

# The University of Queensland Law Journal

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## **SPECIAL ISSUE ON ECOSYSTEM SERVICES AND THE LAW**

Introduction to the Special Issue on Ecosystem Services and the Law

**Justine Bell-James, Catherine E Lovelock and Anya Phelan**

Protecting and Restoring Queensland's Coastal Wetlands: Is a New Legislative Approach Required?

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Climate Change, Wildfires and Wetland Ecosystem Services: Governing Transformation

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Law, Restoration and Ontologies for a More Ecologically Complex World!

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Mangrove Ecosystems and Services: Legal Recognition and Protection in Indo-Pacific Island States

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A Global Assessment of the Law and Policy of Ecosystem Services

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Ecosystem Services as a Metaphor in Environmental Law: Balancing Intrinsic and Instrumental Values

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## **GENERAL ISSUE**

Workplace Safety, Deadly Jellyfish and Tourists: A Novel Approach to an Emergent Problem

**Lynda Crowley-Cyr**

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## SPECIAL ISSUE EDITORS

JUSTINE BELL-JAMES, CATHERINE E LOVELOCK AND ANYA PHELAN

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# INTRODUCTION TO THE SPECIAL ISSUE ON ECOSYSTEM SERVICES AND THE LAW

JUSTINE BELL-JAMES\*, CATHERINE E LOVELOCK<sup>†</sup> AND ANYA PHELAN<sup>‡</sup>

The importance of natural ecosystems to people and their societies has been articulated by scientists since the early 1960s. From this emerged the concept of ecosystem services in the 1970s and 1980s that began to categorize ecosystem services, value and monetarize them, against a backdrop of growing global degradation of natural ecosystems. The concept of ecosystem services has given rise to new inter-disciplinary fields (e.g. ecological economics, bioeconomics, and environmental management), which seek to provide knowledge on how the well-being of humans, which is dependent on ecosystem services from nature, can be maintained. The term has also helped connect ecological complexity and dynamics to human needs and wants, as ecosystem services fundamentally underpin human health, wellbeing and prosperity.

Essential to sustaining ecosystem services is regulation of their use in effective and appropriate ways through the law. But there are fundamental tensions between law, which aspires to certainty, and ecosystems and their services, which can vary spatially and temporally. This tension means that laws for ecosystem services can be ineffective and inappropriate, and that we must develop new ways to regulate and support ecosystem services. Recognition of this risk led to a workshop at UQ in March, 2020, and this special issue on ecosystem services and the law. This year marks the beginning of the United Nations Decade on Restoration, which highlights the importance of restoring and rehabilitating terrestrial, coastal, and marine ecosystems for the good of mankind. This special issue has a strong focus on law that regulates restoration, in recognition of the urgent need to facilitate ecosystem restoration, both on land and in the oceans.

One of the key themes emerging from the workshop is the need for law to be both forward-looking and backward-looking. While ecosystem services are sometimes accounted for in forward-looking decisions regarding development, the law does not adequately cater for the backward-looking function of ecological restoration. Hamman, Purandare and Pointon examine this issue in the context of Queensland, and highlight the deficiencies in the State's legal regimes. They conclude that change is required to ensure that restoration is properly viewed as

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distinct from other forms of development, and to ensure that restoration projects are facilitated.

The theme of restoration carries on through McCormack's article, in the context of bushfire. The workshop was held on the back of some of the most severe bushfires in Australia's history, which impacted on vast areas of the continent, including wetland areas. McCormack analyses how bushfire is projected to impact on wetlands into the future, and highlights a need for more restoration-focused laws to enable transformation in the face of changing climate hazards.

Boulot and Akhtar-Khavari also focus on restoration, through the lens of restorative inputs, and the need to add complexity to the governance system. They consider two case studies to demonstrate how restoration has not permeated environmental governance regimes deeply, and argue for an approach uncoupled from human goals and ambitions.

Techera's and Ruhl and Salzman's contributions add an international dimension to this collection. Techera focuses on the protection of mangroves in the Indo-Pacific, with a detailed review of how mangroves are protected through international and regional legal regimes. She highlights ways in which laws could be strengthened, including the implementation of more specific laws and policies incorporating ecosystem services, and greater recognition of the socio-cultural values of mangroves.

Ruhl and Salzman's contribution provides a more global assessment of the law and policy underpinning ecosystem services, with detailed attention to the regimes in Australia and the United States. They argue that one of the most effective ways to ensure that mangrove ecosystem services are translated into law is to highlight the clear links between conservation, and benefits provided by mangroves to humans. The shift may take some time, but they conclude that progress is already occurring in Australia.

Finally, Bell-James considers the ethical dimensions of using the ecosystem services paradigm in environmental law, distinguishing between ecosystem services as a metaphor, and ecosystem services as a basis for separating and monetising components of nature. She argues that the former approach is already widespread in Australian law, and is ethically defensible. She concludes that, while progress towards a more ecocentric approach to nature is a worthy goal, the ecosystem services paradigm presents a solid compromise between environmental protection and human ambition.

# PROTECTING AND RESTORING QUEENSLAND'S COASTAL WETLANDS: IS A NEW LEGISLATIVE APPROACH REQUIRED?

EVAN HAMMAN,\* JEMMA PURANDARE<sup>†</sup> AND REVEL POINTON<sup>‡</sup>

*Coastal wetlands provide vital ecosystem services, including nutrient cycling, disaster risk reduction, and habitat for biodiversity, including shorebirds, seabirds, turtles and fish. How we design and implement policy approaches for the conservation of coastal wetlands and these ecosystem services matters enormously. This article joins a growing trend of literature that seeks to not only identify the importance of coastal wetlands, but also to consider how best to devise policy measures for their protection and restoration. The article focuses on Queensland's coastal wetlands and suggests that the state has a real opportunity to become a national leader in wetland restoration. For that to occur, new legislative measures may be required to address issues such as tenure, land access, planning and risk management.*

## I INTRODUCTION

Coastal wetlands are an integral part of the Australian landscape. They are vital for both biodiversity and human health. For birds, fish and aquatic plant life (especially mangroves and seagrass) they provide critical habitat and refuge; and for humans, they are a source of flood control,<sup>1</sup> carbon sequestration<sup>2</sup> and cultural heritage.<sup>3</sup> Often considered the 'poor cousins' of the landscape,<sup>4</sup> wetlands require

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<sup>1</sup> Xiaoguang Ouyang et al, 'Spatially-Explicit Valuation of Coastal Wetlands for Cyclone Mitigation in Australia and China' (2018) 8 *Scientific Reports* art 3035.

<sup>2</sup> Catherine Lovelock, Fernanda Adame and Matthew A Hayes, 'Contemporary Rates of Carbon Sequestration through Vertical Accretion of Sediments in Mangrove Forests and Saltmarshes of South East Queensland, Australia' (2014) 37(3) *Estuaries and Coasts* 763.

<sup>3</sup> John C Ryan and Li Chen, *Australian Wetland Cultures: Swamps and the Environmental Crisis* (Lexington Books, 2019).

<sup>4</sup> Richard T Kingsford, Alberto Basset and Leland Jackson, 'Wetlands: Conservations Poor Cousins' (2016) 26(5) *Aquatic Conservation: Marine and Freshwater Ecosystems* 892.

both protection and restoration.<sup>5</sup> Pollution, over-exploitation, climate change and land conversion have damaged Australian wetland environments, as they have in many other nations.<sup>6</sup> Many coastal and intertidal areas in Queensland are now at risk from sediment, nutrients, chemicals and litter,<sup>7</sup> as well as population growth, climate change, overfishing and coastal development.

In seeking new or improved policy approaches to halting and reversing wetland declines, governments may need to look beyond static or 'passive' models of legal protectionism that focus primarily on regulating the impacts of 'development'. Forward-looking legislative measures that directly tackle issues such as risk assessment, land tenure and land access could potentially support wetland restoration by providing certainty and clarity for relevant stakeholders. Environmental offsets, despite their many shortcomings,<sup>8</sup> are a potential component of this approach, but they are by no means the only part. In other words, it may be necessary to consider how environmental law<sup>9</sup> can not only be restrictive in terms of mitigating the impacts of future development, but also supportive in terms of promoting positive interventions into the landscape to make good past damage.<sup>10</sup> A legislative backing for coastal wetland restoration may provide confidence for 'blue finance' investment in 'blue capital' projects across the state to bolster the increasing attention of the 'blue economy',<sup>11</sup> including using restoration as a tool for managing the impacts of sea level rise and

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<sup>5</sup> Sasha Alexander and Robert McInnes, *The Benefits of Wetland Restoration: Ramsar Scientific and Technical Briefing Note 4* (Ramsar Convention Secretariat, 2012).

<sup>6</sup> Royal Gardner and Max Finlayson, *Global Wetland Outlook: State of the World's Wetlands* (Report, Ramsar Secretariat, 2018).

<sup>7</sup> See Queensland Government, *State of the Environment Report, Biodiversity: Estuarine and Marine Ecosystems* (Report, 2017) <<https://www.stateoftheenvironment.des.qld.gov.au/biodiversity/estuarine-and-marine-ecosystems>>. Wetlands in the catchments of the Great Barrier Reef ('GBR') are reported to be generally 'well protected', but they still face threats from 'water pollution, invasive species, changes in hydrology, and increasing temperature and salinity resulting from climate change' See Maria Fernanda Adame et al, 'Managing Threats and Restoring Wetlands within Catchments of the Great Barrier Reef, Australia' (2019) 29(5) *Aquatic Conservation: Marine and Freshwater Ecosystems* 829, 829.

<sup>8</sup> See the concerns about offsets in Martine Maron et al, 'Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting' (2016) 66(6) *BioScience* 489.

<sup>9</sup> In this article, we refer mainly to statutory frameworks for environmental protection and the sustainable use of nature within Queensland's wetland environments.

<sup>10</sup> As Cliquet remarks, 'new legislation is one of the possible ways to advance ecological restoration in the Anthropocene'. See An Cliquet, 'Ecological Restoration as a Legal Duty in the Anthropocene' in Michelle Lim (ed), *Charting Environmental Law Futures in the Anthropocene* (Springer, 2019) 59. Another view is that broader governance changes may be required, for example to corporations law and taxation law. See Benjamin J Richardson and Ted Lefroy, 'Restoration Dialogues: Improving the Governance of Ecological Restoration' (2016) 24(5) *Restoration Ecology* 668.

<sup>11</sup> Michelle Voyer et al, *The Blue Economy in Australia: Conceptualising the Blue Economy, Its Relationship with Maritime Security and Its Role in Australian Oceans Governance* (Royal Australian Navy, 2017) <<http://www.navy.gov.au/media-room/publications/sea-power-series-blue-economy-australia>>.

climate change.<sup>12</sup> Indeed, as a recent interim report on Australia's national environmental law has found:

There is an opportunity to provide the policy settings to better leverage private interest in investing in the environment as well as drive down the cost of restoration.<sup>13</sup>

Exploring whether environmental law can be 'prohibitive' as well as 'facilitative' seems today to be an urgent task.<sup>14</sup> Since colonisation, the Australian landscape has been highly modified by land uses such as agriculture, infrastructure and mining, and there are few, if any, 'untouched areas' left across the nation.<sup>15</sup> Current legal frameworks for the conservation of biodiversity based solely on regulating the impacts of development do not appear to be working effectively.<sup>16</sup> For this and a variety of other reasons, commentators have labelled Australia's environmental laws as 'broken', suggesting that a significant overhaul is required,<sup>17</sup> including an improved focus on restoration.<sup>18</sup>

At the international level, the degradation of the environment has been widely acknowledged with the United Nations ('UN') declaring 2021–2030 the decade of ecosystem restoration.<sup>19</sup> At the same time, the UN has highlighted the urgent need to protect the world's marine and coastal environments.<sup>20</sup> At the local level, Queensland has also recognised the importance of restoration, including for coastal wetlands, through the establishment of a \$500 million Land Restoration Fund ('LRF').<sup>21</sup> The LRF aligns with the carbon-reduction objectives of the Commonwealth Government's Emissions Reduction Fund ('ERF'), and is further

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<sup>12</sup> Kerrylee Rogers et al, 'The State of Legislation and Protecting Australia's Mangrove and Salt Marsh and Their Ecosystem Services' (2016) 72 *Marine Policy* 139.

<sup>13</sup> Graeme Samuel, *Independent Review of the EPBC Act — Interim Report* (Department of Agriculture, Water and the Environment, 2020) 90 <<https://epbcactreview.environment.gov.au/resources/interim-report>>.

<sup>14</sup> See similar arguments we have developed in the case of protecting shorebird habitat at Moreton Bay: Evan Hamman, Revel Pointon and Jemma Purandare, 'Protecting Coastal Wetland Habitat for Migratory Shorebirds: Is Australian Law Doing Enough?' (2020) 37(4) *Environmental and Planning Law Journal* 477.

<sup>15</sup> Australia is one of only a few places said to have true 'wilderness' remaining, namely, the desert. See James EM Watson et al, 'Protect the Last of the Wild' (2018) 563(7729) *Nature* 27.

<sup>16</sup> Samuel (n 13).

<sup>17</sup> Stephanie Dalzell, 'Auditor-General's Review of EPBC Act Finds Severe Deficiencies in Environment Department's processes', *ABC News* (online, 25 June 2020) <<https://www.abc.net.au/news/2020-06-25/auditor-general-severe-deficiencies-environmental-protection/12393780#:~:text=The%20Australian%20Conservation%20Foundation's%20James,%22extinction%20and%20climate%20crises%22>>.

<sup>18</sup> See Samuel (n 13).

<sup>19</sup> Nathan Waltham et al, 'UN Decade on Ecosystem Restoration 2021–2030—What Chance for Success in Restoring Coastal Ecosystems?' (2020) 7 *Frontiers in Marine Science* 71.

<sup>20</sup> UNESCO, *United Nations UN Decade for Ocean Sciences (2021–2030)* (Web Page) <<https://en.unesco.org/ocean-decade>>.

<sup>21</sup> Queensland Government, *Land Restoration Fund* (Web Page) <<https://www.qld.gov.au/environment/climate/climate-change/land-restoration-fund>>.

supported by the \$1 billion National Landcare program. These initiatives, individually and combined, represent an important juncture at which to pause and consider the policy underpinnings of coastal wetland restoration. A critical component of that, we suggest, is the role of law in supporting and bringing about positive change.<sup>22</sup>

As other scholars have noted, it seems reasonable to distinguish between those projects that seek to build upon (or take away from) wetland environments (ie traditional forms of 'development'), and those that seek to give back or to 'restore' ecological values.<sup>23</sup> From this position, two important questions arise:

1. By focusing primarily on regulating the impacts of 'development', are Queensland laws hindering restoration activities for coastal wetlands?
2. What role could law play in facilitating and/or supporting restoration of coastal wetland environments in Queensland (and other degraded environments for that matter)?

While we do not seek to definitively answer those questions in this article, we suggest that they are nevertheless pertinent questions for Queensland policy-makers to grapple with. The role of law in promoting and supporting ecological restoration is a relatively understudied area.<sup>24</sup> Much of the literature on ecological restoration focuses, understandably, on the 'hard science' of methods and management, and how best to determine the indicators of restoration 'success'.<sup>25</sup>

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<sup>22</sup> Law is indeed not the only part of 'governance', but it is an important part to consider. On governance aspects of restoration, see Richardson and Lefroy (n 10), as well as Paul Martin, 'Ecological Restoration of Rural Landscapes: Stewardship, Governance, and Fairness' (2016) 24(5) *Restoration Ecology* 680.

<sup>23</sup> There are subtle but important differences in all interventions into the landscape. As Palmer and Ruhl write, in the United States context: 'many unintended consequences could be avoided if ecological restoration were clearly defined and distinguished from other forms of environmental intervention'. See Margaret A Palmer and JB Ruhl, 'Aligning Restoration Science and the Law to Sustain Ecological Infrastructure for the Future' (2015) 13(9) *Frontiers in Ecology and the Environment* 512.

<sup>24</sup> Exceptions include: Palmer and Ruhl (n 23); Anastasia Telesetsky, 'Ecoscapes: The Future of Place-Based Ecological Restoration Laws' (2013) 14 *Vermont Journal of Environmental Law* 493; Anastasia Telesetsky, An Cliquet and Afshin Akhtar-Khavari, *Ecological Restoration in International Environmental Law* (Routledge, 2017); K Suding et al, 'Committing to Restoration: Efforts Around the Globe Need Legal and Policy Clarification' (2015) 350(6235) *Science* 9; Benjamin J Richardson, 'The Emerging Age of Ecological Restoration Law' (2016) 25(3) *Review of European, Comparative & International Environmental Law* 277; and Afshin Akhtar-Khavari and Benjamin J Richardson (eds), *Ecological Restoration Law: Concepts and Case Studies* (Routledge, 2019).

<sup>25</sup> See, eg, Brett N Abbott et al, 'Bund Removal to Re-Establish Tidal Flow, Remove Aquatic Weeds and Restore Coastal Wetland Services — North Queensland, Australia' (2020) 15(1) *PLOS One* e0217531 <<https://doi.org/10.1371/journal.pone.0217531>>; Hanabeth Luke et al, 'Ecological Restoration of a Severely Degraded Coastal Acid Sulfate Soil: A Case Study of the East Trinity Wetland, Queensland' (2017) 18(2) *Ecological Management & Restoration* 103; Dominic McAfee et al 'The Value and Opportunity of Restoring Australia's Lost Rock Oyster Reefs' (2020) 28(2)

But, as Baker and Eckerberg have remarked, ‘ecological restoration is best seen not only as a technical task, but as a social and political project [as well]’.<sup>26</sup> Accordingly, the aim of this article is to unpack some of the hurdles and opportunities that Queensland law presents in terms of coastal wetland restoration.

The article is structured in three substantive parts. In Part II, we provide an overview of Queensland’s coastal wetlands (their extent, their threats, etc). We include in our definition mangrove forests, saltmarsh, seagrass, shellfish reefs, intertidal mudflats and coral reefs. In Part III, we discuss the current regulatory and non-regulatory approaches for restoration and conservation of coastal wetlands in Queensland; and, in Part IV, we examine whether a new legislative approach might be warranted, and explore how such an approach might sit alongside other planning mechanisms at the state level. In the end, our conclusions are tentative and we argue that further empirical work is required, particularly of a qualitative nature, to determine in what ways Queensland law inhibits or supports coastal wetland restoration efforts.

## II QUEENSLAND’S COASTAL WETLANDS: ECOLOGY AND SIGNIFICANCE

Coastal wetlands provide an ecological and hydrodynamic transition between land-based freshwater systems and the ocean. They provide significant ecosystem services,<sup>27</sup> including coastal protection, fisheries, biodiversity and amenity, and are often utilised for primary industries and tourism. The ecological significance of wetlands has been recognised in international law through the establishment of the *Convention on Wetlands* (‘Ramsar Convention’),<sup>28</sup> as well as the inclusion of many natural coastal ecosystems within World Heritage designations. They provide roosting, breeding and feeding grounds for many important migratory bird species (especially shorebirds), as well as nurseries for some marine mammal and fish species. The significance of wetlands in providing coastal protection has been recognised by the Atlas of Ocean Wealth, where wetlands and associated services have been valued not only in terms of

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*Restoration Ecology* 304; and Nele Svenia Wendländer et al, ‘Assessing Methods for Restoring Seagrass (*Zostera muelleri*) in Australia’s Subtropical Waters’ (2019) 71(8) *Marine & Freshwater Research* 996.

<sup>26</sup> Susan Baker and Katarina Eckerberg, ‘A Policy Analysis Perspective on Ecological Restoration’ (2013) 18(2) *Ecology and Society* 17.

<sup>27</sup> William J Mitsch, Blanca Bernal and Maria E Hernandez, ‘Ecosystem Services of Wetlands’ (2015) 11(1) *International Journal of Biodiversity Science, Ecosystem Services & Management* 1.

<sup>28</sup> *Convention on Wetlands of International Importance especially as Waterfowl Habitat*, opened for signature 2 February 1971, 996 UNTS 246 (entered into force 21 December 1975) (‘Ramsar Convention’).

biodiversity and ecological importance, but also in terms of Gross Domestic Product (tourism and primary industry).<sup>29</sup> Furthermore, coastal protection in terms of insurance reduction has also seen some traction in recent years.<sup>30</sup> In recent studies,<sup>31</sup> the financial value of coastal wetlands with respect to storm surge and flood protection has been quantified and, in some cases, has become accepted as an insurance mitigation measure.<sup>32</sup> In more recent years, the value of coastal wetlands to absorb and store carbon, known as 'blue carbon', has become better understood and widely recognised as having significant potential in the management and mitigation of climate change.<sup>33</sup>

Queensland's coastal wetlands are vast and diverse, ranging from seagrass beds and rocky reefs in the south of the state, to the vast coral reefs and mangrove forests in the north.<sup>34</sup> These coastal wetlands play a significant role in Queensland's economy, particularly in tourism and commercial fisheries,<sup>35</sup> and are of significant cultural and social importance.<sup>36</sup> The most widely studied and best known of Queensland's coastal wetlands are those of the Great Barrier Reef ('GBR'). The GBR comprises the world's largest coral barrier reef, covering an area 348,000 square kilometres<sup>37</sup> stretching down the majority of the Queensland coast, from Cape York in the north, to Gladstone in the south. The GBR hosts significant biological diversity, including extensive coral reef ecosystems, seagrass and mangroves, and saltmarsh, and is recognised for its global value through World Heritage status. The catchment of the GBR comprises 35 river systems that drain approximately 424,000 square kilometres of coastal

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<sup>29</sup> Emily Landis, Mark Spalding and Robert D Brumbaugh, *Atlas of Ocean Wealth* (The Nature Conservancy, 2016).

<sup>30</sup> Siddharth Narayan et al, 'The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA' (2017) 7 *Scientific Reports* art 9463. For an Australian context, see Justine Bell and Catherine E Lovelock, 'Establishing a Legal Basis for the Insurance of Mangrove Forests for Their Role in Mitigating Coastal Erosion and Storm Surge' (2013) 33(2) *Wetlands* 279.

<sup>31</sup> Curt D Storlazzi et al, *Rigorously Valuing the Role of US Coral Reefs in Coastal Hazard Risk Reduction: Open-File Report 2019-1027* (2019) 42 <<https://doi.org/10.3133/ofr20191027>>; and Pelayo Menéndez et al, 'The Global Flood Protection Benefits of Mangroves' (2020) 10 *Scientific Reports* art 4404.

<sup>32</sup> Ouyang et al (n 1).

<sup>33</sup> Linwood Pendleton et al, 'Estimating Global "Blue Carbon" Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems' (2012) 7(9) *PLoS ONE* e43542.

<sup>34</sup> Queensland Government, Department of Environment and Science, *Queensland Wetland Program* (Web Page) <<https://wetlandinfo.des.qld.gov.au/wetlands/about-us/qld-wetland-program.html>>.

<sup>35</sup> Sally Kirkpatrick, *The Economic Value of Natural and Built Coastal Assets — Part 1: Natural Coastal Assets* (NCCARE, 2011) <[https://www.nccarf.edu.au/sites/www.nccarf.edu.au/settlements-infrastructure/files/file/ACCARNSI\\_Economic%20Value%20of%20Natural%20Coastal%20Assets.pdf](https://www.nccarf.edu.au/sites/www.nccarf.edu.au/settlements-infrastructure/files/file/ACCARNSI_Economic%20Value%20of%20Natural%20Coastal%20Assets.pdf)>.

