste Levy https://www.cityservices.act.gov.au/recycling-and-waste/waste-strategies/waste-levy (accessed Dec 30, 2020).

(28) Fletcher, R.; Breitling, J. Market Mechanism or Subsidy in Disguise? Governing Payment for Environmental Services in Costa Rica. *Geoforum* **2012**, *43* (3), 402–411.

(29) Environmental tax statistics - Statistics Explained https://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_tax_statistics#Environmental_taxes_by_payer (accessed Dec 28, 2020).

(30) European Commission. Eurostat. *Environmental Taxes : A Statistical Guide 2013 Edition.*; Publications Office of the European Union: LU, 2013.

(31) EU recovery package - Plastic Tax https://home.kpmg/xx/en/home/insights/2020/09/etf-434-eu-recovery-package-plastic-tax.html (accessed Dec 28, 2020).

(32) Ministry of Economy. *ECAL in Action: How Your Environment and Climate Adaptation Levy Is Building a Better, Stronger Fiji*; Fijian Government, 2019.

(33) Gounder, N. Fiji Economic Survey: Low Growth the New Normal? *Asia Pac. Policy Stud.* **2020**, *7* (2), 145–157.

(34) Harding, M.; Spencer, K. *What Has the Heritage Lottery Fund Done For Nature? Report by Hummingbird/OHES for the Heritage Lottery Fund, London*; 2017.

(35) A New Strategy to Protect and Manage Australia's National and World Heritage. *Greg Hunt MP*, 2015.

(36) Tabcorp raffle touted to boost funds for community sport https://www.abc.net.au/news/2018-12-09/tabcorp-raffle-touted-to-boost-funds-for-community-sport/10597614 (accessed Oct 12, 2020).

(37) Shumais, M.; Mohamed, I. What Makes an Environmental Trust Fund Successful? A Case Study of the Maldives. *Clim. Change* **2020**, 1–18.

(38) Department of Water and Environmental Regulation. *Pilbara Environmental Offsets Fund Implementation Plan*; Western Australian Government, 2019.

(39) Aichi Biodiversity Targets https://www.cbd.int/sp/targets/ (accessed Dec 30, 2020).

(40) Waldron, A.; Miller, D. C.; Redding, D.; Mooers, A.; Kuhn, T. S.; Nibbelink, N.; Roberts, J. T.; Tobias, J. A.; Gittleman, J. L. Reductions in Global Biodiversity Loss Predicted from Conservation Spending. *Nature* **2017**, *551* (7680), 364–367. https://doi.org/10.1038/nature24295.

(41) Victorian Parliamentary Environment and Natural Resources Committee. *Inquiry on the Impact and Trends in Soil Acidity*; Parliament of Victoria, 2004.

(42) McLeod, R. *Annual Costs of Weeds in Australia*; Centre for Invasive Species Solutions, 2018.

(43) Legge, S.; Taggart, P. L.; Dickman, C. R.; Read, J. L.; Woinarski, J. C. Cat-Dependent Diseases Cost Australia AU $6 Billion per Year through Impacts on Human Health and Livestock Production. *Wildl. Res.* **2020**, *47* (8), 731–746.

(44) Deloitte Access Economics. *Economic Contribution of the Great Barrier Reef*; Great Barrier Reef Marine Park Authority, 2013.

(45) Creagh, S.; Mumford, W. Failure to Protect Seagrasses May Cost Australia $45 Billion [Interview with Three Seagrass Marine Scientists]. *The Conversation* **2013**, *11 February 2013*.

(46) Edwards, P.; Sutton-Grier, A.; Coyle, G. Investing in Nature: Restoring Coastal Habitat Blue Infrastructure and Green Job Creation. *Mar. Policy* **2013**, *38*, 65–71.

(47) Country Needs People. Working for Australia. 2019.

(48) Social Ventures Australia. *Consolidated Report on Indigenous Protected Areas Following Social Return on Investment Analyses*; Australian Government Department of the Prime Minister & Cabinet, 2016.