<sup>36</sup> Ryan and Chen (n 3).

<sup>37</sup> Commonwealth of Australia, *Reef 2050 Long-Term Sustainability Plan* (July 2018) <<http://www.environment.gov.au/system/files/resources/35e55187-b76e-4aaf-a2fa-376a65c89810/files/reef-2050-long-term-sustainability-plan-2018.pdf>>.

Queensland. The GBR provides significant coastal protection to Queensland's central and north coasts through the buffering of wave energy, in particular that caused by cyclones, which are most common along the northern and central areas of the GBR.

In addition to the GBR, Moreton Bay at the southern end of the Queensland coast provides numerous significant coastal wetlands, including seagrass beds that support marine mammal and fish species, such as the Dugong (*Dugong dugon*), which is listed as vulnerable under Queensland legislation<sup>38</sup> and are globally threatened.<sup>39</sup> Moreton Bay's coastal wetlands have been designated under the *Ramsar Convention* as being wetlands of international importance for migratory bird species and are a major stopover for 37 migratory shorebird species along the East Asian–Australasian Flyway. At the northern end of Moreton Bay, historical oyster reefs can be found in Pumicestone Passage, which, having been over-exploited in the early 1900s, are gradually being restored and regenerated, providing increasing habitat for fish species, as well as shellfish.<sup>40</sup>

Queensland's coastal wetlands are under increasing threat from development, land use change, water quality and soil degradation, over-exploitation and climate change.<sup>41</sup> Some of the key threats include:

1. Nutrient and sediment run-off from agricultural and other deforested areas within the catchment, which degrades the water quality, reducing light penetration and oxygen availability, and increases the potential for eutrophication;
2. Climate change, including warming ocean temperatures, ocean acidification, increased storm intensities, and rising sea levels;
3. Over-exploitation of natural resources, such as overfishing and depleting fish stocks; and
4. Land use change of coastal areas, such as cane farming, grazing and the conversion of wetlands to agriculture, and urbanisation (including changes to hydrological regimes in the coastal zone).<sup>42</sup>

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<sup>38</sup> *Nature Conservation (Animals) Regulation 2020* (Qld) sch 1.

<sup>39</sup> IUCN Red List of Threatened Species 'Dugong': (Web Page) <iucnredlist.org>.

<sup>40</sup> Ben K Diggles, 'Annual Pattern of Settlement of Sydney Rock Oyster (*Saccostrea glomerata*) Spat in Pumicestone Passage, Moreton Bay' (2017) 122 *Proceedings of the Royal Society of Queensland* 17.

<sup>41</sup> Carla Wegscheidl et al, *Queensland's Salt Marsh Habitats: Values, Threats and Opportunities to Restore Ecosystem Services* (TropWATER Report No 15/54, October 2015). See also Adame et al (n 7).

<sup>42</sup> Examples include Adame et al (n 7) and Abbott et al (n 25).

The Queensland and Commonwealth Governments have introduced both regulatory and non-regulatory measures for the protection and 'rehabilitation'<sup>43</sup> of coastal wetlands. Some of the more important of these are discussed in the next part.

### III CURRENT REGULATORY AND POLICY INITIATIVES

#### A *Planning and Protection for Coastal Wetlands*

In terms of the protection and management of coastal wetlands, the Queensland government has, it seems, done an extraordinary job of bringing together an improved management approach. Much has been achieved through the establishment of the Queensland Wetlands Program ('QWP') in 2003, which, among other things, lays claim to an impressive educational website, a mapping and classification methodology, an intertidal and subtidal ecosystem classification scheme, handbooks, case studies and many other online interactive tools for wetland management.<sup>44</sup> There are guidelines for preparing a Wetland Management Plan for grazing properties,<sup>45</sup> as well as a Wetland Projects Search Tool,<sup>46</sup> and Wetland Buffer Planning Guidelines.<sup>47</sup>

The work of the QWP was first evaluated in 2009 and found to be largely effective, the authors concluding:

Other Australian jurisdictions lack such a comprehensive programme with similar levels of mapping, inventory, information and guidance to support effective wetlands management.<sup>48</sup>

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<sup>43</sup> The language of rehabilitation appears to be most often used by the Queensland Government, at least in the context of wetlands. See Queensland Government, Department of Environment and Science, *Wetlands Management and Rehabilitation* (Web Page) <<https://wetlandinfo.des.qld.gov.au/wetlands/management/rehabilitation/>>. There is a key difference between restoration and rehabilitation, which we discuss below.

<sup>44</sup> Queensland Government (n 34).

<sup>45</sup> Queensland Government, Department of Environment and Science, *Guidelines and Template for Preparing a Wetland Management Plan for Primary Producers (Grazing, Dryland Cropping) in Queensland's Inland Catchments* (Guidelines, November 2012) <<https://wetlandinfo.des.qld.gov.au/resources/static/pdf/resources/reports/guidelines-template-for-preparing-wetland-management-plan-21-1-13.pdf>>.

<sup>46</sup> Queensland Government, Department of Environment and Science, 'Wetlands Projects Search Tool' <<https://wetlandinfo.des.qld.gov.au/wetlands/resources/tools/wetland-project/>>.

<sup>47</sup> Queensland Government, *Wetland Buffer Planning Guideline* (Guidelines, March 2011) <<https://wetlandinfo.des.qld.gov.au/resources/static/pdf/resources/reports/buffer-guide/wetland-buffer-guideline-14-04-13.pdf>>.

<sup>48</sup> Halcrow Pacific Pty Ltd and Institute for Sustainable Futures (UTS), *Queensland Wetlands Programme Evaluation* (Final Report, 2009) viii <<https://wetlandinfo.des.qld.gov.au/>>

At the time the QWP was, however, not without its weaknesses, with one of the main limitations being a lack of progress towards a ‘regulatory regime’ for improved wetland protection<sup>49</sup> — something that has since been at least partially rectified.<sup>50</sup>

For coastal wetlands of the GBR there is a comprehensive Management Strategy (‘the GBR Strategy’) focusing on a ‘whole of system’ approach, acknowledging the interaction between wetlands, coastal ecosystems and upstream land uses.<sup>51</sup> The GBR Strategy supports the Reef 2050 Water Quality Improvement Plan,<sup>52</sup> which aims to tackle water pollution caused by, among other things, sugarcane cultivation and cattle grazing in the GBR catchments. Importantly, the GBR Strategy highlights the key role of multiple actors in the protection, management and rehabilitation of wetlands on both public and private land, such as local and Commonwealth agencies, private freehold and leasehold landowners, traditional owners, natural resource management (‘NRM’) organisations and private citizens.<sup>53</sup> In more recent years, cumulative impacts have also become integrated into the GBR Strategy, and impact assessment in general, which is beginning to develop a broader view of impacts to wetlands, as well as how they should be strategically protected.<sup>54</sup> The GBR Strategy is spread across five key themes or goals including: (1) improvement of information about wetlands; (2) establishment and maintenance of wetland planning arrangements; (3) on-ground actions to rehabilitate and protect

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resources/static/pdf/resources/reports/final-qwp-evaluation-report-kmwhar-issue1-rev2-apr09.pdf>. The Queensland Wetlands Program (‘QWP’) was evaluated again by the Biodiversity Strategy Unit within the (then) Department of Environment and Heritage Protection in 2013, which recommended that areas for improvement were establishing and maintaining partnerships (eg with the Commonwealth Government) and increasing funding and resourcing. See Queensland Government, *Queensland Wetlands Program Phase 2* (Strategic Management Audit, May 2013) 4.

<sup>49</sup> Ibid xiv.

<sup>50</sup> Wetlands are protected through the regulation of impacts on development (see below), including strengthened GBR wetland protections from agricultural and other forms of pollution in ch 4A of the *Environmental Protection Act 1994* (Qld).

<sup>51</sup> Queensland Government, *Wetlands in the Great Barrier Reef Management Strategy 2016–21* (Report, June 2016) <<https://wetlandinfo.des.qld.gov.au/resources/static/pdf/management/policy/wetlands-gbr-strategy2016-21v13.pdf>>.

<sup>52</sup> Commonwealth Government and Queensland Government, *Reef 2050 Water Quality Improvement Plan 2017–2022* (2018) <[https://www.reefplan.qld.gov.au/\\_\\_data/assets/pdf\\_file/0017/46115/reef-2050-water-quality-improvement-plan-2017-22.pdf](https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0017/46115/reef-2050-water-quality-improvement-plan-2017-22.pdf)>.

<sup>53</sup> Queensland Government (n 51) 9.

<sup>54</sup> Queensland Government, ‘Cumulative Impact Management Policy: Queensland’s Implementation Plan’ <[https://www.qld.gov.au/\\_\\_data/assets/pdf\\_file/0021/69024/cumulative-impact-mgmt-policy-ql-implemtnation-plan.pdf](https://www.qld.gov.au/__data/assets/pdf_file/0021/69024/cumulative-impact-mgmt-policy-ql-implemtnation-plan.pdf)>. See the discussion of the development of this policy and its link to the Strategic Environmental Assessment for the GBR (2012–14) in Evan Hamman, Karen Vella and Umberto Baresi, ‘Cumulative impact Assessment and Management for the Great Barrier Reef’ in Jill Blakely and Daniel M Franks (eds), *Handbook of Cumulative Impact Assessment* (Edward Elgar, forthcoming).

wetlands; (4) education and capacity-building around wetlands; and (5) monitoring, evaluation and reporting.

The introduction of a landscape-scale approach to the wetlands of the GBR is a positive step. This is especially the case given the long history of wetland loss across the rest of Australia, and the fact that much of the loss was identified but not always quantified.<sup>55</sup> The focus on information and capacity-building in the GBR Strategy acknowledges a historically weak understanding of values and benefits of coastal wetlands to the State.<sup>56</sup> It seems clear that wetlands and their values have now been elevated by the QWP to be regarded as important components of the State's planning framework. The Queensland State Planning Policy ('SPP'), for instance, lists coastal wetlands as forming part of the 'state interest' of the coastal environment, which provides a requirement upon state and local government to conserve wetlands in the coastal management district.<sup>57</sup> The SPP also seeks to protect wetlands in multiple ways as 'matters of state environmental significance', for example where they are in high ecological value waters, in a wetland protection area, are mapped as a wetland of high ecological significance, or for vegetation within a specified area of a wetland as regulated under the *Vegetation Management Act 1999* (Qld).<sup>58</sup>

The importance of wetland 'values', in terms of planning and protection, is further highlighted by the *Environmental Protection Policy (Water and Wetland Biodiversity) Policy 2019* ('EPP'). The EPP sets out 'environmental values' for wetlands, with the purpose of the policy identified in s 5(2) as, among other things, to identify the values for wetlands that need to be enhanced or protected.<sup>59</sup> Thereafter, s 7 defines the environmental values for wetlands across Queensland, noting they are akin to the 'qualities of a wetland that support and maintain the biodiversity of the wetland'. This can include, for instance, its ecosystems, its natural state and biological integrity, its natural hydrological cycle, and the interaction between the wetlands with other ecosystems, including other wetlands. A 'values-based' approach to protecting and managing Queensland's wetlands is in line with international best practice, specifically the *Ramsar Convention*,<sup>60</sup> and is also consistent with other terrestrial conservation measures

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<sup>55</sup> Max Finlayson, 'Loss and Degradation of Australian Wetlands' (Conference Paper, LAWASIA Conference, Environmental Law in the Asia-Pacific Region, 2000).

<sup>56</sup> Ibid.

<sup>57</sup> Queensland Government, *State Planning Policy* (Report, July 2017) 41 ('State Interest — Coastal Environment', (1)(b)) <<https://dilgpprd.blob.core.windows.net/general/spp-july-2017.pdf>>.

<sup>58</sup> Ibid 71 (Glossary — 'Matters of State Environmental Significance (MSES)' — see items (e), (f) and (1)(vi)).

<sup>59</sup> The reference to 'enhanced' (rather than protected) seems a positive step and may provide a basis on which to explore closer integration with legislative mechanisms for restoration.

<sup>60</sup> See the discussion of the evolution of the Ramsar regime, including the interrelationship between ecosystem services, wetland values and wise use, in Max Finlayson and Nick C Davidson, 'The

being undertaken in Queensland, for example the values-based approach towards the management of national parks.<sup>61</sup>

In terms of further protection for Queensland wetlands,<sup>62</sup> reg 40 of the *Environmental Protection Regulation 2019* (Qld) provides a prohibition on releasing water or waste to wetlands for treatment if there is a possibility that the wetland may be destroyed or reduced in size, or if there may be another impact upon the 'biological integrity' of the wetland. Moreover, State code 9 of the State Development Assessment Provisions, against which development applications are assessed, provides guidance on the planning approach for the protection of wetlands in the catchments of the GBR.<sup>63</sup> While the guidelines are not a 'statutory document', they provide advice for 'high impact earthworks' development in a GBR wetland protection area under the *Planning Regulation 2017* (Qld).<sup>64</sup> Further detail on what 'high impact earthworks' activities include is provided for in the guidelines. Notably, agricultural activities such as cropping and grazing, constructing and maintaining fences, and establishing and maintaining firebreaks will not trigger planning assessment. The guidelines further provide that development must not be carried out in a wetland protection area, and if development is to be carried out outside of that area, then an adequate buffer must be provided.<sup>65</sup> The buffer is considered to be necessary in order to 'maintain the wetland's ecosystems functions and environmental value'.<sup>66</sup>

In addition to local councils, which also assess impacts on wetlands under their planning schemes, there are a variety of other legislative instruments that seek to regulate 'development or disturbance with coastal [wetland] habitat'.<sup>67</sup>

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Ramsar Convention and Ecosystem-Based Approaches to the Wise Use and Sustainable Development Wetlands' (2011) 14(3) *Journal of International Wildlife Law and Policy* 176.

<sup>61</sup> Queensland Government, Department of Environment and Science, *Values-Based Park Management Framework* (Web Page) <<https://parks.des.qld.gov.au/management/plans-strategies/values-based-framework>>.

<sup>62</sup> For a broader review of law and policy relevant to mangrove and wetland protection in Australia, see Justine Bell-James, Tessa Boardman and Rose Foster, 'Can't See the (Mangrove) Forest for the Trees: Trends in the Legal and Policy Recognition of Mangrove and Coastal Wetland Ecosystem Services in Australia' (2020) 45 *Ecosystem Services* 101148; and with respect to Queensland, see Justine Bell-James, 'Integrating the Ecosystem Services Paradigm into Environmental Law: A Mechanism to Protect Mangrove Ecosystems?' (2019) 31(2) *Journal of Environmental Law* 291.

<sup>63</sup> Queensland Government, *State Development Assessment Provisions* ('SDAP'), <<https://dsdmipprd.blob.core.windows.net/general/sdap-version-2.5.pdf>>. For coastal wetlands, more generally, there are other State codes in the SDAP that may be relevant for assessing development, including: State code 8 (Coastal development and tidal works); State code 11 (Removal, destruction or damage of marine plants); State code 12 (Development in a declared fish habitat area); State code 17 (Aquaculture); and State code 18 (Constructing or raising waterway barrier works in fish habitats).

<sup>64</sup> SDAP, State code 9, *ibid*.

<sup>65</sup> *Ibid*.

<sup>66</sup> *Ibid*.

<sup>67</sup> Nathan Waltham et al, 'Lost Floodplain Restoration and Efforts to Restore Connectivity, Habitat, and Water Quality Settings on the Great Barrier Reef' (2019) 6 *Frontiers in Marine Science* 71.

Neither the local nor state measures, however, provide a comprehensive statutory framing for the restoration of coastal wetlands. They are primarily concerned, it seems, with assessing and restricting inappropriate development impacting upon coastal wetland environments. For example, removal of native vegetation within or adjacent to a coastal wetland may be considered 'assessable development' due to the combined operation of the *Planning Act 2016* (Qld) and *Vegetation Management Act 1999* (Qld). Likewise, development within one of Queensland's three marine parks (which includes the intertidal area from the highest astronomical tide, seawards) requires approval under the *Marine Park Act 2004* (Qld).<sup>68</sup> Removal of marine plants (including mangroves) is similarly regulated under the *Fisheries Act 1994* (Qld),<sup>69</sup> and the *Nature Conservation Act 1992* (Qld) controls activities in protected areas (eg national parks), as well as interference with animal or plant species, which may include wetland areas.<sup>70</sup>

Dredging in coastal areas is also highly regulated, and approval (for dredging and/or quarrying of material) must be obtained pursuant to the *Coastal Protection and Management Act 1995* (Qld), the *Planning Act 2016* (Qld), and the *Environmental Protection Act 1994* (Qld).<sup>71</sup> Moreover, development in a Priority Port Development Area along the Queensland coastline is further restricted by the *Sustainable Ports Development Act 2015* (Qld) — a legislative control that was introduced in response to concerns from the World Heritage Committee about the rate of coastal development impacting the GBR.<sup>72</sup>

Finally, additional approvals at the Commonwealth level may be required for the protection of coastal wetlands, especially in the case of development impacting the 'outstanding universal value' of the GBR, or the 'ecological character' of a Ramsar wetland (such as Moreton Bay or Shoalwater/Corio Bays) under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) ('EPBC Act'). Impacts on migratory and marine species are also likely to trigger referral and assessment under the EPBC Act, for example impacts upon dugong, turtle or shorebird habitat. Dredging and dumping affecting coastal wetlands of

<sup>68</sup> See, eg, *Marine Park Act 2004* (Qld) s 15, regarding reclamation of tidal land.

<sup>69</sup> See also the standards for restoration and rehabilitation of fisheries habitat under the SDAP, State code 11 (n 63).

<sup>70</sup> *Nature Conservation Act 1992* (Qld) ss 62, 88 and 89.

<sup>71</sup> Different procedures can apply if wetland development occurs within a Priority Development Area ('PDA') declared under the *Economic Development Act 2012* (Qld). See, eg, the declaration of a PDA for Toondah Harbour and the proposed removal of shorebird habitat discussed in Hamman et al (n 14). Development within State Development Areas ('SDAs') declared under the *State Development and Public Works Organisation Act 1971* (Qld) are also treated differently. Under both PDAs and SDAs, a 'development scheme' controls all development within the area.

<sup>72</sup> See World Heritage Committee Decision 39 COM 7B.7 <<https://whc.unesco.org/en/soc/3234>>. See also *Sustainable Ports Development Act* (2015) s 2. Dumping of dredged material in the GBR Marine Park was also banned. See *Great Barrier Reef Marine Park Regulations 1983* (Cth) reg 88RA, and the analysis of the sea dumping litigation set out in Evan Hamman, 'Save the Reef! Civic Crowdfunding and Public Interest Environmental Litigation' (2015) 15(1) *QUT Law Review* 159.

the GBR must also comply with the *Great Barrier Reef Marine Park Act 1975* (Cth) and the *Environment Protection (Sea Dumping) Act 1981* (Cth).

All of the measures outlined above are aimed at the protection of coastal wetlands and integrate with the planning regime in Queensland primarily through the assessment and approvals process for proposed development. However, it is clear that legislative frameworks for restorative interventions for improving coastal wetland values are largely lacking, despite a desire of the Queensland government to rehabilitate wetland environments, especially for the GBR. The next section of this article discusses some of the policy mechanisms that relate to coastal wetland restoration in Queensland.

### **B *Restoration and Rehabilitation of Coastal Wetlands***

The phrase 'ecological restoration' is defined by the Society of Ecological Restoration ('SER') as the initiation or acceleration of ecosystem recovery following damage, degradation or destruction.<sup>73</sup> Where ecosystems are significantly degraded so that the damage is irreversible, or ambient conditions have changed to a point that the original, historical ecosystem biodiversity cannot be achieved, 'rehabilitation' can assist in repairing the ecosystem, but not restoring it. In the marine environment, and particularly relevant to wetlands, restoration can be challenging where species are dependent on specific sets of conditions that can change at a regional or global scale, and therefore cannot be restored easily (eg sea level rise impacting water depths where species are dependent on intertidal conditions, or increases in water temperatures that occur as a result of global warming).

The focus on repairing the state of wetlands (whether through restoration or rehabilitation), in a policy sense, is not necessarily a new phenomenon. The Queensland Wetlands Conservation and Management Implementation Plan 2004, for example, highlighted the need for both conservation and restoration of wetlands.<sup>74</sup> Shortly thereafter, in 2008, wetland 'rehabilitation' guidelines for the GBR were developed, but concerns over a lack of integration with other wetland programs meant that they were delayed.<sup>75</sup> The rehabilitation guidelines were initially intended to provide 'practical and specific guidance about how to rehabilitate different wetland types in the GBR'.<sup>76</sup> While those guidelines have

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<sup>73</sup> Society for Ecological Restoration, 'What is Ecological Restoration?' (Web Page) <<https://www.ser-rrc.org/what-is-ecological-restoration/>>.

<sup>74</sup> Halcrow Pacific (n 48) 139.

<sup>75</sup> Ibid 69.

<sup>76</sup> Ibid 52.

since been released,<sup>77</sup> there are currently no standard guidelines for the 'restoration of coastal wetlands' that are supported by the State Government. The Nature Conservancy, in conjunction with the SER, recently released *Restoration Guidelines for Shellfish Reefs*,<sup>78</sup> but these are not endorsed in any formal policy sense.

There are other policy and guidance measures provided by the Queensland Government that relate to the restoration of coastal wetlands, but these are mainly in the context of rehabilitating habitat following the impacts of development. For example, the *Planning Act 2016* (Qld) framework allows for restoration or rehabilitation of disturbed marine plants and fisheries habitat.<sup>79</sup> The objective is 'to encourage fish habitats and fisheries resource values to naturally regenerate'.<sup>80</sup> The Department of Agriculture and Fisheries has a 'self-assessable code' for proponents conducting 'low impact' rehabilitation works for fish habitat,<sup>81</sup> as well as guidelines for fish habitat restoration and rehabilitation.<sup>82</sup> There are also policies around transportation of marine plants for rehabilitation purposes,<sup>83</sup> but, again, these measures primarily relate to controlling the post-impact practices of development, rather than facilitating strategic restoration in its own right.

There are also other guidelines for primary producers (grazing and dryland cropping) that allow for wetland restoration to occur, but those are focused on inland river systems and are generally not transferable to the coastal zone.<sup>84</sup> The *Marine Parks Act 2004* (Qld) also provides for restoration of tidal and marine areas

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<sup>77</sup> Queensland Government (n 41).

<sup>78</sup> James Fitzsimons et al (eds), *Restoration Guidelines for Shellfish Reefs* (The Nature Conservancy, 2019).

<sup>79</sup> SDAP, State code 11 (n 63).

<sup>80</sup> Ibid.

<sup>81</sup> Queensland Government, Department of Agriculture and Fisheries, *Code for Self-Assessable Development: Minor Impact Works in a Declared Fish Habitat Area or Involving the Removal, Destruction or Damage of Marine Plants* (Code No: MP06, January 2013) <[https://www.daf.qld.gov.au/\\_\\_data/assets/pdf\\_file/0010/73927/MP06-minor-new-works-June2012.pdf](https://www.daf.qld.gov.au/__data/assets/pdf_file/0010/73927/MP06-minor-new-works-June2012.pdf)>.

<sup>82</sup> Queensland Government, Department of Agriculture and Fisheries, *Restoration of Fish Habitats: Fisheries Guidelines for Marine Areas* (FHG 002) <[https://www.daf.qld.gov.au/\\_\\_data/assets/pdf\\_file/0018/62820/FHG002-Fish-Habitat-Guideline.pdf](https://www.daf.qld.gov.au/__data/assets/pdf_file/0018/62820/FHG002-Fish-Habitat-Guideline.pdf)>. The guidelines provide 'methods for restoration or rehabilitation of disturbed or degraded marine areas for fisheries purposes, useful during the planning stages of restoration projects'. See Queensland Government, Department of Agriculture and Fisheries, *Habitat Guidelines* <<https://www.daf.qld.gov.au/business-priorities/fisheries/habitats/policies-guidelines/habitat-guidelines>>.

<sup>83</sup> Queensland Government, Department of Fisheries and Agriculture, *Management and Protection of Marine Plants and Other Tidal Fish Habitats* (FHMOP001) <[https://www.daf.qld.gov.au/\\_\\_data/assets/pdf\\_file/0010/56359/FHMOP001-Fish-Hab-Manage.pdf](https://www.daf.qld.gov.au/__data/assets/pdf_file/0010/56359/FHMOP001-Fish-Hab-Manage.pdf)>.

<sup>84</sup> Queensland Government (n 45).

in certain instances of environmental damage,<sup>85</sup> and there are also options to declare a 'restricted area' for the purposes of restoration of a marine park.<sup>86</sup> Under the *Coastal Protection and Management Act 1995* (Qld) framework, there is a requirement to restore after certain tidal works are undertaken,<sup>87</sup> and dredged material from completed tidal works can also be used 'beneficially' in beach nourishment and for restoration or rehabilitation of wetlands.<sup>88</sup>

In the context of the GBR, recent amendments to the *Environmental Protection Act 1994* (Qld), under pt 5, allow for water quality 'offsets' (discussed further below) to be carried out in order to counterbalance damaging impacts upon the GBR catchment. This may be considered restoration, although it is more likely to be seen as rehabilitation, as pre-degradation impacts, such as ocean warming, cannot be reversed, and therefore pre-degradation conditions cannot be achieved. The legislation makes it clear that a GBR 'water quality offset' may include, for example, rehabilitating a degraded riverbank or constructing an artificial wetland on a property.<sup>89</sup> The offsets are underpinned by a Point Source Water Quality Offsets Policy.<sup>90</sup> That policy provides for diffuse source offsets to be made available, in which case developers can apply for an offset to achieve a 'net improvement' in water quality in the receiving environment, for example by constructing or remediating wetlands in the catchment.<sup>91</sup> Allied to this is the *Environmental Offsets Act 2014* (Qld) and the accompanying Environmental Offsets Policy in Queensland.<sup>92</sup> Despite claims by the Queensland Government that the legislation would simplify and increase efficiencies in the provision of offsets across the state,<sup>93</sup> concerns still exist with the scientific validity, accountability and transparency that is recognised in a review that is currently underway by the Queensland Government to seek to ameliorate its deficiencies.<sup>94</sup>

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<sup>85</sup> *Marine Parks Act 2004* (Qld) ss 109, 114, 139. For a similar provision allowing the State to take action to restore or rehabilitate land, waters, marine waters or fish habitat, see the *Fisheries Act 1994* (Qld) s 124.

<sup>86</sup> *Marine Parks Regulation 2017* (Qld) reg 121(1)(c)(ii).

<sup>87</sup> *Coastal Protection and Management Regulation 2017* (Qld) sch 3 pt 3 Column 1 Performance Outcome 7.3. See also *Coastal Protection and Management Act 1995* (Qld) ss 59, 60.

<sup>88</sup> SDAP, State code 8 (n 63).

<sup>89</sup> *Environmental Protection Act 1994* (Qld) s 87(3).

<sup>90</sup> Queensland Government, *Point Source Water Quality Offsets Policy 2019* <[https://environment.des.qld.gov.au/\\_\\_data/assets/pdf\\_file/0033/97845/point-source-wq-offsets-policy-2019.pdf](https://environment.des.qld.gov.au/__data/assets/pdf_file/0033/97845/point-source-wq-offsets-policy-2019.pdf)>.

<sup>91</sup> *Ibid* 5.

<sup>92</sup> Queensland Government, *Queensland Environmental Offsets Policy* (Version 1.8, February 2020) <[https://environment.des.qld.gov.au/\\_\\_data/assets/pdf\\_file/0018/102834/offsets-policyv1-8.pdf](https://environment.des.qld.gov.au/__data/assets/pdf_file/0018/102834/offsets-policyv1-8.pdf)>.

<sup>93</sup> Explanatory Notes, *Environmental Offsets Bill 2014* (Qld) 1–2 <<https://www.legislation.qld.gov.au/view/pdf/bill.first.exp/bill-2014-1791>>.

<sup>94</sup> See Queensland Government, *A Review of Queensland's Environmental Offsets Framework: A Discussion Paper* (February 2019) <[https://www.qld.gov.au/\\_\\_data/assets/pdf\\_file/0018/94131/qld-enviro-offsets-framework-discuss-paper.pdf](https://www.qld.gov.au/__data/assets/pdf_file/0018/94131/qld-enviro-offsets-framework-discuss-paper.pdf)>.

Finally, the LRF also provides the opportunity for landholders to seek funds for restoration-based activities that can be connected to a carbon offsets project and can provide for co-benefits. Wetland restoration is a designated co-benefit under the LRF Co-Benefits Standard,<sup>95</sup> and is being considered for 'blue carbon' sequestration options as part of the Commonwealth' ERF initiatives.<sup>96</sup> The Queensland Government has currently committed \$500 million for the LRF; however, only \$100 million has been provided to date.

### III IS A NEW LEGISLATIVE MODEL NEEDED?

#### A *From Conservation to Restoration*

There are numerous challenges facing policy-makers and other stakeholders involved in coastal wetland restoration in Queensland. Contested or underdeveloped science is a part of the problem,<sup>97</sup> as is the need for funding, establishing and maintaining partnerships, and securing expertise to assess and conduct restoration projects.<sup>98</sup> Waltham et al have also written about the difficulties of conducting coastal wetland restoration 'at scale'.<sup>99</sup> While the law is not a panacea for all of these complex dilemmas, it is nevertheless important to consider the potential regulatory roadblocks and opportunities it can provide for restorative efforts.<sup>100</sup>

Broadly speaking, for environmental law to 'work', it must assist in avoiding, resolving or at least contributing to the resolution of environmental problems. It is important to note, however, that environmental law is broader than simply environmental impact regulation.<sup>101</sup> Trading schemes, offsets, freedom of

<sup>95</sup> Queensland Government, *Land Restoration Fund Co-Benefits Standard* (Version 1.2, 28 January 2020) 11 s 4.3.3 <[https://www.qld.gov.au/\\_\\_data/assets/pdf\\_file/0025/116548/lrf-co-benefits-standard-exposure.pdf](https://www.qld.gov.au/__data/assets/pdf_file/0025/116548/lrf-co-benefits-standard-exposure.pdf)>.

<sup>96</sup> Commonwealth Government, Department of Agriculture, 'Wetlands Australia 31: Australian Government Initiatives for Blue Carbon' <<https://www.environment.gov.au/water/wetlands/publications/wetlands-australia/national-wetlands-update-february-2019/govt-initiatives-blue-carbon>>.

<sup>97</sup> There have historically been 'critical gaps in the knowledge base' in Queensland. See Halcrow Pacific (n 48) 69.

<sup>98</sup> Funding and collaborations were one of the issues to be focused on in 2013 for the QWP. See Queensland Government (n 48).

<sup>99</sup> Waltham et al (n 67).

<sup>100</sup> In the same vein, see the legal analysis presented in Justine Bell-James and Catherine E Lovelock, 'Legal Barriers and Enablers for Reintroducing Tides: An Australian Case Study in Reconverting Poned Pasture for Climate Change Mitigation' (2019) 88 *Land Use Policy* 104192.

<sup>101</sup> More broadly, on the difference between 'law' and 'regulation', see Julia Black, 'Critical Reflections on Regulation' (2002) 27 *Australian Journal of Legal Philosophy* 1.

information registries and stewardship programs are all non-regulatory mechanisms that can be supported, to varying extents, by statutory frameworks. Although each of these examples may have regulatory components (eg rules around abiding by conditions, etc), the overarching purpose is to establish the foundations for a non-regulatory behavioural mechanism.

The key question we arrive at, then, is what role can law play in facilitating or supporting restoration of coastal wetland environments (and other environments for that matter)? One option is for law to provide the framework for restoration to occur, for example by outlining statutory processes for obtaining tenure and/or land access to priority sites. As with Queensland resources legislation, the State could potentially institute a tender system for restoration projects over land.<sup>102</sup> The framework could also establish a process for risk assessment and management, as well as measures to protect the rights of First Nations Peoples and private landholders. An alternative approach, and one that has been adopted in Japan, is to establish a legislative framework that allows for the creation of multi-stakeholder committees responsible for identifying, sponsoring and ultimately overseeing restoration projects.<sup>103</sup>

The point is that legislative frameworks can be used for restoration and rehabilitation of degraded coastal wetlands, in addition to conservation and protection. The concepts of protection, restoration and mitigation are not mutually exclusive, and, indeed, a more sophisticated planning framework for Queensland's coastal areas may need to facilitate a better balance between both protection and restoration (ie *integrate* them through the SPP, regional plans, local planning schemes, etc). As with the conservation of protected areas (eg Ramsar sites), legislation can provide a supportive base for restorative action. The next section of the article explores why the current framework for assessing and approving restoration in Queensland may not be fit for purpose.

## **B *Restoration and Development Assessment***

Traditionally in Queensland, the restoration of coastal wetlands has been conducted relatively ad hoc, predominantly driven by research projects specific to universities, land and water impacts management by local governments, NRM groups or smaller-scale community group projects. The GBR Restoration and Adaptation Program ('RRAP')<sup>104</sup> is perhaps the first coordinated, strategic

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<sup>102</sup> See, eg, the state tender process for exploration of coal seam gas (petroleum) tenures under the *Petroleum and Gas (Production) Act 2004* (Qld). The framework allocates access rights to the deposits, while environmental impacts on underground aquifers and the surrounding environment are assessed (and approved) under the *Environmental Protection Act 1994* (Qld).

<sup>103</sup> For analysis of the Japanese restoration law, see Evan Hamman, 'Wetland Restoration in Japan: What's Law Got to Do with It?' (2019) 11 *New Voices in Japanese Studies* 47.

<sup>104</sup> Reef Restoration and Adaptation Program (Web Page) <<https://www.gbrrestoration.org/home>>.

restoration plan for coastal wetlands; however, there is currently no similar coastal restoration strategy for the rest of Queensland or other coastal ecosystems. As such, restoration projects require assessment and approval in the same manner as any other development. This may be problematic, as we alluded to above; there is a fundamental difference in terms of environmental risk assessment and management when considering removing or mitigating impacts on values in the environment, as opposed to restoring, enhancing or rehabilitating them.

These differences can be explored through a hypothetical example, whereby a small area of mangroves on State (Crown) land is to be restored as part of a coastal adaptation program. In such a case, it may be possible that the following would be required:

- Works may involve placement and removal of material in the intertidal zone. This would trigger the need for a Development Approval — Prescribed Tidal Works and Development Approval — Works in a Coastal Management District.
- Works may involve introducing, creating or altering fish habitat, which would trigger certain approvals under the *Fisheries Act 1994* (Qld), such as marine plants permits.
- Works may take place inside a marine park (such as the Moreton Bay Marine Park) and would therefore require approval under the *Marine Parks Act 2004* (Qld).
- Works may include the removal of terrestrial or invasive (non-native) vegetation in order to restore mangrove habitat. If the vegetation is native or designated essential habitat, it would require approval under the *Nature Conservation Act 1992* (Qld) and the *Planning Act 2016* (Qld)–*Vegetation Management Act 1999* (Qld).
- Certain ecological communities, such as salt marsh, are classified as Matters of National Environmental Significance ('MNES'), as are migratory species such as shorebirds and seabirds. Any significant impacts to MNES would require referral and assessment under the EPBC Act.

While restoration is not to be considered a substitute for conservation, it is currently being categorised as development under the planning framework. It follows that the practicality of establishing a restoration project usually results in lengthy development and other state-triggered approvals that are designed to assess (and mitigate) impacts on values to the environment, as opposed to the creation or re-establishment of lost values. In addition to proponents, this may also present problems for assessment authorities, who may lack the expertise or

statutory guidelines to help assess the potential risks to the receiving environment from the restoration of ecosystems that were degraded or damaged some time ago.

An example of this in Queensland can often be found in shellfish reef restoration, where oyster beds were over-exploited in the late 19<sup>th</sup> to early 20<sup>th</sup> centuries, leaving few remnants of habitat. In some cases, where scientists have sought approvals to restore oyster reefs, questions have been raised by the assessing authority as to whether re-establishment constitutes restoration, or the introduction of a new species (where the habitat was entirely destroyed decades earlier), which in turn may present a biosecurity concern. Similar concerns have been expressed with regard to innovation restoration projects that relate to RRAP,<sup>105</sup> where regulatory assessment teams highlighted concerns regarding their ability to adequately assess the risk of new technologies and innovation to the existing environment and environmental values of the GBR without firm guidance of a technical expert advisory committee.<sup>106</sup>

These challenges often create a barrier to achieving the restoration of coastal wetlands at any meaningful scale, perhaps limiting projects to research trials, which can be approved under an alternative regulatory framework. This, in turn, links back to the question of whether restoration of marine and coastal ecosystems can truly be conducted at scale, where, in this case, the limitation becomes the assessment and approval framework, not the scientific or technical capability. That is not to suggest that restoration activities should not be comprehensively assessed in some way. There are likely to be many risks to the receiving environment even where those interventions are perceived as 'restorative'. Such concerns have also been raised by regulators in the context of the GBR, where there is the potential for the integrated nature of the RRAP to open doors to everyone with regard to submitting 'innovative technologies and solutions' for restoring the reef.<sup>107</sup> The careful assessment of these solutions is vital to ensure that restoration and conservation outcomes are both viable and safe, rather than simply based around economic gain or commercial advantage.

Whether a new legislative regime is pursued or not, conditions of approval in some form will still likely be required, that is, in addition to adequate monitoring

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<sup>105</sup> Damien W Burrows et al, 'Symposium Report: GBR Restoration Symposium 2018' (2019) 20(2) *Ecological Management and Restoration* 175.

<sup>106</sup> On the complex topic of regulating restorative actions in the GBR, see Pedro Fidelman et al, 'Regulatory Implications of Coral Reef Restoration and Adaptation under a Changing Climate' (2019) 100 *Environmental Science and Policy* 221.

<sup>107</sup> See Burrows et al (n 105).

and enforcement in the event of non-compliance.<sup>108</sup> As with other aspects of environmental law and governance, transparency, public participation and the accountability of decision-makers should also underpin the process.<sup>109</sup> The rights of First Nations Peoples, including their cultural heritage in wetland landscapes, must also be appropriately balanced. This raises an additional question, which is not tackled in this article, namely, whether cultural heritage wetland values can be restored, and, if so, what the appropriate policy approach might be.<sup>110</sup>

### C *Restoration and Environmental Offsets*

Offsets are mechanisms designed to counterbalance the impacts of development upon the environment. The Queensland Government states:

An environmental offset compensates for unavoidable impacts on significant environmental matters (eg valuable species and ecosystems) on one site, by securing land at another site, and managing that land over a period of time, to replace those significant environmental matters which were lost.<sup>111</sup>

In this regard, they are implemented as a result of the loss of environmental values from planned development and as a mechanism to prevent complete loss.<sup>112</sup>

While there are ongoing debates as to the effectiveness of offsets with regard to conservation,<sup>113</sup> there is limited commentary on whether offsets can be utilised

<sup>108</sup> Conditions are already placed on restoration projects, including those connected with development. See, for example, the need for a 'post-works monitoring and maintenance program', which may be included as a condition in fish habitat restoration works: SDAP, State code 12 (n 63).

<sup>109</sup> See also the discussion on restoration governance in Richardson and Lefroy (n 10).

<sup>110</sup> The Queensland Government's *State Planning Policy* (n 57) briefly mentions the need to 'restore' cultural heritage within the planning framework (at 42). In terms of protection, a court may order 'restoration' if aboriginal cultural heritage is damaged, for example in the case of development. See *Aboriginal Cultural Heritage Act 2003* (Qld) s 27. Importantly, cultural heritage extends past artefacts and can include coastal wetland 'areas' (see s 8).

<sup>111</sup> Queensland Government, *What Is an Environmental Offset and When Is It Required?* (Web Page) <[<sup>112</sup> For wetlands, offsets are available in Queensland for impacts upon a wetland protection area, wetlands of high ecological significance, or impacts on a wetland or watercourse in high ecological value waters. For the offset requirements, see Queensland Government, Department of Environment and Science, \*Significant Residual Impact Guideline\* \(Report, December 2014\) <\[https://environment.des.qld.gov.au/\\\_\\\_data/assets/pdf\\\_file/0017/90404/significant-residual-impact-guide.pdf\]\(https://environment.des.qld.gov.au/\_\_data/assets/pdf\_file/0017/90404/significant-residual-impact-guide.pdf\)>.](http://www.qld.gov.au/environment/pollution/management/offsets/what-when#:~:text=Under%20the%20Environmental%20Offsets%20Act,on%20a%20prescribed%20environmental%20matter.> . See also the definition of 'an environmental offset' in the <i>Environmental Offsets Act 2014</i> (Qld) s 7: 'an environmental offset is an activity undertaken to counterbalance a significant residual impact of a prescribed activity on a prescribed environmental matter'.</p>
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<sup>113</sup> See Jelena May, Richard J Hobbs and Leonie E Valentine, 'Are Offsets Effective? An Evaluation of Recent Environmental Offsets in Western Australia' (2017) 206 *Biological Conservation* 247; Nigel

to facilitate restoration of other degraded habitats. In one sense, offsets may be considered 'restorative' — for example, where riparian restoration is implemented as a nutrient and sediment offset downstream — but they are also a mechanism tied to damaging developments for which the intervention into the landscape is typically linked (ie based on geographic locality or spatial scale), rather than restoration being prioritised where it is needed most. A recent review of Australian environmental law has suggested a clearer legislative link may need to be made between offsets and restoration.<sup>114</sup> However, on other occasions, arguments have been put that offsets may not be truly restorative, as their purpose is not to bring back 'self-sustaining ecological systems with the full suite of organisms and ecosystem processes and characteristics'.<sup>115</sup>

The existing offsets framework in Queensland does provide a method for a financial market to feed funding into restoration activities. For instance, the *Environmental Offsets Act 2014* (Qld) enables a proponent of a development to provide funds for an offset as a financial settlement offset paid to the government, rather than organising the offset themselves.<sup>116</sup> There is very little regulation, however, as to how this money must be spent, in that it must simply be used for delivery of environmental offsets to achieve conservation outcomes.<sup>117</sup> This lack of regulatory specificity around the use of the financial settlement offsets may jeopardise accountability for the provision of the offset for which it was paid. Given the extent to which it is used, with 97 per cent of offsets under Queensland's framework being delivered as financial settlement,<sup>118</sup> it is essential that this framework is effective at achieving the conservation outcomes for which that money is being paid. Under a more sophisticated, accountable and scientifically robust framework, there is potential scope that these funds be directed towards strategic restoration activities. However, significant reforms and well-considered strategic conservation prioritisation methods are needed for existing offsets frameworks at a state and national level to be capable of ensuring positive environmental outcomes under such an initiative.

There may be other issues as well. Some of the key reasons that landholders are not offering their land for either offset initiatives or programs, for example, such as the Queensland LRF, appear to be: the complexity in establishing a carbon

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Martin et al, 'Using Offsets to Mitigate Environmental Impacts of Major Projects: A Stakeholder Analysis' (2016) 179 *Journal of Environmental Management* 58; and Katherine Miller et al, 'The Development of the Australian Environmental Offsets Policy: From Theory to Practice' (2015) 42(4) *Environmental Conservation* 306.

<sup>114</sup> Samuel (n 13).

<sup>115</sup> See Palmer and Ruhl (n 23), citing Telesetsky (n 24).

<sup>116</sup> *Environmental Offsets Act 2014* (Qld) pt 6 div 5 ('Financial settlement offsets').

<sup>117</sup> *Ibid* s 84.

<sup>118</sup> Queensland Government (n 94).

offset initiative; the high costs associated with legal and expert fees to establish the project; and the disempowerment that landholders may feel in the processes of establishing an initiative on their land that is led by carbon market professionals.<sup>119</sup> For coastal wetland restoration initiatives, reliant on similar funding mechanisms, these challenges may have to be addressed in order to ensure that the 'restorative-offset' initiatives have a better chance at long-term success.

In contrast, the New South Wales ('NSW') Biodiversity Offset Scheme appears to provide for in-perpetuity protection of offset sites and arguably greater rigour around the provision of the offset. A key issue with reliance on the Queensland or NSW offsets framework is that a developer must be seeking to offset a particular impact on a species to gain benefit from the framework. A live question for these offsets frameworks is the validity of providing for restoration activities on another species or bioregion that needs attention but is not the species or bioregion that is being impacted by a development and requiring offsetting. This may be a way to ensure there was funding provided for needed restoration activities, regardless of whether the species or bioregion is being impacted by an 'offsettable activity'. This scheme would require strategic prioritisation of restoration works and sacrifice of some species offsets for the betterment of more vulnerable species, which is likely to be a controversial and potentially dangerous initiative in its potential for misuse to the detriment of de-prioritised species.

All that said, it should be noted that offsets can be used to justify inappropriate environmental impacts where a species impact is simply not able to be offset, for example due to the vulnerability of the species or a lack of knowledge to provide for an appropriate offset. Furthermore, the definition of offsets relates back to 'unavoidable loss', and therefore questions can be raised as to whether the majority of developments that ultimately result in offsets are truly 'necessary', particularly in the geographical locations where loss of habitat has greater cumulative impact than in other areas. In these cases, proper implementation of the offsets hierarchy — 'avoid, mitigate, offset' — should stop at 'avoid', due to the inability to provide the offset for the species. Establishing a scheme that allows the offset to be provided regardless of the outcome for the particular species impacted, but rather for the greater good of the restoration strategy, is therefore an interesting option for funding restoration works, but should only be considered with the greatest care and input and consistent oversight from conservation science.

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<sup>119</sup> As Martin (n 22) has written, the uptake of restoration in rural and regional areas in Australia may be impacted by many factors, including 'land tenure norms and rules', as well as 'governance complexity' and the 'economic incapacity of some landholders'.

## D *Restoration and Sustainable Development*

If legislative instruments can be utilised to promote restoration across a landscape (eg in coastal wetland locations), then it stands to reason that those approaches should be integrated, as far as possible, into existing planning and protection systems. Just as development is an intervention into the natural world, so too is restoration. One of the possible ways to integrate restoration into the current Queensland system is to include the assessment, land access and tenure processes under the *Planning Act 2016* (Qld) regime, for example by separating it from traditional forms of development.<sup>120</sup> Yet for this to occur, the overarching vision of Queensland's *Planning Act 2016* (Qld) framework (including the SPP and regional plans) may need to be revisited.

The current paradigm for planning in Queensland is, and has been for some time, ecologically sustainable development (or 'ecological sustainability').<sup>121</sup> Broadly speaking, this includes the integration of environmental protection, economic development and community wellbeing.<sup>122</sup> Restoration does exist as a passing component of this approach, but only insofar as it relates to the 'protection' of ecological processes and natural systems.<sup>123</sup> Moreover, in the mechanisms intended to 'advance the purposes of the [Planning] Act' (ie to achieve ecological sustainability), there is no mention of restoration (or rehabilitation for that matter), only references to minimising the adverse impacts of development and promoting the sustainable use of natural resources.<sup>124</sup> Accordingly, restoration is not comprehensively integrated into the objectives of the current Queensland planning regime. In particular, it is not considered an integral part of economic development and community wellbeing, and nor, for that matter, is there any significant reference to restoration or rehabilitation elsewhere in the Act, apart from as a 'restorative' measure following instances of non-compliance.<sup>125</sup>

This is problematic, as the link between restoration of the environment and sustainable development more broadly has been made increasingly clear. As a recent review of Australia's EPBC Act highlighted:

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<sup>120</sup> The three categories of development under the Act are currently: (1) prohibited; (2) assessable; and (3) accepted. See *Planning Act 2016* (Qld) s 44.

<sup>121</sup> *Ibid* s 3(1).

<sup>122</sup> *Ibid* s 3(2).

<sup>123</sup> *Ibid* s 3(a)(i).

<sup>124</sup> *Ibid* s 5.

<sup>125</sup> *Ibid* s 180. It is also worth noting that the Court has powers in the case of environmental pollution (or other forms of degradation) to order a defendant to 'restore' the environment, including for unauthorised damage to coastal wetland environments. See *Environmental Protection Act 1994* (Qld) ss 501–2.

Given the state of decline of Australia's environment, restoration and adaptation are required to enable future development to be sustainable.<sup>126</sup>

Indeed, the link between restoration and all aspects of sustainability (not just environmental protection) is apparent from the academic literature,<sup>127</sup> not to mention global treaty regimes. Under the *Ramsar Convention*, for example, the need to restore wetlands is intimately connected to their wise use.<sup>128</sup> Ramsar's current Strategic Plan (2016–24) highlights this on numerous occasions, including placing the restoration of wetlands squarely within its future vision for a more sustainable world.<sup>129</sup> Furthermore, the restoration of wetlands is considered integral to the attainment of the United Nations' Sustainable Development Goals ('SDGs'), especially SDG15 (protecting and restoring terrestrial ecosystems),<sup>130</sup> as well as SDG6 (ensuring water and sanitation for all), and SDG14 (conserving and sustainably using the ocean and its marine resources).<sup>131</sup>

In the end, regardless of whether a new legislative regime for coastal wetland restoration is necessary, the concept of sustainability in Queensland may need to evolve to embrace ecological restoration more explicitly, that is, laying bare the connection between conservation, protection, development and restoration. Arguably, only then will a fully integrated vision of sustainability for the State start to emerge.

#### IV CONCLUSION

Coastal wetlands are an important part of the landscape. They provide vital ecosystem services and thus require both protection and restoration. While the Queensland Government has introduced several important initiatives of late, including an impressive GBR Wetlands Strategy and numerous educational and planning tools, it lacks a strategic vision for coastal wetland restoration that is comprehensively embedded within Queensland's planning framework. Accordingly, we have suggested that environmental law could be 'put to work' in Queensland, including a move away from viewing restoration in the same way as

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<sup>126</sup> Samuel (n 13).

<sup>127</sup> See, eg, Krystyna M Urbanska, Nigel R Webb and Peter J Edwards, *Restoration Ecology and Sustainable Development* (Cambridge University Press, 1997); and James Aronson et al, 'Ecological Restoration: A New Frontier for Nature Conservation and Economics' (2006) 14 (3–4) *Journal for Nature Conservation* 135.

<sup>128</sup> Alexander and McInnes (n 5).

<sup>129</sup> Ramsar Secretariat, *The Fourth Ramsar Strategic Plan 2016–2024* <<https://www.ramsar.org/document/the-fourth-ramsar-strategic-plan-2016-2024>> ('Strategic Plan'); Ramsar Secretariat, *An Introduction to the Convention on Wetlands* (Ramsar Handbook Series, 5<sup>th</sup> ed, 2016) Sub-Series II ('Wise Use of Wetlands').

<sup>130</sup> United Nations, *Sustainable Development Goal 15: Life on Land* (Web Page) <[www.un.org/sustainabledevelopment/biodiversity](http://www.un.org/sustainabledevelopment/biodiversity)>.

<sup>131</sup> Ramsar Secretariat, *Strategic Plan* (n 129) 6.

other forms of 'development'. To do this, one must conceive of 'the law' as broader than simply 'regulation', thus promoting a policy mindset whereby environmental law can empower and facilitate change, rather than simply restricting it.

It would be a shame, of course, to saddle much-needed wetland restoration projects with an inappropriate administrative burden that is not relevant to the risks associated with the activities. That said, it still seems reasonable that there must be some form of environmental assessment and permitting process given the potential risks to the receiving environment, for example from introduced species and altered hydrological landscapes. Despite the urgency of the task, the restoration of coastal wetlands cannot be a 'free for all', but surely there are benefits from adopting a more strategic approach that provides certainty and clarity for restoration actors and their financiers. Offsets may or may not prove a viable component of this approach, and considerable care must be taken to ensure that 'compensating' for environmental loss does not become the primary driver towards restoration success.

In this article, we have considered whether a new legislative regime (or amendments to the existing regime) is required for coastal wetland restoration in Queensland. Further empirical work is now required, particularly of a qualitative nature, to examine in what ways the law prevents or supports coastal wetland restoration efforts across the State. Only then will we begin to understand the inefficiencies and anomalies in the current regime, and attempt to tackle the more pressing question posed by scientists of how coastal wetland restoration can occur at scale, and where it is needed most.<sup>132</sup>

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<sup>132</sup> Waltham et al (n 67).



# CLIMATE CHANGE, WILDFIRES AND WETLAND ECOSYSTEM SERVICES: GOVERNING TRANSFORMATION

PHILLIPA C MCCORMACK\*

*Australia's 2019–20 fire season has been described as the 'Black Summer'. Vast swathes of the continent burned, including areas that have not been fire-prone in the past, such as wet rainforest and alpine wetlands. This article considers the implications of more frequent and intense wildfires for wetland ecosystems and the extremely valuable ecosystem services that they provide. The article investigates what Australia's laws have to say about restoring ecosystem services after extreme events such as fire. In particular, the article considers the extent to which existing laws anticipate the possibility of ecosystem transformation, asking: what do our laws require if restoration is not possible?*

## I INTRODUCTION

Australia experienced a catastrophic 2019–20 bushfire season. Fires razed large areas of the continent, from Queensland, down the east coast to Tasmania, and across to Western Australia. One area that was heavily impacted was the Macquarie Marshes — a large, Ramsar-listed wetland and one of Australia's most important waterbird nesting sites, where up to 90 per cent of the site's reed beds were burned.<sup>1</sup> Fires are increasingly burning ecosystems that have not been fire-prone in the past, including Gondwana Rainforest in Eastern Australia<sup>2</sup> and

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<sup>1</sup> Jessie Davies, 'Ramsar-Protected Macquarie Marshes Wetland on Fire with 90pc of Crucial Reed Bed Razed', *ABC Western Plains* (online, 28 October 2019) <<https://www.abc.net.au/news/2019-10-28/macquarie-marshes-on-fire-90pc-reed-bed-razed/11645914>>.

<sup>2</sup> Michelle Ward et al, 'Impact of 2019–2020 Mega-Fires on Australian Fauna Habitat' [2020] 4 *Nature Ecology & Evolution* 1321. Fires affected approximately 54 per cent of the Gondwana Rainforests of Australia and 81 per cent of the Greater Blue Mountains World Heritage Areas. See Department of Agriculture, Water and the Environment, *Wildlife and Threatened Species Bushfire Recovery Research and Resources* (online, 2020) <<https://www.environment.gov.au/biodiversity/bushfire-recovery/research-and-resources>>.

ancient and fragile alpine peatlands in central Tasmania.<sup>3</sup> While much of Australia's biodiversity is adapted to fire, recent wildfires demonstrate a climate-driven change in intensity and frequency that represents a new threat to ecosystems and the services they provide.<sup>4</sup> The implications of climate change for coastal wetlands have been examined in some detail in recent scholarship,<sup>5</sup> but there is far less analysis of the threat of changing fire regimes to wetland ecosystems, or of the ways in which legal, policy and management regimes should anticipate and respond to this changing threat.<sup>6</sup>

Of course, wetland ecosystems are not alone in being threatened by changing fire regimes. However, wetlands provide a useful lens through which to assess the capacity for legal frameworks to promote restoration after extreme events such as wildfire, because wetland conservation laws are some of the few that set active restoration obligations and explicitly engage with the concept of ecosystem functions and services. Fire is also not the only threat to wetlands but, particularly when combined with other climate trends such as warming and drying, it has the potential to rapidly transform these ecosystems, with complex implications for their legal and conservation status.

The purposes of this article are threefold. First, it brings together scholarship about climate-driven changes to wildfire regimes and climate adaptation in wetland ecosystems. The analysis highlights how important it is to support adaptation in wetland ecosystems to maintain crucial ecosystem services. Second, having demonstrated that changing wildfire regimes pose a growing threat to wetland ecosystems in Australia, the article investigates what existing laws and policies have to say about restoring ecosystem services after extreme events. In particular, the article considers the extent to which existing laws anticipate the possibility of restoration failure or ecosystem transformation, asking: what do our laws require if restoration is not possible? And do our laws protect the conservation status of an area, even if it is no longer providing the ecosystem services for which it was conserved? The third purpose of this article is to draw

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<sup>3</sup> Tasmanian Climate Change Office ('TCCO'), *Tasmanian Government's Response — TWWHA Bushfire and Climate Change Research Project* (2015); Ward et al (n 2).

<sup>4</sup> While acknowledging that controversy exists in the ecological, legal and philosophical scholarship about 'ecosystem services', the term is used here not as an economic calculation but rather to describe the rich, diverse ways that wetlands provide benefits to people.

<sup>5</sup> Valerie Masson-Delmotte et al (eds), *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty* (Report, 2018) 181 ('IPCC 1.5°C Report'); Vishnu Prahalad et al, 'The Creation and Conservation Effectiveness of State-Wide Wetlands and Waterways and Coastal Refugia Planning Overlays for Tasmania, Australia' (2019) 81 *Land Use Policy* 502.

<sup>6</sup> But see, generally, William R Moomaw et al, 'Wetlands In a Changing Climate: Science, Policy and Management' (2018) 38 *Wetlands* 183; CM Finlayson et al, 'Policy Considerations for Managing Wetlands under a Changing Climate' (2017) 68 *Marine and Freshwater Research* 1803.

lessons from climate adaptation law scholarship for responding to ecosystem transformation and changing ecosystem services.

Part II of this article briefly describes the rich diversity of wetland ecosystems in Australia and the range of ecosystem services that they provide. Part III synthesises climate projections about changing fire regimes and their implications for wetland ecosystem services in Australia. Part IV provides an overview of the ways that Australian conservation laws facilitate restoration after extreme events and the complexity of restoring disrupted ecosystem services to a site. Examples from governance instruments for the Macquarie Marshes Ramsar site and Tasmanian Wilderness World Heritage area demonstrate the complex web of law, policy, management and practice that guide restoration activities in protected wetland ecosystems. Part V applies recommendations from climate adaptation law scholarship to the particular case of wetlands and wildfire, demonstrating the need for a substantial shift in the way that we measure and respond to conservation success and failure. The article concludes in Part VI with a call for greater ambition and commitment to conserving the full richness and diversity of Australia's unique and threatened ecosystems.

## II WETLAND ECOSYSTEMS AND THEIR SERVICES

Wetlands are found across the Australian continent from coastal mangroves and saltmarshes, to alpine sphagnum bogs and peatlands, to mound springs in arid regions,<sup>7</sup> and they are crucial sites for both conservation and climate management. Wetland ecosystems are diverse, specialised environments that support unique flora and fauna and complex ecological processes. Wetland ecosystems also contribute to climate mitigation with their substantial capacity for carbon dioxide sequestration, and they facilitate climate adaptation by, for example, buffering coastal human and ecological communities from the impact of storm surges and sea-level rise.<sup>8</sup> Wetlands are highly vulnerable to the effects of anthropogenic climate change, especially drying and warming trends, sea-level rise, and extreme events such as storms and fire.<sup>9</sup> Drying wetlands can also release methane and other greenhouse gases and so, as these ecosystems are

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<sup>7</sup> Department of Agriculture, Water and the Environment, *Directory of Important Wetlands in Australia* (online, 2005) <<https://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands#inland>>.

<sup>8</sup> Sandra Díaz et al (eds), *The Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (IPBES Secretariat, 2019); Ove Hoegh-Guldberg et al, 'Impacts of 1.5°C Global Warming on Natural and Human Systems' in IPCC 1.5°C Report (n 5) 233.

<sup>9</sup> IPCC 1.5°C Report (n 5).

impacted by climate change, they also represent an important potential contributor to future warming.<sup>10</sup>

Wetlands provide a host of ecosystem services to human communities. Services provided by coastal wetlands have been well-documented and include provisioning services such as: fuel and fibre; regulating services such as carbon sequestration, protection from storm surges and erosion, water regulation and purification, and biodiversity conservation, including through the provision of habitat; cultural services such as spiritual, recreational and aesthetic values; and supporting services such as nutrient cycling.<sup>11</sup> A recent global assessment produced by the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (‘IPBES’) noted that estuaries support 70 per cent of people worldwide and their extensive contributions to human wellbeing include intangible, often sacred, values.<sup>12</sup>

Permanent and ephemeral wetlands in arid regions, such as soaks, mounds and swamps, provide drought refuges and habitat for populations of freshwater fishes, amphibians, reptiles, birds and mammals taking advantage of sporadic water availability in otherwise harsh and dry environments.<sup>13</sup> Arid wetlands also offer provisioning services in the form of livestock fodder in agricultural regions, along with regulating services in the form of sediment and nutrient retention, and cultural services such as Aboriginal cultural heritage sites.<sup>14</sup> Inland and alpine wetlands provide services such as soil conservation (preventing erosion), flood control, water and air purification, and sources of food, fuel, spiritual and recreational values as well as important niche habitats for migratory birds such as Latham’s Snipe (*Gallinago hardwickii*) and the critically endangered Northern Corroboree Frog (*Pseudophryne pengilleyi*).<sup>15</sup>

Climate change is creating new and important roles for wetlands in providing ecosystem services. One of the best-recognised examples is mangroves and coastal wetlands slowing coastal accretion and saltwater inundation as sea levels

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<sup>10</sup> Allen Myles et al (eds), *Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C Approved by Governments* (Cambridge University Press, 2018) 12 (‘IPCC 2018 SPM’).

<sup>11</sup> Justine Bell-James, Tessa Boardman and Rose Foster, ‘Can’t See the (Mangrove) Forest for the Trees: Trends in the Legal and Policy Recognition of Mangrove and Coastal Wetland Ecosystem Services in Australia’ (2020) *45 Ecosystem Services* 101148.

<sup>12</sup> Nakul Chettri et al, ‘Status and Trends — Nature: Draft Chapter’ in Diaz et al (n 8) 89.

<sup>13</sup> Roger Jaensch and Sarah Young, *Wetland Management Profile: Arid Swamps* (Queensland Wetlands Program, 2010); DA Roshier, AI Robertson and RT Kingsford, ‘Responses of Waterbirds to Flooding in an Arid Region of Australia and Implications for Conservation’ (2002) 106(3) *Biological Conservation* 399.

<sup>14</sup> Jaensch and Young (n 13) 5.

<sup>15</sup> A Wild et al, *Ecological Character Description: Ginini Flats Wetland Complex* (Unpublished Report, Australian Government Department of Sustainability, Environment, Water, Population and Communities, 2010).

rise.<sup>16</sup> Wetlands are also increasingly recognised as important sites for climate refugia, in addition to their role as short-term refuges from extreme events such as drought and fire.<sup>17</sup> Climate refugia are habitats into which species can shift or retreat and persist through extended periods of adverse climate conditions.<sup>18</sup> Climate refugia will be crucial for biodiversity over coming decades,<sup>19</sup> and healthy, functioning wetlands can play an important refugial role.<sup>20</sup>

### III CLIMATE CHANGE, WETLANDS AND CHANGING FIRE REGIMES

Global mean surface temperatures are now approximately 1°C above pre-industrial levels and are expected to reach 1.5°C of warming between 2030 and 2052.<sup>21</sup> In Australia, temperatures are expected to warm more rapidly, reaching up to 6.6°C by 2085.<sup>22</sup> Projections about changing patterns of rainfall and runoff in Australia are complex and uncertain,<sup>23</sup> but will occur in a context of ongoing decline, with over 85 per cent of the area of global wetlands already lost.<sup>24</sup>

Climate change will have both direct impacts on wetland ecosystems, as a result of warming and drying trends, and indirect impacts as climate changes interact with existing stressors such as over-extraction, invasive species and changes in wildfire regimes.<sup>25</sup> Some wetland ecosystems will be more resilient in

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<sup>16</sup> See, eg, Oscar Serrano et al, 'Coastal Wetlands: Conservation of Blue Carbon Ecosystems for Climate Change Mitigation and Adaptation' in Gerardo ME Perillo et al (eds), *Coastal Wetlands: An Integrated Ecosystem Approach* (Elsevier, 2<sup>nd</sup> ed, 2019) 965.

<sup>17</sup> CS James et al, *Identifying Climate Refuges for Freshwater Biodiversity across Australia* (National Climate Change Adaptation Research Facility, 2013) 2.

<sup>18</sup> Toni Lyn Morelli et al, 'Managing Climate Change Refugia for Climate Adaptation' (2016) 11(8) *PLoS One* e0159909; April E Reside et al, *Climate Change Refugia for Terrestrial Biodiversity: Defining Areas that Promote Species Persistence and Ecosystem Resilience in the Face of Global Climate Change* (National Climate Change Adaptation Research Facility, 2013).

<sup>19</sup> See, eg, Meddens et al, 'Fire Refugia: What Are They, and Why Do They Matter for Global Change?' (2018) 68(12) *BioScience* 944; Reside et al (n 18).

<sup>20</sup> A diversity of 'fire ages' in a landscape, including areas of long-unburnt habitat, is disproportionately important for climate refugia. See Dixon et al, 'More Long-Unburnt Forest Will Benefit Mammals in Australian Sub-Alpine Forests and Woodlands' (2019) 44(7) *Austral Ecology* 1150.

<sup>21</sup> IPCC 2018 SPM (n 10) 4.

<sup>22</sup> James et al (n 17) 2–3.

<sup>23</sup> Ibid.

<sup>24</sup> Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 'Summary for Policymakers' in Díaz et al (n 8) 11, noting (at 24) that only '13% of the wetland present in 1700 remained by 2000; recent losses have been even more rapid (0.8 per cent per year from 1970 to 2008)'.

<sup>25</sup> Although there is some uncertainty about the precise effect of interactions between existing threats and climate-driven changes, particularly in freshwater ecosystems. See A Reisinger et al,

the face of these impacts, such as those fed by groundwater systems, while others, such as coastal wetlands and those fed by rainfall and runoff, are highly vulnerable and may be irreversibly transformed.<sup>26</sup>

### A *Climate Impacts on Wetland Ecosystem Services*

The IPCC reported in 2019 that climate change will have severe impacts on the ecosystem services provided by wetland ecosystems, including as a result of increasing risks of species extinctions, biome transformations and changes in extreme weather events.<sup>27</sup> These impacts include likely disruptions to ecosystem functioning and loss of cultural, provisioning and regulating services such as flood control, food and fuel provisioning, and recreation.<sup>28</sup>

In Australia, the Commonwealth Government's 2017 State of the Environment report found that '[c]limate variability and climate change, and associated changes in rainfall regimes, are the primary risks to inland water environments in both the short and long term'.<sup>29</sup> Wetlands in southern Australia will be particularly exposed to interactions between decreasing average rainfall and increasing occurrences of hot days and fire weather.<sup>30</sup> Climate change is expected to reduce winter rainfall by up to 40 per cent in southeastern Australia and 70 per cent in southwestern Australia.<sup>31</sup> Drying trends will be exacerbated by both long periods of drought and higher evaporation in warmer temperatures, as well as interceptions from changing agricultural uses.<sup>32</sup> In this context,

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'Australasia' in VR Barros et al (eds), *Climate Change 2014: Impacts, Adaptation, and Vulnerability Part B: Regional Aspects* (Cambridge University Press, 2014) 1371, 1390.

<sup>26</sup> Finlayson et al (n 6) 1805. This depends on the ultimate extent of climate change and global climate mitigation actions: IPCC 2018 SPM (n 10) 4, 11.

<sup>27</sup> IPCC 1.5°C Report (n 5) 221.

<sup>28</sup> Ibid.

<sup>29</sup> Robert Argent, 'Outlook: Inland Water' in ID Cresswell and HT Murphy, *Australia State of the Environment 2016* (Web Page, Australian Government, 2017) <<https://soe.environment.gov.au/theme/inland-water/framework/outlook>>.

<sup>30</sup> Reisinger et al (n 25) 1374, 1379.

<sup>31</sup> Ibid.

<sup>32</sup> Such as the 'Millennium Drought' in Australia (1997–2009), which caused an 'unprecedented decline' in water availability in southeastern Australia, triggering severe water allocation restrictions for irrigators and urban water users, serious environmental impacts, and the suspension of national water-sharing arrangements. See Reisinger et al (n 25) 1377, 1387–8, 1391.

increasingly heavy extreme rainfall events will decrease water quality and increase erosion,<sup>33</sup> causing particular damage to wetlands.<sup>34</sup>

Some wetlands, such as those in arid areas, may be more resilient to these changes because they are adapted to boom and bust cycles.<sup>35</sup> However, 'hotspots' of climate vulnerability in Australia include low-lying coastal wetlands, such as those in Kakadu National Park, where very small rises in sea level will result in saline intrusion.<sup>36</sup> Inland freshwater and groundwater systems that are already subject to over-allocation will also be particularly vulnerable to increased drought and changes in the timing and extent of flooding,<sup>37</sup> while peat-forming wetlands are particularly vulnerable to significant drying.<sup>38</sup>

Wetland boundaries have already been observed tracking changes in climate,<sup>39</sup> and wetland species are also expected to redistribute with changing temperature and rainfall patterns,<sup>40</sup> though not necessarily at the same rate or in the same direction.<sup>41</sup> Climate-driven redistributions will cause species assemblages to 'shuffle' with impacts on threatened species habitats as well as other wetland ecosystem services.<sup>42</sup> Changes in species distributions and assemblages may also reduce the capacity of some wetlands to provide refuge from heatwaves and drought, despite increasing need for refuges and diverse and longer-term climate refugia.<sup>43</sup>

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<sup>33</sup> David Blake et al, 'Assessment of Post-Wildfire Erosion Risk and Effects on Water Quality in South-Western Australia' (2020) 29(3) *International Journal of Wildland Fire* 240; CN Dahm et al, 'Extreme Water Quality Degradation Following a Catastrophic Forest Fire' (2015) 60(12) *Freshwater Biology* 2584.

<sup>34</sup> Reisinger et al (n 25) 1374.

<sup>35</sup> Hans-Martin Füssel and Richard JT Klein, 'Climate Change Vulnerability Assessments: An Evolution of Conceptual Thinking' (2006) 75(3) *Climatic Change* 301; *Decision of the COP in its Eighth Meeting, Held in Valencia from 18–26 November 2002 Climate Change and Wetlands: Impacts, Adaptation and Mitigation*, Resolution VIII.11 (26 November 2002) 29.

<sup>36</sup> Reisinger et al (n 25) 1377.

<sup>37</sup> *Ibid.*

<sup>38</sup> *Ibid.*

<sup>39</sup> David A Keith, Suzette Rodoreda and Michael Bedward, 'Decadal Change in Wetland-Woodland Boundaries During the Late 20<sup>th</sup> Century Reflects Climatic Trends' (2010) 16(8) *Global Change Biology* 2300; Kerry Lee Rogers, Neil Saintilan and Craig Copeland, 'Managed Retreat of Saline Coastal Wetlands: Challenges and Opportunities Identified from the Hunter River Estuary, Australia' (2014) 37(1) *Estuaries and Coasts* 67.

<sup>40</sup> Rogers, Saintilan and Copeland (n 39).

<sup>41</sup> Jeremy VanDerWal et al, 'Focus on Poleward Shifts in Species' Distribution Underestimates the Fingerprint of Climate Change' (2013) 3(3) *Nature Climate Change* 239.

<sup>42</sup> Lochran W Traill et al, 'Managing for Change: Wetland Transitions under Sea-Level Rise and Outcomes for Threatened Species' (2011) 17(6) *Diversity and Distributions* 1225; Wayne A Houston et al, 'Climate Change, Mean Sea Levels, Wetland Decline and the Survival of the Critically Endangered Capricorn Yellow Chat' (2020) 45(6) *Austral Ecology* 731.

<sup>43</sup> Reside et al (n 18); James et al (n 17).

## B *The Effect of Changing Wildfire Regimes on Wetland Services*

Individual fire events are relatively common in the Australian landscape and many ecosystems, including wetland ecosystems, have adapted to occasional burning. In fact, restoring indigenous fire practices has been a crucial restoration practice for wetlands in Kakadu National Park.<sup>44</sup> The 2019–20 Australian fires were different. Unusual in their intensity and scale, they decimated species ranges and will almost certainly have caused species extinctions.<sup>45</sup> However, in the longer term, it is the combination of repeated and more intense fires — fire regimes rather than events — that will have the largest impact on species and ecosystems.<sup>46</sup> Fire regimes are ‘the spatial and temporal patterning’ of recurring fires, including the history of burning across a landscape, intervals between fire events, the seasons in which fires have burned, and their length and the intensity of a fire in any given area.<sup>47</sup>

There is clear evidence that conditions for extreme wildfires are becoming more severe and common in Australia.<sup>48</sup> The season for extreme fire danger is also becoming longer, extending into ‘shoulder periods’ in autumn and spring and reducing opportunities for planned and controlled burns to reduce fuel loads.<sup>49</sup> The Climate Council reported recently that, globally, the fire weather season extended by nearly 19 per cent between 1979 and 2013.<sup>50</sup> Each of these trends underpin a significant shift in the character of fire regimes that we can expect in future, and their likely impact on wetland ecosystems and their services. Indeed, depending on the rate and magnitude of climate change, changing fire regimes present a potentially existential threat to some wetland ecosystems.<sup>51</sup>

While the implications of wildfire for wetlands are complex, changing fire regimes will likely have negative impacts on wetlands, decimating species populations and habitat and disrupting ecological interactions and the provision

<sup>44</sup> Sandra McGregor et al, ‘Indigenous Wetland Burning: Conserving Natural and Cultural Resources in Australia’s World Heritage–Listed Kakadu National Park’ (2010) 38(6) *Human Ecology* 721, 723–4.

<sup>45</sup> Lily van Eeden et al, *Australia’s 2019–20 Bushfires: The Wildlife Toll* (Report, WWF Australia, 2020).

<sup>46</sup> Richard J Williams et al, *Interactions between Climate Change, Fire Regimes and Biodiversity in Australia: A Preliminary Assessment* (Report, Australian Government Department of Climate Change and Department of the Environment, Water, Heritage and the Arts, 2009) 14.

<sup>47</sup> *Ibid.*

<sup>48</sup> Reisinger et al (n 25) 1381, describing a projected ‘increase in days with very high and extreme fire danger index by 2–30% (2020), 5–100% (2050)’.

<sup>49</sup> Rebecca MB Harris et al, ‘An Assessment of the Viability of Prescribed Burning as a Management Tool under a Changing Climate: A Tasmanian Case Study’ in M Rumsewicz (ed), *Research Forum 2017: Proceedings from a Research Forum* (Bushfire and Natural Hazards CRC, 2017) 48.

<sup>50</sup> Lesley Hughes and Jacqui Fenwick, *The Burning Issue: Climate Change and the Australian Bushfire Threat* (Report, Climate Council, 2015).

<sup>51</sup> Reisinger et al (n 25) 1375.

of ecosystem services.<sup>52</sup> The IPCC notes that '[s]ignificant local and global losses of species, functional diversity, and ecosystem services, and large-scale changes in ecological communities, are anticipated' as a result of extreme events, including wildfire.<sup>53</sup> This is borne out in the early evidence from the 2019–20 wildfires in Australia, where 30.38 million hectares were burned.<sup>54</sup> Direct impacts from these fires include the destruction of more than 30 per cent of the habitat of 70 different species (21 of which are threatened species),<sup>55</sup> and a staggering three billion individual vertebrates are estimated to have been killed or displaced, including mammals, reptiles, birds and amphibians.<sup>56</sup> Direct impacts from extreme fire can also affect habitat and climate control services by, for example, raising water temperatures to extreme levels. The Black Saturday fires in Victoria in 2008 caused the water in at least one stream to boil.<sup>57</sup> Fires can also destroy soil bacteria and micro and invertebrate fauna, disrupting food webs and other provisioning services, as well as burning native wetland plants and destroying their roots, disrupting regulating services and severely delaying or preventing wetland recovery.

Fires also have indirect impacts on wetlands, including by exacerbating existing stressors. For example, young trees and vegetation regrowth use far more water than long-established forests. As climate change reduces average rainfall and increases evaporation rates, vegetation re-growth after fire will further reduce the proportion of run-off that reaches catchments to replenish wetland ecosystems.<sup>58</sup> Invasive species or pathogens may also be introduced to sensitive and remote wetland areas, for example, if contaminated water is dumped in an aerial delivery onto a fire or introduced to an area on fire-fighting equipment.

Fires also indirectly affect water quality, with rain washing ash, dust and fire retardant into waterways and wetlands after a fire. 'Sediment slugs' have been observed flowing down waterways after fire, suffocating freshwater fishes and other species and affecting water flows.<sup>59</sup> Suspended sediments can severely

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<sup>52</sup> Williams et al (n 46).

<sup>53</sup> Reisinger et al (n 25) 1387.

<sup>54</sup> David Bowman et al, 'Wildfires: Australia Needs National Monitoring Agency' (2020) 584(7820) *Nature* 188.

<sup>55</sup> Ward et al (n 2).

<sup>56</sup> van Eeden et al (n 45).

<sup>57</sup> J Khan, 'Our Drinking Water, Rivers and Fish Will All Feel the Impact of Bushfires, Experts Warn', *ABC Science* (online, 9 January 2020) <<https://www.abc.net.au/news/science/2020-01-09/freshwater-ecosystems-water-catchment-bushfire-impact/11850826>>.

<sup>58</sup> NE Marcar et al, *Predicting the Hydrological Impacts of Bushfire and Climate Change in Forested Catchments of the River Murray Uplands: A Review* (CSIRO, 2006).

<sup>59</sup> See, eg, Paul McInerney et al, 'The Sweet Relief of Rain after Bushfires Threatens Disaster for Our Rivers', *The Conversation* (online, 12 January 2020); Jason Alexandra and C Max Finlayson, 'Floods

impede services such as water purification, habitat provision and the capacity for wetlands to manage erosion and sediments and filter nutrients and pollution.<sup>60</sup> Carbon sequestration services can also be compromised when wetlands are damaged by fire, although carbon cycles may be even more significantly affected by carbon releases from wetlands as a result of burning, especially in peatlands where fires can burn for months or even years.<sup>61</sup>

Changing fire regimes in the Macquarie Marshes are interacting with drought and unsustainable upstream water uses, which have shifted the system from a semi-permanent to an ephemeral wetland.<sup>62</sup> The October 2019 fire burned 3,000 hectares of the Macquarie Marshes Ramsar site, including 90 per cent of the wetland's main reed bed and potentially burning the reeds' root systems, which were not protected by wet mud as they have been in previous fire seasons.<sup>63</sup> The latest fire plan for the Macquarie Marshes notes that vegetation fire thresholds in large parts of the Ramsar site have now been exceeded and are categorised as 'Too Frequently Burnt'.<sup>64</sup> Other parts of the site are listed as 'Vulnerable to Frequent Fire' and will become 'Too Frequently Burnt' if they burn again in 2020–21.<sup>65</sup> Management zones require that both categories of vegetation in the Ramsar site should be protected from fire 'as far as possible'.<sup>66</sup>

Emerging fire regimes present a far-greater threat to wetland ecosystems and their services than they have in the past because they combine increased exposure to wildfire events, re-burning after shorter periods of time, and a reduced likelihood of rainfall conditions that would support wetland replenishment and restoration, post-fire. This discussion provides a striking example of a broader challenge for conservation laws, about how best to anticipate and respond to the increasing likelihood of ecological transformation.

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after Bushfires: Rapid Responses for Reducing Impacts of Sediment, Ash, and Nutrient Slugs' (2020) 24(1) *Australasian Journal of Water Resources* 9.

<sup>60</sup> Reisinger et al (n 25) 1389; Alexandra and Finlayson (n 59).

<sup>61</sup> William R Moomaw et al, 'Wetlands in a Changing Climate: Science, Policy and Management' (2018) 38(2) *Wetlands* 183.

<sup>62</sup> New South Wales Office of Environment and Heritage, *Macquarie Marshes Ramsar Site: Article 3.2 Response Strategy* (2013) ('NSW OEH').

<sup>63</sup> Davies (n 1), reporting Professor Richard Kingsford, Director of the Centre for Ecosystem Science at the University of New South Wales; New South Wales Parks and Wildlife Service, *Fire Management Strategy 2020–2025 for the Macquarie Marshes Nature Reserve* (March 2020) ('Fire Management Strategy').

<sup>64</sup> Fire Management Strategy (n 63).

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

#### IV LAW AND PRACTICE FOR RESTORING WETLAND ECOSYSTEM SERVICES AFTER WILDFIRE

Many Australian wetlands have already been degraded by unsustainable water extractions and extended drought, and the climate impacts described above will both increase and complicate the need for restoration in future. While ecological restoration seeks to reverse ecosystem degradation and regain a system's ecological functionality,<sup>67</sup> adaptation-oriented restoration seeks more than reinstating past ecological functions and returning to a past state.<sup>68</sup> Instead, adaptive restoration acknowledges the inevitability of changing ecological and climatic baselines and accepts that healthy ecosystems may need to rely on novel species assemblages to build climate resilience in wetlands and across broader landscapes. Wetland restoration can reduce the risks and impacts of extreme events such as floods, droughts and fire while also fostering adaptive capacity in the face of ongoing change.<sup>69</sup> For example, riparian revegetation projects can improve the health of freshwater species and the habitat value of river and wetland systems, while also moderating future increases in water temperatures.<sup>70</sup> The discussion below provides an overview of the ways that existing legal frameworks facilitate wetland restoration, and the weaknesses of these laws, in their current form, for facilitating restoration of ecosystem services as the climate changes.

##### *A Implementing the Ramsar Convention in Australian law*

The *Convention on Wetlands of International Importance especially as Waterfowl Habitat* ('Ramsar Convention') is the primary international legal instrument for conserving, managing and restoring wetland ecosystems.<sup>71</sup> The Convention

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<sup>67</sup> International Union for Conservation of Nature, 'UN Elevates Action on Ecosystem Restoration — IUCN Is Ready' (Web Page, 6 March 2020) <<https://www.iucn.org/news/forests/201903/un-elevates-action-ecosystem-restoration-iucn-ready>>.

<sup>68</sup> See Phillipa C McCormack, 'Reforming Restoration Law to Support Climate Change Adaptation' in Afshin Akhtar-Khavari and Benjamin J Richardson (eds), *Ecological Restoration Law: Concepts and Case Studies* (Routledge, 2019) 265.

<sup>69</sup> World Summit on Sustainable Development, *Plan of Implementation* (nd) 37(d), <[https://www.ramsar.org/sites/default/files/documents/pdf/res/key\\_res\\_viii\\_16\\_e.pdf](https://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_viii_16_e.pdf)>.

<sup>70</sup> See Nicole E Heller and Erika S Zavaleta, 'Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations' (2009) 14,2(1) *Biological Conservation* 14, and references therein.

<sup>71</sup> Preamble, *Convention on Wetlands of International Importance especially as Waterfowl Habitat*, opened for signature 2 February 1971, 996 UNTS 246 (entered into force 21 December 1975) ('Ramsar Convention').

recognises the importance of wetland ecosystem services, including ‘as regulators of water regimes and as habitats supporting a characteristic flora and fauna, especially waterfowl’.<sup>72</sup> Parties to the Convention must report changes to the ecological character of wetlands listed under the Convention, including changes to ‘the combination of ecosystem components, processes, benefits and services that characterise a wetland at a given point in time’, and must seek to restore the ecological character of degraded wetlands.<sup>73</sup>

International guidance on the focus of ecological restoration, including under the *Ramsar Convention*, has been reframed in recent years to acknowledge the fact that ‘fully restoring an ecosystem to its original state is increasingly challenging and may not always be achievable’.<sup>74</sup> Under the *Ramsar Convention*, a listed site may be downsized or delisted due to unpreventable wetland loss or deterioration,<sup>75</sup> but only if it is impossible to maintain or restore its character. Guidance under the Convention explains that ‘unpreventable wetland loss or deterioration’ must be mitigated and, if the change is irreversible, compensation measures are required, such as an offset within the region of the wetland or as close to ‘like-for-like’ as possible.<sup>76</sup>

The *Ramsar Convention’s* unusual recognition of the importance of ecosystem services has been translated into domestic legal frameworks in Australia, creating some of the few legal tools available to directly recognise, protect and restore ecosystem services. To meet Australia’s international obligations under the *Ramsar Convention*, the national *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (‘EPBC Act’) facilitates site listings under the *Ramsar Convention* and requires ecological character descriptions to inform site-management and planning. Ecological character descriptions must describe the wetland system and its components, along with short- and long-term threats and pressures, providing rigorous recommendations for restoring and maintaining

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<sup>72</sup> Ibid.

<sup>73</sup> Ibid arts 3(2), 8(2)(c).

<sup>74</sup> ‘Ecological restoration’ is also an explicit target under the *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 69 (entered into force 29 December 1993). See Conference of the Parties to the Convention on Biological Diversity, *Decision of the COP in its Twelfth Meeting, Held in Pyeongchang from 6–17 October 2014 — Ecosystem Conservation and Restoration*, UN Doc UNEP/CBD/COP/DEC/XII/19 (17 October 2014); *Decision of the COP in its Eleventh Meeting, Held in Hyderabad from 8–19 October 2012 — Ecosystem Restoration*, UN Doc UNEP/CBD/COP/DEC/XI/16 (5 December 2012).

<sup>75</sup> Jamie Pittock et al, ‘Changing Character: The Ramsar Convention on Wetlands and Climate Change in the Murray–Darling Basin, Australia’ (2010) 27(6) *Environmental and Planning Law Journal* 401.

<sup>76</sup> See *Decision of the COP in its Eighth Meeting, Held in Valencia from 18–26 November 2002 — General Guidance for Interpreting ‘Urgent National Interests’ under Article 2.5 of the Convention and Considering Compensation under Article 4.2, Resolution VIII.20* (26 November 2002), in which compensation may include offsets for the wetland within the same region or as close to a ‘like-for-like’ as possible.

ecological components, processes and resilience.<sup>77</sup> Ecological character descriptions explicitly assess the ecosystem services provided by Ramsar sites, and must detail both the ‘Ecosystem benefits and services’ that most strongly influence the ecological character of the Ramsar site and the ‘Limits of Acceptable Change’ (beyond natural variability) for those benefits and services.<sup>78</sup>

Regulations under the *EPBC Act* set out Ramsar Management Principles that guide planning to maintain the ecological character of a wetland.<sup>79</sup> The Regulations do not mention ecosystem services but include, as a general principle, the need to maintain the ‘natural properties of the ecosystem’, including ‘for the benefit of humanity’.<sup>80</sup> The Regulations do not provide any guidance about restoration in wetlands beyond requiring that the management plan for each Ramsar site identifies whether restoration is needed (at the time the plan is prepared) and, if so, explain how the plan provides for that restoration.<sup>81</sup>

National guidelines also support implementing the *Ramsar Convention*, with directions about nominating sites, describing and mapping their boundaries and ecological character, and notifying the Ramsar Secretariat of a change in ecological character (‘Article 3.2 notification’).<sup>82</sup> The national guidelines indicate that change to the ecological character of a site that is beyond acceptable limits may become apparent for ecosystem *processes* before it is apparent for ecosystem *services*, due to lag effects. Future impacts on ecosystem services at a site may nevertheless underpin an Article 3.2 notification on the basis that the site’s ecological character is ‘likely to change’.<sup>83</sup> In the case of wildfire, if burning causes or threatens to cause changes to a wetland’s ecological character that are beyond

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<sup>77</sup> See, eg, New South Wales Office of Environment and Heritage, *Macquarie Marshes Ramsar Site Ecological Character Description* (Report, 2012) 2, 4.

<sup>78</sup> Department of the Environment, Water, Heritage and the Arts, *National Framework and Guidance for Describing the Ecological Character of Australia’s Ramsar Wetlands* (Report, 2008) 12, 19–20, <<http://www.environment.gov.au/system/files/resources/6d7408dc-2519-4294-9820-f7b2284816dd/files/module-2-framework.pdf>>.

<sup>79</sup> *Environment Protection and Biodiversity Conservation Act 1999* (Cth) s 335 (‘*EPBC Act*’), and *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) (‘*EPBC Regs*’) reg 10.02, sch 6, cl 1.01(a) and (b); the Minister ‘must make plans’ for Ramsar wetlands wholly located within Commonwealth areas and must *try* to prepare and implement management plans for other wetlands, in cooperation with states and territories: *EPBC Act* ss 328(1), 333(2).

<sup>80</sup> *EPBC Regs* sch 6, cl 1.01(a) and (b)(ii).

<sup>81</sup> *Ibid* cl 2.02(f) and (g).

<sup>82</sup> Department of Agriculture, Water and the Environment, *Australian National Guidelines for Ramsar Wetlands — Implementing the Ramsar Convention in Australia* (Web Page) <<https://www.environment.gov.au/water/wetlands/ramsar/australian-national-guidelines>>. This web page lists the multiple ‘modules’ or topic-specific guidelines (eg, below n 83) developed by the Australian government to support implementation of the Ramsar Convention.

<sup>83</sup> Department of the Environment, Water, Heritage and the Arts, *National Guidelines for Notifying Change in Ecological Character of Australian Ramsar Sites (Article 3.2)* (2009) (‘*Article 3.2 Guidelines*’) 6.

the specified Limits of Acceptable Change, this national statutory framework requires — at least at face value — that the Australian Government notify the Ramsar Secretariat and undertake planning and restoration activities to restore ‘critical’ ecosystem services,<sup>84</sup> which are those services that are most important to its ecological character.

Despite widespread recognition that climate change will negatively affect Ramsar wetlands,<sup>85</sup> the Australian Government’s national guidelines explain that an Article 3.2 notification will only be lodged with the Secretariat for human-induced changes to a wetland’s ecological character, not for changes principally caused by climate change.<sup>86</sup> Separating out human impacts from other drivers of change is complex, particularly where natural events such as floods, fires and droughts interact with human activities in a catchment, such as water extraction. Pittock and colleagues have argued strongly that climate change is human-induced and that climate-driven changes to a Ramsar site’s ecological character should be notified,<sup>87</sup> but there is no indication, at least at present, that the government intends to change its approach.

In practice, Article 3.2 notifications can drive climate-adaptive restoration planning and action in a wetland. For example, in July 2009, the Australian Government lodged an Article 3.2 notification for a likely change in ecological character in the NSW Macquarie Marshes. The notification was based on changes in water management and availability that had shifted the wetland from a semi-permanent to an ephemeral system.<sup>88</sup> Restoration actions taken under a resulting management strategy, along with two years of flooding rain, did improve the wetland against some criteria such as the presence of waterbirds and wetland vegetation.<sup>89</sup> However, years of drought followed, and ongoing reductions in flows from agricultural offtakes upstream left the marshes vulnerable. After the 2019–20 fires, the national Wildlife and Threatened Species Bushfire Recovery Expert Panel has targeted the Macquarie Marshes Ramsar site for detailed assessment to determine whether those fires have caused another notifiable change to the wetland’s ecological character.<sup>90</sup>

It is not clear from the *EPBC Act*, Regulations or national guidelines how the Australian government would respond if climate-driven changes to wildfire

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<sup>84</sup> Ibid 7.

<sup>85</sup> *Decision of the COP in its Tenth Meeting, Held in Changwon from 28 October–4 November 2008 — Climate Change and Wetlands*, Resolution X.24 (4 November 2008).

<sup>86</sup> Article 3.2 Guidelines (n 83) 8; Pittock et al (n 75).

<sup>87</sup> Pittock et al (n 75).

<sup>88</sup> NSW OEH (n 62).

<sup>89</sup> Ibid.

<sup>90</sup> Along with the Gwydir Wetlands and Gippsland Lakes Ramsar sites: Wildlife and Threatened Species Bushfire Recovery Expert Panel, *Communiqué* (online, 17 April 2020) <<https://www.environment.gov.au/system/files/pages/effd94e2-00fc-4e4b-8692-941f90f5ad8c/files/communique-17apr2020.pdf>>.

regimes transformed a Ramsar wetland towards an ecosystem state other than a wetland or caused the complete collapse of its ecosystem services. Guidance under the *Ramsar Convention* indicates that it would no longer qualify for continued listing, but the Australian legal framework does not describe the criteria against which that decision would be made and it is unclear how the *Ramsar Convention's* compensatory measures would be implemented or enforced.

## B *Protected Area Management Laws*

Australia's protected area laws establish a framework for creating and managing protected areas. Australian protected area laws typically seek to conserve biodiversity, ecosystem processes, landscapes and natural features such as rivers and waterfalls.<sup>91</sup> While these statutes do not explicitly protect 'ecosystem services', their overarching goals directly protect some supporting services and particularly biodiversity conservation. Protected area laws also protect cultural services in the form of sites and places of cultural significance to Traditional Owners, as well as places for scientific research and recreation.<sup>92</sup> Protected area laws also implicitly protect other ecosystem services. For example, these laws may conserve regulating services such as protecting against soil erosion and maintaining hydrological regimes by protecting rivers and wetland systems and their functions.<sup>93</sup> At the same time, these laws often explicitly *exclude* many provisioning services such as firewood collection, and agricultural, commercial and industrial resource uses within protected areas.<sup>94</sup>

Some protected area statutes include explicit restoration obligations, though none directly connect restoration with the concept of ecosystem services. For example, a person may be required to remediate a protected area if their actions have damaged that area.<sup>95</sup> Parks agencies may also be required to, for example:

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<sup>91</sup> See, eg, *National Parks and Wildlife Act 1974* (NSW) s 2A(1)(a); *Nature Conservation Act 1992* (Qld) s 5; *Nature Conservation Act 2002* (Tas) sch 1.

<sup>92</sup> See, eg, *Nature Conservation Act 1992* (Qld) s 5(f), 21(1)(c); *Nature Conservation Act 2002* (Tas) sch 1, column 3. The *Crown Land Management Act 2009* (SA) goes somewhat further, declaring that principles of management under the Act include environmental protection being managed in a way that enables 'communities to provide for their economic, social and physical well-being and for their health and safety while...safeguarding the life-supporting capacity of air, water, land and ecosystems', s 5(2)(a)(ii).

<sup>93</sup> See, eg, *Nature Conservation Act 2002* (Tas) sch 1, cl 1(g); *National Parks and Wildlife Act 1974* (NSW) s 2A(1).

<sup>94</sup> See, eg, *Wilderness Protection Act 1992* (SA); *National Parks and Wildlife Act 1974* (NSW) s 41.

<sup>95</sup> *Crown Land Management Act 2009* (SA) s 57.

protect the national park against, and rehabilitate the national park following, adverse impacts such as those of fire ... and soil erosion on the national park's natural and cultural values.<sup>96</sup>

Protected area laws typically require that government agencies create management plans for publicly managed protected areas, identifying important ecological values and threats to them, as well as the management objectives and priorities for conserving those values.<sup>97</sup> Statutory management plans can define priority values and threats as issues that require more detailed planning. For example, the Tasmanian Wilderness World Heritage Area ('TWWHA') Management Plan describes changing fire regimes as a particular threat to wetland values in the area, including alpine wetlands, blanket bogs and peat mounds.<sup>98</sup> In response, the statutory plan requires subsidiary (non-statutory) plans for fire management and rehabilitation activities, among other things,<sup>99</sup> acknowledging that active interventions can, at least in some circumstances, 'help to boost natural recovery, limit damage and restore natural values'.<sup>100</sup> Statutory management plans may also direct particular forms of restoration in the event of damage to protected values (though again, not specifically directed to service provision). For example, the Macquarie Marshes fire management plan requires emergency rehabilitation after fire, to prevent erosion where vegetation has been cleared for new firebreaks, containment lines and access tracks.<sup>101</sup> The way that these obligations are framed suggests that restoring ecosystem services is, if anything, no more than an incidental benefit from the restoration of other protected area values.

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<sup>96</sup> *National Parks and Reserves Management Act 2002* (Tas) sch 1, cl 1(g). See also *National Parks Act 1975* (Vic) s 21D(6)(b).

<sup>97</sup> See, eg, *EPBC Act* s 316 (world heritage properties); *National Parks Act 1975* (Vic) s 17(2)(d); *National Parks and Reserves Management Act 2002* (Tas) s 20(2); *Conservation and Land Management Act 1984* (WA) s 54(1). Conservation tenure is not conveyed with a Ramsar site listing; rather, Ramsar sites are often overlaid by a Commonwealth, state or territory reserve. Private protected areas and Indigenous Protected Areas are not subject to statutory planning obligations, but approved management plans are prerequisites for government support.

<sup>98</sup> Department of Primary Industries, Parks, Water and Environment, *Tasmanian Wilderness World Heritage Area Management Plan* (2016) 119–121 ('TWWHA Management Plan'); JB Marsden-Smedley and JB Kirkpatrick, 'Fire Management in Tasmania's Wilderness World Heritage Area: Ecosystem Restoration Using Indigenous-Style Fire Regimes?' (2000) 1(3) *Ecological Management & Restoration* 195.

<sup>99</sup> See, eg, Tasmanian Parks and Wildlife Service, *Site and Rehabilitation Plan: Melaleuca, Southwest National Park* (2014) 14, noting fire as a primary threat to blanket bogs and peat mounds in the area and requiring careful monitoring of planned burn regimes.

<sup>100</sup> TWWHA Management Plan (n 98) 119, [5.2.7] ('Restoring and Rehabilitating Values').

<sup>101</sup> See, eg, Macquarie Marshes Fire Management Strategy (n 63), which requires that '[d]rainage lines and channels disturbed by the construction of containment lines must be rehabilitated as soon as possible as part of the suppression operations'.

Protected area management in practice is incorporating new responses to fire in sensitive ecosystems though, to date, these responses are also not focused on protecting or restoring ecosystem services. For example, Bushfire Rapid Risk Assessments were first implemented in Australia in 2008 by United States Burned Area Emergency Response Teams deployed to fight the Black Saturday fires in Victoria.<sup>102</sup> This emergency assessment tool has since been refined in cooperation with other Australian jurisdictions and is now regularly implemented to identify and minimise immediate and long-term risks to natural values after fire events, including through emergency rehabilitation.<sup>103</sup> Rapid Risk Assessment activities can help to minimise lost services through, for example, preventing large-scale erosion, but do not contribute to long-term threats to ecosystem functioning or services that benefit human communities.

While statutory protected area management planning is well-equipped to support some cultural services such as recreation, research and an appreciation of natural features and views, this legal tool has more limited capacity to facilitate more complex services such as regulating services for climate and pollution control. Limitations include that management plans only apply within protected area boundaries, which can be an impediment to effectively restoring lost or degraded wetland ecosystem services that rely on tributaries across a broader catchment.<sup>104</sup> For example, management planning cannot protect against reduced flows into a catchment as a result of drying trends, or from increased offtakes upstream for agriculture or human needs. This is a well-recognised challenge for wetland conservation and will increase in significance as the climate changes.<sup>105</sup>

Protected area laws do not provide guidance on the status of an area if an extreme event triggers its transformation from, for example, a wetland ecosystem towards a novel ecological state. In some cases, transforming ecosystems will continue to be protected — such as alpine wetlands located far from industrial and urban centres in the heart of the TWWHA. Other sites, such as

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<sup>102</sup> TCCO (n 3) 39–40.

<sup>103</sup> Ibid. Rapid risk and damage assessments have been deployed in fighting fires in the TWWHA in 2013, 2016 and 2019 and are incorporated into the Tasmanian Emergency Management Arrangements under the *Emergency Management Act 2006* (Tas).

<sup>104</sup> Although there is some capacity to manage broader environmental flows into Ramsar wetlands to ensure their ecological character, for example through Environmental Impact Assessment processes under the *EPBC Act*. See Jamie Pittock, 'Murray–Darling Basin: Conservation and Law' in C Finlayson et al (eds) *The Wetland Book* (Springer, 2016) 1.

<sup>105</sup> Jamie Pittock et al, 'Managing Freshwater, River, Wetland and Estuarine Protected Areas' in Graeme L Worboys et al (eds), *Protected Area Governance and Management* (ANU Press, 2016) 569; Robin Abell et al, 'Looking Beyond the Fenceline: Assessing Protection Gaps for the World's Rivers' (2016) 10(4) *Conservation Letters* 384.

fire-affected wetlands in the Murray–Darling Basin, may be the subject of calls for access to develop (eg for agriculture) or to be ‘swapped’ for more diverse, resilient or healthy ecosystems. Protected area legislation typically requires a declaration of revocation to be approved by both houses of Parliament before a reserve’s conservation status is revoked,<sup>106</sup> but there is little-to-no legal guidance about the level of consultation required before a protected area can be downgraded or revoked or on the scientific or other considerations that should be taken into account.<sup>107</sup> The process is even more opaque for revoking conservation covenants on private land. These legal gaps in planning for ecosystem transformation will become far more apparent as climate change causes rapid, simultaneous and widespread ecological change, and as ecosystem services change more rapidly and are lost.

### C *Threatened Species and Habitat Conservation Laws*

In addition to protecting Ramsar wetlands, the *EPBC Act* also implements Australia’s international obligations for protecting migratory birds and threatened species and ecological communities, including by empowering the national Environment Minister to make recovery plans for any species or ecological community threatened with extinction.<sup>108</sup>

Recovery plans are statutory instruments that list the actions necessary to stop species and ecological community declines, support their recovery, and maximise their long-term chances of survival,<sup>109</sup> and may include habitat restoration obligations. For example, the interim recovery plan for the critically endangered *Tumulus* (organic mound) springs of the Western Australia Swan Coastal Plain proposes to reverse the degraded status of the ecological community’s habitat and sustain its hydrological regimes by rehabilitating

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<sup>106</sup> See, eg, *Nature Conservation Act (Tas)* s 21(1), (4); *EPBC Act* s 350; cf *Legislation Act 2001 (ACT)* s 46, which provides that the ‘power to make a declaration includes the power to amend or repeal the declaration. The power to amend or repeal the declaration is exercisable in the same way, and subject to the same conditions, as the power to make the declaration.’

<sup>107</sup> For example, *EPBC Act* s 351 requires a comprehensive report prior to proclaiming a reserve, including an invitation for public comment, but for revocation, simply publication of a notice identifying the boundaries of the relevant Commonwealth reserve.

<sup>108</sup> The *EPBC Act* implements Australia’s obligations under, for example, the *Convention on the Conservation of Migratory Species of Wild Animals*, opened for signature 23 June 1979, 1651 UNTS 333 (entered into force 1 November 1983), and bi-lateral migratory bird conservation agreements such as the *Japan Australia Migratory Bird Agreement*, opened for signature 6 February 1974, [1981] ATS 6 (entered into force 30 April 1981).

<sup>109</sup> *EPBC Act* s 270.

'recharge catchment zones' and replanting adjacent areas with native wetland shrubs.<sup>110</sup>

Implementing recovery plans for species and ecological communities may contribute to restoring ecosystem services, particularly if the focal species or community plays a key role in service provision. Mangroves are a ubiquitous example because the keystone species forms mangrove forests that provide a host of ecosystem services such as food and fuel; supporting services such as fish nurseries and other aquatic habitat; and regulating services such as managing hazards from storm surges and sea level rise.<sup>111</sup> Promoting the recovery of protected mangrove forests will have clear restoration outcomes for the ecosystem services that those forests provide. However, as with other laws described above, ecosystem services that are restored through activities under a species or ecological community recovery plan will usually be an incidental (though desirable) outcome of those activities.

Recovery plans are a limited legal tool for restoration in general, let alone for restoring ecosystem services. Many threatened species and ecological communities are not keystone species like mangroves and implementing recovery plans for them will not restore broader ecosystem services. Recovery plans are also restricted to individual species or communities and not embedded in a broader, ecological context. However, their greatest weakness is that recovery plans are discretionary.<sup>112</sup> The Commonwealth Minister is not obliged to prepare recovery plans for threatened species and communities and less than half of nationally listed species and communities have a recovery plan.<sup>113</sup> Of those plans that do exist, many are out-of-date, under-funded and poorly implemented, and few impose any prescriptive measures to protect or restore habitat, let alone facilitate the restoration or recovery of ecosystem services to which those species and communities contribute.<sup>114</sup>

State legislation also provides for the protection of threatened species and ecological communities and their habitat. For example, the Tasmanian *Nature Conservation Act 2002* lists wetlands and *Sphagnum* peatlands as threatened native vegetation communities that the state Environment Minister can protect,

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<sup>110</sup> Western Australian Government, *Community of Tumulus (Organic Mound) Springs of the Swan Coastal Plain Interim Recovery Plan No 198* (2006) 12, 24, adopted in 2012 as the federal recovery plan under s 269A of the *EPBC Act*.

<sup>111</sup> Bell-James et al (n 11).

<sup>112</sup> *EPBC Act* s 269AA.

<sup>113</sup> Recovery plans are operationalised through a prohibition on the Minister taking any action that contravenes a recovery plan: *EPBC Act* s 268. See Australian Conservation Foundation (ACF), Birdlife Australia and Environmental Justice Australia, *Recovery Planning: Restoring Life to Our Threatened Species* (2015) 6, 8.

<sup>114</sup> ACF et al (n 113).

including on private land through conservation covenants with landowners.<sup>115</sup> The Tasmanian Act imposes financial penalties for breaching a conservation covenant by destroying, for example, a *Sphagnum* peatland, but does not require any form of ecological restoration, nor does it recognise connections between impacts on a peatland and flow-on impacts on the ecosystem services they provide, such as climate regulation, water filtration or nutrient cycling.<sup>116</sup>

The *Biodiversity Conservation Act 2016* (NSW) takes a broader approach, protecting (uniquely in Australia) climate refuges,<sup>117</sup> along with areas of ‘outstanding biodiversity value’ if, among other things, they make a significant contribution to the persistence of ecological processes or ecological integrity.<sup>118</sup> Both of these values protected under the NSW Act could readily encompass the protection of at least some wetland ecosystem services. The NSW Act does not recognise that potential role, though, and in practice it operates similarly to other state and territory conservation laws, imposing rehabilitation obligations for human-caused environmental damage<sup>119</sup> and penalties or ‘make good’ orders for harming, among other things, a declared area of outstanding biodiversity value.<sup>120</sup>

In the absence of specific guidance for implementation, or an ecosystem services framework into which species and habitat conservation could be embedded, the conservation laws described in this section offer very limited support for restoring and sustaining ecosystem services.

## D *Natural Resource Management Laws*

There are few obligations to protect or restore important wetland systems and their services outside of Australia’s conservation-specific legal frameworks. One important exception is the scheme for managing ‘environmental flows’ in the Murray–Darling Basin. The *Water Act 2007* (Cth) establishes the Murray–Darling Basin Authority and the Commonwealth Environmental Water Holder to manage flows in the Basin and regulate the balance between competing environmental, economic and social objectives for water use.<sup>121</sup> The *Water Act* includes an unusual

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<sup>115</sup> See *Nature Conservation Act 2002* (Tas) pt 5, sch 3A, although the extent to which conservation covenants are imposed on landowners to protect threatened native vegetation communities is unclear.

<sup>116</sup> *Nature Conservation Act 2002* (Tas) s 46.

<sup>117</sup> *Ibid* cl 3.2(2).

<sup>118</sup> *Biodiversity Conservation Act 2016* (NSW) cl 3.2(1).

<sup>119</sup> Although the Act relies heavily on a Biodiversity Offsetting scheme: *ibid* pt 6.

<sup>120</sup> *Ibid* cl 13.20(1).

<sup>121</sup> While these authorities were intended to improve the health of freshwater ecosystems in the Basin, they operate in a particularly politically charged context and have been limited in their capacity to

statutory object, to ‘protect, restore and provide for the *ecological values and ecosystem services* of the Murray–Darling Basin’,<sup>122</sup> emphasising ecological health and the services that the water resources of the Basin provide to humans. This focus probably reflects the complexity of the regulatory environment, which seeks to find an (as yet elusive) balance between environmental flows and industrial agriculture and human communities located along the full length of this transboundary water system. Nevertheless, the *Water Act* is an important example of statutory recognition of ecosystem services, seeking to protect ecosystem services as an environmental asset of the Murray–Darling Basin and a key indicator of the health of Basin water resources. It is disappointing that despite the promise of the objects in the *Water Act* and the powers granted to the Basin Authority and Environmental Water Holder, balancing social, economic and ecological outcomes has proven difficult and, in practice, the Murray–Darling Basin remains the site of many of the most-stressed freshwater ecosystems on the continent.

A small number of natural resource management laws support active restoration without a human-caused damage ‘trigger’, which creates opportunities for their use in restoring ecosystem services after climate-driven events such as wildfire. For example, the *Landscape South Australia Act 2019* (SA) (*‘Landscape Act’*) promotes restoration of ecological systems and processes that have been lost or degraded, through integrated management of natural resources at landscape scales. Landscapes are defined to include natural resources and features as well as the *‘human values and uses related to interaction with the environment’*.<sup>123</sup> The *Landscape Act* empowers the Minister to enter into management agreements with private landowners for, among other things, ‘the conservation ... enhancement, restoration or rehabilitation of any natural resources’.<sup>124</sup> While there is no explicit reference to ecosystem services, this legislation takes an unusually broad approach to natural resource management, recognising a range of *values and uses* for natural resources in South Australia. The *Landscape Act* relies on landowners to ‘opt in’ to its conservation and restoration goals, so there is no capacity to impose a consistent statutory definition of restoration that acknowledges the multiple ways that humans value and use the environment. The *Landscape Act* does, however, provide legal principles and tools

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achieve positive environmental outcomes. See Jamie Pittock and C Max Finlayson, ‘Australia’s Murray–Darling Basin: Freshwater Ecosystem Conservation Options in an Era of Climate Change’ (2011) 62(3) *Marine and Freshwater Research* 232.

<sup>122</sup> *Water Act 2007* (Cth) s 3(d)(ii) (emphasis added).

<sup>123</sup> *Landscape South Australia Act 2019* (SA) s 7(1)(emphasis added).

<sup>124</sup> *Landscape South Australia Act 2019* (SA) s 219(1)(a); see also *Conservation and Land Management Act 1984* (WA) s 33(1)(cc).

for incentivising restoration and an unusual capacity to direct restoration effort towards ecosystem services, as examples of both values and uses of the environment.<sup>125</sup>

Voluntary mechanisms such as Landcare and Coastcare are another potential tool for engaging and empowering communities to engage in ecosystem services-focused restoration. Involving local communities in planning and executing restoration projects is widely recognised as a fundamental principle for achieving ecological restoration.<sup>126</sup> Local volunteer organisations have the advantage of bringing together local expertise and connection to ecosystems that provide services to them, and fostering and sustaining commitment to their protection over the long-term. At present, Landcare and Coastcare restoration projects tend to have limited capacity, resourcing and expertise to undertake the kind of large-scale or complex restoration involved in restoring wetland ecosystem services, but could facilitate local community engagement in such projects in future.

Practical legal mechanisms to generate environmental gains, other than liability for environmental harm, are otherwise absent from Australian conservation laws.<sup>127</sup> Given the climate change projections and implications described in Part III above, it is noteworthy that most legal frameworks for conservation and restoration provide so little guidance about the role and value of ecosystem services provided by wetlands, and no guidance about the status of wetlands (and other valuable natural areas) that *cannot* be restored to previous functional states after extreme events such as wildfire.

## V LEGAL REFORM FOR RESTORING OR TRANSFORMING ECOSYSTEM SERVICES

There is growing evidence that wetland restoration projects can successfully restore wetland ecosystem services, but also that the task of restoring wetland functions and the services they provide to human communities is extremely

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<sup>125</sup> Eg, *Landscape South Australia Act 2019* (SA) 'State Landscape Strategy' in pt 3, 'Landscape Priorities Fund' in s 93, and 'action plans' issued under pt 7.

<sup>126</sup> Katharine Suding et al 'Committing to Ecological Restoration' (2015) 348(6235) *Science* 638; Finlayson et al (n 6); Kyle Blount and Adrienne Kroepsch, 'Improving the Resilience of Water Resources after Wildfire through Collaborative Watershed Management: A Case Study from Colorado' (2019) 3(1) *Case Studies in the Environment* 1.

<sup>127</sup> Cf the Canadian *National Parks Act* (SC 2000, c32) s 8(2), which provides that 'the maintenance or restoration of *ecological integrity* ... shall be the first priority of the Minister administering the Act', as referenced in Australian Panel of Experts in Environmental Law, *The Foundations of Environmental Law Technical Paper 1: Goals, Objects, Principles and Norms* (APEEL, 2017) 40.

challenging. Nevertheless, existing conservation laws could, if fully implemented, improve the adaptive capacity of wetland systems and the services they provide, to changing wildfire regimes. Important strategies in existing laws include environmental flow regimes to supplement water arriving in wetlands in dry periods, and invasive species eradication that can, among other benefits, reduce the exposure of wetlands to non-native vegetation that exacerbates wildfire.<sup>128</sup> New approaches to implementing existing laws could also improve their effectiveness by, for example, prioritising critical habitat declarations for wetlands unharmed by fire, and protecting wetland ecosystems in new reserves that offer fire refuges and climate refugia.<sup>129</sup> Existing environmental laws have failed to arrest environmental decline in Australia, due in large part to serious shortfalls in funding, implementation, monitoring and enforcement,<sup>130</sup> and climate change is emerging as a far more complex threat for which existing laws are generally unprepared.<sup>131</sup> It is in this context that the effect of wildfires on wetlands demands that we engage in a difficult conversation about how to choose between different goals and objectives for natural areas. In addition to rigorously implementing and enforcing existing laws, this Part proposes that legal objects and substantive and procedural legal frameworks will require reform to accommodate the certainty of transformational change and ecological loss.<sup>132</sup>

### *A Practical Challenges for Restoring Wetland Ecosystem Services*

There is growing evidence from around the world that wetland restoration projects can produce positive results, including successfully restoring ecosystem

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<sup>128</sup> See, eg, Jenny Davis et al, *Climate Change Adaptation Guidelines for Arid Zone Aquatic Ecosystems and Freshwater Biodiversity* (National Climate Change Adaptation Research Facility, 2013) 22; Kristin Zouhar et al, *Wildland Fire in Ecosystems: Fire and Nonnative Invasive Plants* (US Department of Agriculture, 2008).

<sup>129</sup> James A Fitzsimons, 'Urgent Need to Use and Reform Critical Habitat Listing in Australian Legislation in Response to the Extensive 2019–2020 Bushfires' (2020) 37(2) *Environmental and Planning Law Journal* 143.

<sup>130</sup> Australian National Audit Office, *Referrals, Assessments and Approvals of Controlled Actions under the Environment Protection and Biodiversity Conservation Act 1999, Auditor-General Report No 47* (Report, 2020). For underfunding in Australia, see James E Watson et al, 'The Performance and Potential of Protected Areas' (2014) 515(7525) *Nature* 67, 69.

<sup>131</sup> See, generally, the work of the Australian Panel of Experts on Environmental Law <<http://apeel.org.au/>>.

<sup>132</sup> Saffron J O'Neill and John Handmer 'Responding to Bushfire Risk: The Need for Transformative Adaptation' (2012) 7(1) *Environmental Research Letters* 014018.

services.<sup>133</sup> For example, when bird species returned to restored Bangladeshi wetlands, they improved the economic benefits of ecotourism and fisheries;<sup>134</sup> and a wetland restoration in the Napa River Basin in California reduced both flood risk and damage, and improved water quality, property values, wildlife habitat and tourism in the region.<sup>135</sup>

However, restoring ecosystem services faces serious practical hurdles, particularly in the context of climate change. The most fundamental hurdle, which is widely recognised in scientific and legal scholarship, is defining what climate change will mean for an ecosystem services restoration project to succeed.<sup>136</sup> That is, against what historical and ecological baseline conditions should restored services be measured? Should success be based on actions — such as replanting a full suite of a wetland's native vegetation communities or ensuring inundation in a particular year — or should it depend on outcomes, such as ecological processes occurring without human intervention and, in fact, providing services to human and ecological communities?<sup>137</sup> In some cases, efforts to restore wetland ecosystem services for climate adaptation, including to support human adaptive capacity, will achieve neither the ecosystem services goal nor ecological restoration outcomes.<sup>138</sup> Changed rainfall patterns and reduced river flows, warmer temperatures and more frequent extreme events may all undermine the possibility of 'returning' a wetland to a past state, and in some cases may make it difficult to restore a 'wetland' at all.

Other practical challenges include the complexity of interactions between the ecological components of a system and the diversity of ecological, legal, social and economic inputs, many of which cannot be controlled.<sup>139</sup> It may also take a long time for a restored wetland to provide, for example, habitat conditions suitable for water birds, and for those water birds to actually return, if they ever

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<sup>133</sup> Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 'Chapter 2.2: Status and Trends – Nature' in Díaz et al (n 8) 90; Vanessa Reis et al, 'A Global Assessment of Inland Wetland Conservation Status' (2017) 67(6) *BioScience* 523.

<sup>134</sup> Reis et al (n 133).

<sup>135</sup> Ibid.

<sup>136</sup> See, eg, Suding et al (n 126); R Keller Kopf et al, 'Anthropocene Baselines: Assessing Change and Managing Biodiversity in Human-Dominated Aquatic Ecosystems' (2015) 65(8) *Bioscience* 798.

<sup>137</sup> On the importance of a clear and effective definition of ecological restoration in law and policy to 'support ecosystems and the people that depend on them' see, eg, Margaret A Palmer and JB Ruhl, 'Aligning Restoration Science and the Law to Sustain Ecological Infrastructure for the Future' (2015) 13(9) *Frontiers in Ecology and the Environment* 512.

<sup>138</sup> Suding et al (n 126) and references therein; on the difference between ecological and other forms of restoration in law, policy and practice, see Afshin Akhtar-Khavari and Benjamin J Richardson (eds), *Ecological Restoration Law: Concepts and Case Studies* (Routledge, 2019).

<sup>139</sup> See, generally, Society for Ecological Restoration Australasia, *National Standards for the Practice of Ecological Restoration in Australia* (2<sup>nd</sup> ed, 2017).

do. Both ecological complexity and time lags may mean that human intervention such as weeding or artificial watering will need to be sustained over long timeframes, or indefinitely, and even with ongoing active intervention, restoration of some wetland ecosystem services may face diminishing odds of long-term success.

## B *Legal Objects and Goals Must Anticipate Change*

In Australia, as is the case elsewhere, conservation laws are often framed by ‘preservation-oriented’ goals, and underpinned by broad legal presumptions about nature remaining essentially unchanging over time.<sup>140</sup> There is widespread recognition that climate change raises significant challenges for these goals and presumptions, and that they must be reformed.<sup>141</sup> There is, however, no consensus about the precise form that new legal goals should take.

Conservation scholarship has highlighted the need to shift the focus of these laws, policies and management practices as the climate changes, from ‘preventing change to managing inevitable change’.<sup>142</sup> The *Biodiversity Conservation Act 2016* (NSW) is the first Australian conservation law to engage with that task to some degree, with an objects clause that specifically mentions climate change and its significance for conservation.<sup>143</sup> However, no Australian conservation law currently anticipates the growing need to recognise value in novel ecological functions and the new combinations of ecosystem services that they may provide. Similarly, legal protection for mixed native and non-native species assemblages or engineered forms of habitat are limited.<sup>144</sup> As a result,

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<sup>140</sup> For a review of Australian conservation laws, see Phillipa C McCormack, ‘The Legislative Challenge of Facilitating Climate Change Adaptation for Biodiversity’ (2018) 92(7) *Australian Law Journal* 546. See also Arie Trouwborst, ‘International Nature Conservation Law and the Adaptation of Biodiversity to Climate Change’ (2009) 21(3) *Journal of Environmental Law* 419; Robin Kundis Craig, ‘“Stationarity is dead” — Long Live Transformation: Five Principles for Climate Change Adaptation Law’ (2010) 34(1) *Harvard Environmental Law Review* 9.

<sup>141</sup> McCormack (n 140); Michael Dunlop et al, *Climate-Ready Conservation Objectives: A Scoping Study* (National Climate Change Adaptation Research Facility, 2013); Reisinger et al (n 25) 1391.

<sup>142</sup> Dunlop et al (n 141); McCormack (n 140).

<sup>143</sup> *Biodiversity Conservation Act 2016* (NSW) cl 1.3(b), (d). This Act was the subject of a series of detailed issues papers and government consultation, including on the issue of climate change. See New South Wales Office of Environment and Heritage, *Biodiversity Legislation Review: Submissions Report* (Report, 2014) 6–11.

<sup>144</sup> Though they may find some protection in local government and private conservation initiatives, which are less strictly bound by definitions of ‘nativeness’ and ‘naturalness’. See, eg, the treatment of local biodiversity in Government Architect NSW, *Greener Places: An Urban Green Infrastructure Design Framework* (Draft 2020) <<https://www.governmentarchitect.nsw.gov.au/policies/greener-places>>.

there is limited capacity to develop clear restoration guidelines that include a focus on ecosystem services as environmental conditions change. The same is true for interventions that might facilitate more rapid ecosystem transformation, either to circumvent a less-desirable but highly likely future change or, for example, to engineer conditions to provide specific ecosystem services, such as habitat for species that have lost the entirety of their natural habitat in a fire.<sup>145</sup>

In reforming statutory objects clauses, governments should also provide guidance about how to balance competing objects.<sup>146</sup> For example, maintaining the ‘naturalness’ of an ecosystem may need to give way to active intervention such as earthworks and artificial watering to sustain threatened wetland ecosystem services such as water purification for a city’s water supply. Similarly, protecting a threatened species in the wild may need to give way, if it loses *all* of its habitat in repeated wildfires, to a greater emphasis on conserving the species in a new location, where climatically suitable habitat exists or can be created. Climate change will also exacerbate conflicts between objects in different statutes, such as conserving native vegetation while also managing flammable vegetation and fuel loads under planning instruments.<sup>147</sup> These kinds of conflicts will need to be managed to avoid degrading or losing ecosystem services *in anticipation of fire*, as well as during fire events themselves.

### C *New Legal Mechanisms Will Be Required*

Climate change will transform many wetland ecosystems, regardless of whether Australia’s legal frameworks are prepared or equipped for that outcome. In coming decades, some wetlands will be lost, others will change, and some may be sustained through active forms of intervention. As in any environmental management context, effective restoration will depend on clear goals and measures of success.<sup>148</sup> An issue that deserves much closer attention, then, is whether the primary goal of wetland restoration ought to be an ecological goal — ie to restore adaptive, resilient wetland ecosystems — or whether, as human communities are also forced to adapt to climate change, the primary goal for wetland restoration ought to be creating and sustaining ecosystem services that

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<sup>145</sup> For a discussion about restoration, recovery and redefinition in marine areas: Melinda Ann Coleman et al, ‘Restore or Redefine: Future Trajectories for Restoration’ (2020) 7 *Frontiers in Marine Science* 237.

<sup>146</sup> McCormack (n 140).

<sup>147</sup> See, eg, Victoria’s Wildfire Management Overlay, discussed in Reisinger et al (n 25) 1408.

<sup>148</sup> Karel Prach et al, ‘A Primer on Choosing Goals and Indicators to Evaluate Ecological Restoration Success’ (2019) 27(5) *Restoration Ecology* 917; Jeffrey D Parrish et al, ‘Are We Conserving What We Say We Are? Measuring Ecological Integrity Within Protected Areas’ (2003) 53(9) *BioScience* 851.

benefit humans and facilitate human adaptation. In some cases, we may be able to chart a middle path, prioritising the restoration of functional ecosystems that also provide ecosystem services to human communities.<sup>149</sup> In other cases, decision-makers will be forced to choose between ecological and anthropocentric restoration goals. The remainder of this paper argues that decision-makers will need clearer statutory and policy guidance to make those decisions, and to balance trade-offs in ecological and human wellbeing.

The clearest opportunities for promoting both biodiversity and human adaptation through wetland restoration arise in the context of climate mitigation and negative emissions strategies. Wetlands will be less sensitive and vulnerable to changing wildfire regimes if the global community — including the Australian government — adopts and implements strong climate mitigation targets. Wetland restoration can contribute to climate mitigation targets through carbon trading schemes and especially blue-carbon abatement methodologies.<sup>150</sup> Restoration in this context can focus on facilitating wetland adaptation and conservation because restored, and constructed, wetlands can provide services such as carbon sequestration and climate mitigation while also providing biodiversity habitat and other provisioning and supporting ecosystem services.<sup>151</sup> Wetland restoration can also contribute to negative emissions strategies by drawing carbon from the atmosphere and sequestering it in natural wetland carbon sinks.<sup>152</sup>

Another context in which biodiversity and human adaptation needs may be mutually served through wetland restoration is in restoring ecosystem services outside of Ramsar sites and other protected areas. Bioregional and integrated catchment management planning tools in Commonwealth and state legislation<sup>153</sup>

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<sup>149</sup> Matthew J Colloff et al, 'Adaptation Services of Floodplains and Wetlands under Transformational Climate Change' (2016) 26(4) *Ecological Applications* 1003. On the issue of co-benefits in restoration or 'renewal', see David MJS Bowman et al, 'Renewal Ecology: Conservation for the Anthropocene' (2017) 25(5) *Restoration Ecology* 674.

<sup>150</sup> Australian Government Department of the Environment and Energy, *Wetlands Australia 31: Australian Government Initiatives for Blue Carbon*, <<https://www.environment.gov.au/water/wetlands/publications/wetlands-australia/national-wetlands-update-february-2019/govt-initiatives-blue-carbon>>; Karita Negandhi et al, 'Blue Carbon Potential of Coastal Wetland Restoration Varies with Inundation and Rainfall' (2019) 9 *Scientific Reports* 4368.

<sup>151</sup> Serrano et al (n 16).

<sup>152</sup> Negative emissions strategies seek to remove greenhouse gases from the atmosphere to reduce emissions to below zero. See, eg, Lisamarie Windham-Myers et al, 'Potential for Negative Emissions of Greenhouse Gases (CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O) through Coastal Peatland Re-Establishment: Novel Insights from High Frequency Flux Data at Meter and Kilometer Scales' (2018) 13(4) *Environmental Research Letters* 045005.

<sup>153</sup> See, eg, *EPBC Act* pt 12 (bioregional planning); *Catchment and Land Protection Act 1994* (Vic) s 27 (catchment plans).

suffer from limited implementation but, if appropriately resourced and implemented, could be used to recognise the significance of well-connected tributaries and catchments for wetland ecosystems and improve the provision of ecosystem services from a broader range of waterways and wetlands.<sup>154</sup> Adaptation-oriented catchment-scale management could empower managing authorities to prioritise wetland ecosystem services that are poorly managed under existing, often-siloed regulatory schemes. Services such as climate, water and natural hazard regulation, connectivity for freshwater biodiversity, and spiritual and cultural services such as traditional knowledge and burning practices in wetland ecosystems,<sup>155</sup> could be prioritised more effectively alongside economic water uses such as agricultural offtakes.<sup>156</sup> Funding limitations for restoration activities within and beyond the protected area estate could be alleviated by support for investment in green bonds to restore wetland ecosystem services, capitalising on institutional investors' growing interest in 'greening' investment portfolios and creating desperately needed new sources of funding for ambitious, adaptation-oriented restoration.<sup>157</sup>

In some circumstances, biodiversity adaptation may need to be prioritised over restoring ecosystem services for human benefit. For example, restoring wetlands to provide climate refugia to vulnerable species and ecological communities will become an increasingly urgent strategy for reducing climate-driven species extinctions, including in the context of fire-sensitive and vulnerable wetland communities.<sup>158</sup> Refugia provide 'transitional havens' to buy time for species and ecological communities to adapt as the climate changes.<sup>159</sup> The US Forest Service has recognised this need, incorporating climate refugia projections into its restoration planning for areas that were affected by the 2014

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<sup>154</sup> Freshwater connectivity and dispersal patterns are critical factors, including in allowing species to access refugia and recolonise unburned areas after extreme events such as wildfire, James et al (n 17).

<sup>155</sup> McGregor et al (n 44).

<sup>156</sup> Sustainability objectives that might otherwise have promoted regulating, supporting and cultural services under the *Water Act 2007* (Cth) have been undermined by political imperatives; but see Ministry for the Environment (New Zealand Aotearoa), *National Policy Statement for Freshwater Management 2020* (2020), which prioritises health and wellbeing of freshwater ecosystems over essential human needs and social, economic and cultural wellbeing (cl 2.1), and mandates restoration and improvement of degraded water bodies, including outside protected areas (cl 3.22(4)), to ensure ecosystem services can be sustained over the long term.

<sup>157</sup> Emma Herd, 'Institutional Investors Increasingly Taking Their Own Climate Action', *The Age* (online, 14 January 2020) <<https://www.smh.com.au/business/the-economy/institutional-investors-increasingly-taking-their-own-climate-action-20200114-p53raz.html>>.

<sup>158</sup> On the urgent need to identify and protect climate refugia generally, see Reside et al (n 18); Morelli et al (n 18).

<sup>159</sup> Morelli et al, 'Climate Change Refugia: Biodiversity in the Slow Lane' (2020) 18(5) *Frontiers in Ecology and the Environment* 228.

'King Fire' in California.<sup>160</sup> Protecting refugia will require strong legal instruments that effectively exclude human development from wetland refugia, incentives for public and private restoration efforts that restore or create refugial values,<sup>161</sup> and legal mandates for restoring wetland habitats after extreme events such as fire.

In some cases, rigorously managed, adaptation-oriented offsets may be needed to conserve healthy refugia by allowing heavily damaged conservation areas to be converted to other uses. For example, where wetland ecosystem services are suddenly lost (eg to wildfire) or transformed over time (eg by drying and warming trends) and *cannot* be restored to a functioning state, it may be preferable to 'swap' such areas for newly protected, healthy wetlands that can provide refuge from future fires or other critical habitat.<sup>162</sup> Rules for wetland offsets would need to be designed to achieve real offsets, with strong penalties and other enforcement tools for failing to achieve or maintain offset values. Offsetting should be a tool of absolute last resort — unavailable in respect of healthy wetland ecosystems — and lessons must be learned from the demonstrable failings of biodiversity offsetting laws, including failures in the mitigation hierarchy and the absence of climate considerations in offsetting calculations.<sup>163</sup>

There is a great deal of work to be done in developing legitimate and rigorous priorities for wetland restoration, and the work will need diverse input, including from sociological, ecological, Traditional Owner, bioengineering and legal perspectives. In the meantime, and regardless of what priorities are ultimately set, there is an urgent need to improve procedural aspects of decision-making to better meet the challenges of climate change.

Procedural guidance will be crucial for enhancing the legitimacy and accountability of complex and controversial decisions about whether and when to intervene to restore ecosystem services. In particular, decision-makers will

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<sup>160</sup> James H Thorne et al, 'Vegetation Refugia Can Inform Climate-Adaptive Land Management under Global Warming' (2020) 18(5) *Frontiers in Ecology and the Environment* 281.

<sup>161</sup> Joseph L Ebersole et al, 'Managing Climate Refugia for Freshwater Fishes under an Expanding Human Footprint' (2020) 18(5) *Frontiers in Ecology and the Environment* 271, describing United States state and federal government efforts to integrate characteristics such as streamflow and water temperature to identify and evaluate potential climate-change refugia. See also Thorne et al (n 160).

<sup>162</sup> See, eg, Nicholas Whipps, 'What Happens When Species Move but Reserves Do Not? Creating Climate-Adaptive Solutions to Climate Change' (2015) 66(2) *Hastings Law Journal* 557.

<sup>163</sup> Martine Maron et al, 'Faustian Bargains? Restoration Realities in the Context of Biodiversity Offset Policies' (2012) 155 *Biological Conservation* 141; Jan McDonald, Phillipa C McCormack and Anita Foerster, 'Promoting Resilience to Climate Change in Australian Conservation Law: The Case of Biodiversity Offsets' (2016) 39(4) *University of New South Wales Law Journal* 1612; *Decision of the COP in Its Eighth Meeting, Held in Valencia from 18–26 November 2002 — Principles and Guidelines for Wetland Restoration*, Resolution VIII.16 (26 November 2002) ('Resolution VIII.16').

require support in resolving trade-offs and selecting between allowing an ecosystem to gradually (or rapidly) transform, actively intervening to maintain historically-referenced ecosystem services or, in some cases, facilitating a transition to a more- rather than less-desirable ecosystem state.<sup>164</sup>

Legal frameworks will also need to embed, and resource, adaptive management approaches, maximising opportunities to learn from both ‘success’ and ‘failure’ in restoring wetland ecosystem services. Restoration projects ‘break new ground in the understanding of ecosystem processes’ and are almost always experimental in nature.<sup>165</sup> As such, revising project goals, performance standards and remedial actions should be considered a necessary part of every restoration project.<sup>166</sup> New information from strategic and long-term water quality monitoring, revised climate projections and fire events in the landscape must be consistently integrated into cyclical decision-making processes.<sup>167</sup> Adaptive management is often poorly implemented through legal instruments,<sup>168</sup> with impediments including a lack of agency commitment, prohibitive costs, and limitations on learning in highly complex management contexts, where climate and fire regimes interact in sudden and irreversible ways on multiple components of biodiversity.<sup>169</sup> Tools for supporting learning in this environment already exist, and include mandating and enforcing regular review periods for management plans and actions, sunset clauses for regulations and recovery plans, and obligations — on both public and private wetland managers — to report restoration outcomes to publicly accessible databases.<sup>170</sup>

## VI CONCLUSION

The increasing occurrence of fire in areas that are traditionally not fire-prone creates new challenges for both conservation and wildfire governance. Changing fire regimes create the need for new trade-offs and more effective guidance in contexts of transformation. Choosing whether, when and how to restore

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<sup>164</sup> Colloff et al (n 149) especially Table 1.

<sup>165</sup> Resolution VIII.16 (n 163) [32].

<sup>166</sup> Ibid.

<sup>167</sup> Ibid; McInerney et al (n 59).

<sup>168</sup> Jan McDonald and Megan C Styles, ‘Legal Strategies for Adaptive Management under Climate Change’ (2014) 26(1) *Journal of Environmental Law* 25.

<sup>169</sup> Don A Driscoll et al, ‘Fire Management for Biodiversity Conservation: Key Research Questions and Our Capacity to Answer Them’ (2010) 143(9) *Biological Conservation* 1928.

<sup>170</sup> See, eg, Daniel A DeCaro, ‘Legal and Institutional Foundations of Adaptive Environmental Governance’ (2017) 22(1) *Ecology and Society* 32; Annette Stewart et al, *Open Standards for the Practice of Conservation* (nd) <<https://cmp-openstandards.org/cs-examples/case-studies/>>; Ramsar Secretariat, *Case Studies* <[http://ramsar.org/strp\\_rest\\_index.htm](http://ramsar.org/strp_rest_index.htm)>.

ecosystem services that have been lost in wildfires will also require new legal and technical approaches, from more active engagement with novel assemblages to new forms of procedural and accountability tools.

The Macquarie Marshes is a wetland that has already lost some of the ecosystem services that it historically provided, and it is under increasing threat from changing fire regimes.<sup>171</sup> Heavy rainfall and mild summers may help to revive some of the affected reed beds and support the recovery of the marshes in the short term, but climate projections for the region indicate ongoing warming and drying trends, with more frequent, severe fire weather. These projections are replicated across south east Australia, which serves to emphasise the importance of this snapshot of the impact of fire on the Macquarie Marshes — and its increasingly threatened ecosystem services — and the broader significance of the questions it raises for conservation laws that focus on preservation, maintenance and stability.

This article does not suggest that we ‘give up’ on the marshes just yet, nor on other vulnerable wetland ecosystems across the continent. Rather, it proposes that we sharpen our attention on the rapid ecological and climatic changes affecting vulnerable and sensitive wetland ecosystem services. This article demonstrates that, while we must increase our commitment to reducing existing pressures on these systems, particularly in the short term, we must also begin a conversation about what to do when wetland ecosystems are irreversibly transformed so that decision-makers are equipped to respond to the very substantial ecological losses projected as a result of climate change.

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<sup>171</sup> NSW OEH (n 62).



# LAW, RESTORATION AND ONTOLOGIES FOR A MORE ECOLOGICALLY COMPLEX WORLD!

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*Restoration efforts can target very different outcomes. Simply put, restoration is a process, and diverse values and ontological dispositions can shape the why, what and how questions about what people do. Restorative inputs focused on adaptively adding complexity into an ecosystem commits to values that go beyond rehabilitating and just removing threats and harms that are disturbing an ecosystem. Restoring within a landscape to enhance its ecological complexity is a useful goal for adaptive governance, and one which will also enable discussions about how humans and legal and governance institutions can change and respond to managing the environment. Using two scenarios we briefly explore how governance approaches to restoration need ontological dispositions focused on ecological complexity. In particular, we argue in this article that a focus on inputs into ecological complexity creates not only opportunities for overall net gain, but also, and more critically, that it requires legal and governance changes that establish parameters for how the vision will be realised. We explore and briefly discuss four of these institutional challenges to chart further research trajectories for how restorative inputs into ecological complexity can be achieved.*

## I INTRODUCTION

In a recent review of the signature conservation legislation in Australia, the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), *The Independent Review of the Environment Protection and Biodiversity Conservation Act 1999* ('Interim Report') identified the thin governance framework around restoration as a major reason for the Act not having achieved its goals.<sup>1</sup> The report then went on to identify restoration as a necessary complement to protection and conservation strategies in order to 'enable future development to be

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<sup>1</sup> See Australian Government, *The Independent Review of the Environment Protection and Biodiversity Conservation Act 1999* (2020) ch 1 <<https://epbactreview.environment.gov.au/>> ('Interim Report')

sustainable'.<sup>2</sup> It defined restoration as improving 'the condition of the environment to a state that is required to be sustainable in the long-term, or a state that is desirable'.<sup>3</sup> This definition was set against an alternative, which the report identified as 'a blanket ambition for a return to a particular historic environmental condition'.<sup>4</sup> From this starting point, the Interim Report suggested, rather simply, that offset schemes need to be reimagined to achieve restoration.

This is a good start, given that the Interim Report was clear about the ineffectiveness of offset schemes to actually 'offset the impact of development', but it appears to reinforce a narrow approach that is usually taken to adapting and responding to damage, disturbance and degradation. While the report rejects 'historical' baselines as a measure of complexity, there is little to suggest that the changes envisioned will aim at anything beyond remediating and rehabilitating the environment so that ecosystems can sustain themselves without human input. While this review of a crucial piece of Australian legislation continues to put the attention on restoration, it also continues to situate restoration as part of a reactive strategy to manage the natural environment, once it has been damaged to a point that it matters to human beings.<sup>5</sup> The Interim Report went as far as suggesting that offsets in Australia need to contribute to restoring new areas, but it stopped short of pushing for deeper ecological gains that required developers to contribute to genuine gain in native ecosystems and higher levels of complexity in those systems. Given that restoration can support a range of values and ethical dispositions, there is always the risk that restoration will not get articulated as managing disturbances to recover complexity, but rather to achieve a 'desirable' future landscape.

This article seeks to describe an alternative approach to restoration governance and regulation, so as to draw attention to the value of transforming the normative and ontological foundations of environmental law. A burgeoning practice in governing restoration activities is adaptively and reflexively doing the work over a period of time. Responses to damage and degradation, and also offsets that seek to genuinely restore a site, require the use of long-term adaptive approaches in order to ensure successful restoration outcomes, particularly at the landscape scale.<sup>6</sup> In this article we discuss how governance for ecological

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<sup>2</sup> Ibid 13.

<sup>3</sup> See *ibid* 86, Box 21.

<sup>4</sup> *Ibid*.

<sup>5</sup> The United Nations has declared 2021–2030 the Decade for Restoration, bringing further attention to this subject. For more information, see <<https://www.decadeonrestoration.org>>.

<sup>6</sup> James Aronson, João S Pereira and Juli G Pausas (eds), *Cork Oak Woodlands on the Edge: Ecology, Adaptive Management, and Restoration* (Island Press, 2009); Standards Reference Group SERA,

restoration needs a strong value base in addition to adaptive and reflexive processes, and we propose the term ‘restorative inputs’ to describe the aim of building complexity through restoration as a normative goal. This approach is ultimately a surer way of ensuring long-term ecological gain. Transactional arrangements that typically exist for net-gain instruments like offsets do not always focus on restorative inputs that build complexity, as this is expensive and can take a long time to deliver.

In Parts II and III we explore how discussions of complexity can usefully inform environmental law approaches to restoration, by first pointing to its ontological frailties and problems, and practically by focusing attention on the benefits that adaptive governance brings to managing restoration processes. In Part IV we draw on two short governance scenarios within Australia to illustrate these points. In Parts V and VI we explore and discuss how ‘restorative inputs’ can complicate, but usefully add to, adaptive governance frameworks, and conclude by outlining governance frameworks required for an approach that seeks to add complexity to systems. While the focus on restorative inputs that add complexity to a system has already been discussed elsewhere,<sup>7</sup> this article brings together discussions of the institutional and governance significance and potential of these ideas, and critiques and frames important environmental law responses going into the future.

## II THE ONTOLOGICAL PARADOX OF ENVIRONMENTAL LAW

It is through the instruments of law and governance that decisions are made informing land management and landscape function, as well as species conservation, ecosystem management and processes, influencing intergenerational landscapes and responses to environmental damage. Our current environmental law and governance systems are, however, failing to prevent and remediate the ecological degradation that distinguishes the

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*National Standards for the Practice of Ecological Restoration in Australia* (Society for Ecological Restoration Australasia, 2017); Robert J Cabin, ‘Science-Driven Restoration: A Square Grid on a Round Earth?’ (2007) 15(1) *Restoration Ecology* 1; Ian Hodge and William M Adams, ‘Short-Term Projects versus Adaptive Governance’ (2016) 5(4) *Land* 1; Mita Nagarkar and Karsten Raulund-Rasmussen, ‘An Appraisal of Adaptive Management Planning and Implementation in Ecological Restoration: Case Studies from the San Francisco Bay Delta, USA’ (2016) 21(2) *Ecology and Society* 43; Charles Simenstad, Denise Reed and Mark Ford, ‘When Is Restoration Not?’ (2006) 26(1) *Ecological Engineering* 27.

<sup>7</sup> Afshin Akhtar-Khavari, ‘Restoration and Cooperation for Flourishing Socio-Ecological Landscapes’ (2020) 11(1–2) *Transnational Legal Theory* 62.

Anthropocene era.<sup>8</sup> Traditional notions of environmental governance struggle to adequately capture the complex relations between global transformations of social and natural systems,<sup>9</sup> and tend to approach environmental management in a predominantly efficiency-driven, transactional, command-and-control way, prioritising front-end processes to predict and assess environmental harm in a balancing act with economic growth, national interests and social stability.<sup>10</sup> Along with the legal illusion of control and stability that remains prominent in international and national norms,<sup>11</sup> environmental governance continues a single-trait, maximum-sustained yield paradigm that is top-down, bureaucratic and efficiency-driven, aiming to produce goods and services in a predictable manner.<sup>12</sup> This assumes that the environment is bounded and problems can be solved through linear cause-and-effect frameworks that either control the processes leading to the problem or ameliorating the problem after it occurs.<sup>13</sup> This governance approach, by which we mean a system where collective goals are identified and decisions and actions are undertaken to achieve these collective goals, linking the social and the ecological,<sup>14</sup> advances principles such as sustainable development and ‘polluter-pay’. Such principles are well-suited to managing bounded environmental problems, such as point-source pollution, and maintaining the status quo by protecting private property, national statehood, risk and liability management, and fostering predictability and stability, but ill-suited to governing the omnipresent, uncertain and pervasive ‘thing’ that is ‘the environment’.<sup>15</sup>

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<sup>8</sup> Louis Kotzé, *Environmental Law and Governance for the Anthropocene* (Hart Publishing, 2017); Nicholas A Robinson, ‘Fundamental Principles of Law for the Anthropocene?’ (2014) 44(13) *Environmental Policy and Law* 15; Anna Grear and Evadne Grant (eds), *Thought, Law, Rights and Action in the Age of Environmental Crisis* (Edward Elgar Publishing, 2015).

<sup>9</sup> Frank Biermann, et al. ‘Transforming Governance and Institutions for Global Sustainability: Key Insights from the Earth System Governance Project’ (2012) 4(1) *Current Opinion in Environmental Sustainability*, 51.

<sup>10</sup> Andreas Philippopoulos-Mihalopoulos, ‘Towards a Critical Environmental Law’ in Andreas Philippopoulos-Mihalopoulos (ed), *Law and Ecology: New Environmental Foundations* (Routledge, 2011) 18; JB Ruhl, ‘Panarchy and the Law’ (2012) 17(3) *Ecology and Society* 31.

<sup>11</sup> Philippopoulos-Mihalopoulos (n 11).

<sup>12</sup> Brian C Chaffin, Hannah Gosnell and Barbara Cosens, ‘A Decade of Adaptive Governance Scholarship: Synthesis and Future Directions’ (2014) 19(3) *Ecology and Society* 56; CS Holling and Gary K Meffe, ‘Command and Control and the Pathology of Natural Resource Management’ (1996) 10(2) *Conservation Biology* 328; Ahjond S Garmestani and Melinda Harm Benson, ‘A Framework for Resilience-Based Governance of Social-Ecological Systems’ (2013) 18(1) *Ecology and Society* 9.

<sup>13</sup> Holling and Meffe (n 12).

<sup>14</sup> Chaffin, Gosnell and Cosens (n 12).

<sup>15</sup> Luigi Pellizzoni, ‘Responsibility and Environmental Governance’ (2004) 13(3) *Environmental Politics* 541.

Environmental law is deeply informed by both the tradition of legal positivism and positivist interpretations of environmental realities continuing a particular ontological framing.<sup>16</sup> Environmental law continues to reinforce a constructed dichotomy between the sphere of the *anthropos* and that of the natural world. The former is viewed as operating above or outside the functions of the latter. Nature, in environmental law, is abstracted and sheared from social context (both human and more-than), becoming passive or non-agentive and, therefore, *res nullius*: a resource empty of meaning and purpose and available for annexation. It is this dichotomy that forms Western environmental law's ontological canon.<sup>17</sup>

While conceptualisations of 'the environment' have largely arisen through the application of an epistemology that necessitates and privileges technical scientific knowledge and a belief in control, the rise of an ecological narrative, in which humans are recognised as a part of the environment which itself has myriad forms of agency, culture and history, with complex interactions and relationships between subjects, has begun to challenge the operation of environmental law. This 'new ecology', emerging from systems-science perspectives, accepts that natural systems operate far from equilibrium and assumes the possibility of uncertainty, instability and variability in natural systems.<sup>18</sup> McMichael argues that this systems approach of ecological science

embraces the complex interplay between animate and inanimate components; it studies dynamic, non-equilibrium and non-linear processes ... To an ecologist the world is neither deterministic nor randomly unpredictable; rather, it is a world of contingent probabilities within mutually adapted, self-ordering systems.<sup>19</sup>

Socio-ecological systems — that is, the bio-geophysical ecological unit and associated social actors and institutions — have been characterised as complex

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<sup>16</sup> Nicole Graham, Margaret Davies and Lee Godden, 'Broadening Law's Context: Materiality in Socio-Legal Research' (2017) 26(4) *Griffith Law Review* 480.

<sup>17</sup> Anna Grear, "'Anthropocene, Capitalocene, Chthulucene': Re-encountering Environmental Law and its "Subject" with Haraway and New Materialism' in Louis Kotzé (ed), *Environmental Law and Governance for the Anthropocene* (Hart, 2017) 77; Louis Kotzé and Duncan French, 'The Anthropocentric Ontology of International Environmental Law and the Sustainable Development Goals: Towards an Ecocentric Rule of Law in the Anthropocene' (2018) 7(1) *Global Journal of Comparative Law* 5; Saskia Vermeulen, 'Materiality and the Ontological Turn in the Anthropocene: Establishing a Dialogue Between Law, Anthropology and Eco-Philosophy', in Louis Kotzé (ed), *Environmental Law and Governance for the Anthropocene* (Hart, 2017).

<sup>18</sup> Lee Godden and Jacqueline Peel, *Environmental Law: Scientific, Policy and Regulatory Dimensions* (Oxford University Press Australia & New Zealand, 2010); William L Steffen et al, *Global Change and the Earth System: A Planet Under Pressure* (Springer-Verlag, 2005).

<sup>19</sup> Tony McMichael, *Human Frontiers, Environments, and Disease: Past Patterns, Uncertain Futures* (Cambridge University Press, 2001) 21–22.

adaptive systems ('CAS').<sup>20</sup> This means that the characteristics of such systems cannot be captured using a single perspective,<sup>21</sup> but are instead a set of components 'interconnected in such a way that [they] produce their own pattern of behaviour over time'.<sup>22</sup> Mitchell defines a CAS as 'a system in which large networks of components with no central control and simple rules of operation give rise to complex collective behaviour, sophisticated information processing, and adaptation via learning or evolution'.<sup>23</sup> The collective behaviour resulting from component interactions is therefore more than the sum of the behaviour expected of individual parts,<sup>24</sup> exhibiting non-linear relationships, unpredictability, autopoiesis, adaptation and emergent behaviour.<sup>25</sup> Such processes support system identity and self-organisation,<sup>26</sup> adapting to changes in their external environment through conditional action and anticipation<sup>27</sup> and exhibiting coherence under change (stable disequilibrium).<sup>28</sup> In contrast to the epistemic belief in objectivity within the scientific method, a systems approach does not assume that the act of observation is a neutral pre-analytical step. Rather, decisions as to what and how to observe a system become crucial analytical requirements determining the representation of the system.<sup>29</sup>

The complexity and uncertainty of these systems raises challenges for environmental, institutional and governance arrangements,<sup>30</sup> not least because uncertainty is no longer confined geographically or jurisdictionally, temporally, or by relationships of duty between those creating the harm and those who are

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<sup>20</sup> Steffen et al (n 18).

<sup>21</sup> Giuseppe Munda, 'Social Multi-Criteria Evaluation: Methodological Foundations and Operational Consequences' (2004) 158(3) *European Journal of Operational Research* 662.

<sup>22</sup> Donella H Meadows, *Thinking in Systems: A Primer* (Chelsea Green Publishing, 2008) 2.

<sup>23</sup> Melanie Mitchell, *Complexity: A Guided Tour* (Oxford University Press, 2009) 13.

<sup>24</sup> MEJ Newman, 'Complex Systems: A Survey' (2011) 79(8) *American Journal of Physics* 800.

<sup>25</sup> Silvio O Funtowicz and Jerome R Ravetz, 'The Worth of a Songbird: Ecological Economics as a Post-Normal Science' (1994) 10(3) *Ecological Economics* 197.

<sup>26</sup> Rakhyun E Kim and Klaus Bosselmann, 'International Environmental Law in the Anthropocene: Towards a Purposive System of Multilateral Environmental Agreements' (2013) 2(2) *Transnational Environmental* 285.

<sup>27</sup> Stuart Kauffman, *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity* (Oxford University Press, 1995); Simon A Levin, *Fragile Dominion: Complexity and the Commons* (Perseus Books, 1999).

<sup>28</sup> Per Bak, *How Nature Works: The Science of Self-Organized Criticality* (Springer, 1996); John Henry Holland, *Hidden Order: How Adaptation Builds Complexity* (Perseus Books, 1995).

<sup>29</sup> Zora Kovacic, 'Investigating Science for Governance through the Lenses of Complexity' (2017) 91 *Futures* 80.

<sup>30</sup> Carl Folke et al, 'Adaptive Governance of Social-Ecological Systems' (2005) 30(1) *Annual Review of Environment and Resources* 441; Oran R Young and Will Steffen, 'The Earth System: Sustaining Planetary Life-Support Systems' in Carl Folke, Gary P Kofinas and F Stuart Chapin (eds), *Principles of Ecosystem Stewardship: Resilience-Based Natural Resource Management in a Changing World* (Springer-Verlag, 2009).

harmed. Uncertainties are recognised as not only analytical, but also normative, with traditional and reductionist approaches of prediction and control being of limited effectiveness. Uncertainty, inherent to the scientific method, lack of coherence between scientific understandings<sup>31</sup> and complex adaptive systems, challenges the reliability of rational decision-making processes<sup>32</sup> where certainty as a possibility is assumed.<sup>33</sup> Rational assumptions that the environment can be controlled and that certainty can be achieved, fundamentally ring false thus questioning the very ability of environmental law 'to become or even to be law'.<sup>34</sup> The 'unsettling internalisation of scientific uncertainty' in environmental law results in 'constant re-evaluation of already established problem-solving methodologies',<sup>35</sup> requiring ongoing generation and application of new knowledge.<sup>36</sup>

Environmental law and governance have increasingly been attempting to fill the gaps where uncertainties have emerged. Processes of prediction and control only result in incoherence and fragmentation, inadequately capturing the important, non-linear and complex interconnections between ecological and social systems.<sup>37</sup> Holling and Meffe have observed that traditional governance approaches reduce the natural variation of ecological systems by applying rules for fixed yields, resulting in the perverse effect of increased uncertainty as the resilience of ecosystems diminish — ecosystems being more likely to break down in response to disturbances that could have been previously absorbed.<sup>38</sup>

Many new governance solutions have been put forward to respond to these questions of dynamism, uncertainty and complexity in strongly coupled socio-ecological systems, as well as in response to the fundamental uncertainty created by the novel conditions of the Anthropocene.<sup>39</sup> In the next part, we discuss one

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<sup>31</sup> Daniel Sarewitz, 'How Science Makes Environmental Controversies Worse' (2004) 7(5) *Environmental Science & Policy* 385.

<sup>32</sup> Mariachiara Tallacchini, 'Before and Beyond the Precautionary Principle: Epistemology of Uncertainty in Science and Law' (2005) 207(2) *Toxicology and Applied Pharmacology* 645, 648.

<sup>33</sup> Åsa Knaggård, 'What Do Policy-Makers Do with Scientific Uncertainty? The Incremental Character of Swedish Climate Change Policy-Making' (2014) 35(1) *Policy Studies* 22.

<sup>34</sup> Philippopoulos-Mihalopoulos (n 10) 22.

<sup>35</sup> Philippopoulos-Mihalopoulos (n 10) 21.

<sup>36</sup> Adan Tarlock, 'Is There a There There in Environmental Law?' (2004) 19(2) *Journal of Land Use & Environmental Law* 213.

<sup>37</sup> Ruhl (n 10); Rak Kim, 'Unravelling the Maze of Multilateral Environmental Agreements: A Macroscopic Analysis of International Environmental Law and Governance for the Anthropocene' (PhD Thesis, Australian National University, 2013).

<sup>38</sup> Holling and Meffe (n 12). See also Simon Levin et al, 'Social-ecological systems as complex adaptive systems: modelling and policy implications' (2012) 18(2) *Environment and Development Economics* 111.

<sup>39</sup> Bradley Karkkainen, 'Marine Ecosystem Management and a Post-Sovereign Transboundary Governance' (2004) 6(1) *San Diego International Law Journal* 113; Judith E Koons, 'Key Principles to

such response, namely, adaptive governance in the context of a complex socioecological process: ecological restoration.

### III ADAPTATION AND ECOLOGICAL RESTORATION

Legal systems have a key role in responding and adapting to questions of dynamism, uncertainty and complexity inherent to socio-ecological systems.<sup>40</sup> The environmental governance challenge of our time is the development of governance systems that can respond to, adapt to, manage, and recognise the inherent uncertainty, interdependencies and dynamic conditions of these systems in which we live, in order to restore and maintain life-sustaining earth processes.<sup>41</sup> Ecological restoration is an example of a complex, systems process.<sup>42</sup> Ecological restoration refers to the process of assisting the recovery of a damaged ecosystem to restore ecological structure, complexity and integrity so that the system is self-supporting, resilient and displays a level of historical continuity and fidelity.<sup>43</sup> The practice of ecological restoration does not assume restoration to a replica environment, as landscapes are dynamic, but rather envisions an ecological system that is self-sustaining, historically informed, with ranges of variability and multiple potential ecological trajectories.<sup>44</sup> As ecosystems can take decades or centuries to restore, evaluation is therefore a necessary tool in avoiding costly mistakes.<sup>45</sup>

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Transform Law for the Health of the Planet' in Peter Burdon (ed), *Exploring Wild Law: The Philosophy of Earth Jurisprudence* (Wakefield Press, 2011) 45; Ruhl (n 10).

<sup>40</sup> Jan McDonald, 'The Role of Law in Adapting to Climate Change' (2011) 2(2) *Wiley Interdisciplinary Reviews: Climate Change* 283; Kotzé (n 8).

<sup>41</sup> Louis Kotzé, 'Earth System Law for the Anthropocene: Rethinking Environmental Law Alongside the Earth System Metaphor' (2020) 11(1–2) *Transnational Legal Theory* 75; Andreas Philippopoulos-Mihalopoulos, 'Critical Environmental Law as Method in the Anthropocene' in Andreas Philippopoulos-Mihalopoulos and Victoria Brooks (eds), *Research Methods in Environmental Law: A Handbook* (Elgar, 2017) 131.

<sup>42</sup> Michael P Weinstein, Steven Y Litvin and Justin M Krebs, 'Restoration Ecology: Ecological Fidelity, Restoration Metrics, and a Systems Perspective' (2014) 65 *Ecological Engineering* 71.

<sup>43</sup> Eric Higgs, *Nature by Design: People, Natural Process, and Ecological Restoration* (MIT Press, 2003); Standards Reference Group SERA (n 6); Katharine Suding et al, 'Committing to Ecological Restoration' (2015) 348(6235) *Science* 638; Anastasia Telesetsky, 'Ecoscapes: The Future of Place-Based Ecological Restoration Laws' (2013) 14(4) *Vermont Journal of Environmental Law* 493.

<sup>44</sup> Luis Balaguer et al, 'The Historical Reference in Restoration Ecology: Re-Defining a Cornerstone Concept' (2014) 176 *Biological Conservation* 12; Eric Higgs et al, 'The Changing Role of History in Restoration Ecology' (2014) 12(9) *Frontiers in Ecology and the Environment* 499; Margaret A Palmer and JB Ruhl, 'Aligning Restoration Science and the Law to Sustain Ecological Infrastructure for the Future' (2015) 13(9) *Frontiers in Ecology and the Environment* 512; Suding et al (n 43).

<sup>45</sup> Christer Nilsson et al, 'Evaluating the Process of Ecological Restoration' (2016) 21(1) *Ecology and Society* 41.

The National Standards for the Practice of Ecological Restoration developed for Australia note that restoration is an adaptive, reflexive and systemic practice guided by site characteristics and the relationship of the site with socio-ecological systems, including climate, landscape function and community.<sup>46</sup> Ecological restoration therefore requires long-term conservation management, review processes and changes in direction in order to correct for unexpected ecosystem responses — conditions requiring flexible and adaptive governance regimes to account for high levels of uncertainty and imperfect understandings of ecosystem interrelationships and feedback.<sup>47</sup> As such, adaptive approaches, such as adaptive management and adaptive governance, have been widely recommended to govern ecological restoration,<sup>48</sup> particularly landscape scale projects.<sup>49</sup>

Adaptive approaches shift environmental law's focus to the back-end of governance processes, requiring continuous monitoring, evaluation and adjustment in achieving an optimal socio-ecological system. Adaptive governance, for example, is defined as the social conditions and context that mediate human interactions with ecosystems, resulting in a 'range of interactions between actors, networks, organizations, and institutions emerging in pursuit of a desired state for social-ecological systems'.<sup>50</sup> It attempts a paradigmatic shift from a singular reductionist approach governing singular parts of an ecosystem, to one that seeks to understand and respond to the dynamism and uncertainty of the whole socio-ecological system.<sup>51</sup> This approach recognises that top-down, centralised state-based environmental governance approaches generally do not match ecological complexity or provide effective solutions.<sup>52</sup> Adaptive governance responds to these challenges therefore often emerge through community-led, bottom-up initiatives.<sup>53</sup> Ongoing explorations of adaptive governance strategies in law and decision-making have shown it to be a relatively

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<sup>46</sup> Standards Reference Group SERA (n 6).

<sup>47</sup> Hodge and Adams (n 6); Weinstein, Litvin and Krebs (n 42).

<sup>48</sup> Aronson et al (n 6); Standards Reference Group SERA (n 6).

<sup>49</sup> Cabin (n 6); Hodge and Adams (n 6); Nagarkar and Raulund-Rasmussen (n 6); Simenstad, Reed and Ford (n 6).

<sup>50</sup> Chaffin, Gosnell and Cosens (n 12) 61.

<sup>51</sup> Ibid.

<sup>52</sup> Oran R Young, *The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale* (MIT Press, 2002); Graeme S Cumming, David HM Cumming and Charles L Redman, 'Scale Mismatches in Social-Ecological Systems: Causes, Consequences, and Solutions' (2006) 11(1) *Ecology and Society* 14.

<sup>53</sup> Peter J Brosius, Anna Lowenhaupt Tsing and Charles Zerner (eds), *Communities and Conservation: Histories and Politics of Community-Based Natural Resource Management* (AltaMira Press, 2005); Edward P Weber, *Bringing Society Back In: Grassroots Ecosystem Management, Accountability, and Sustainable Communities* (MIT Press, 2003).

successful environmental governance response,<sup>54</sup> and it has been applied to studies of watershed management,<sup>55</sup> management of desert areas,<sup>56</sup> regional drought management,<sup>57</sup> the Great Barrier Reef,<sup>58</sup> and urban sustainability,<sup>59</sup> as well as some ecological restoration sites.<sup>60</sup>

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- <sup>54</sup> See (2013) 18(3) *Ecology and Society* ('Law and Social-Ecological Resilience, Part II: Contributions from Law for Social-Ecological Resilience Symposium', Jonas Ebbesson and Ellen Hey (eds)); Ahjond S Garmestani and Craig R Allen (eds), *Social-Ecological Resilience and Law* (Columbia University Press, 2014); (2013) 18(2) *Ecology and Society* ('Law and Social-Ecological Resilience, Part I: Contributions from Resilience 2011', Ahjond S Garmestani, Craig R Allen and Melinda Harm Benson (eds)); Lisa Sharma-Wallace, Sandra J Velarde and Anita Wreford, 'Adaptive Governance Good Practice: Show Me the Evidence!' (2018) 222 *Journal of Environmental Management* 74.
- <sup>55</sup> Barbara Cosens, Lance Gunderson and Brian C Chaffin, 'Introduction to the Special Feature Practicing Panarchy: Assessing Legal Flexibility, Ecological Resilience, and Adaptive Governance in Regional Water Systems Experiencing Rapid Environmental Change' (2018) 23(1) *Ecology and Society* 4; Barbara Cosens, Lance Gunderson, Craig Allen and Melinda Benson, 'Identifying Legal, Ecological and Governance Obstacles, and Opportunities for Adapting to Climate Change' (2014) 6(4) *Sustainability* 2338; Dave Huitema et al, 'Adaptive Water Governance: Assessing the Institutional Prescriptions of Adaptive (Co-)Management from a Governance Perspective and Defining a Research Agenda' (2009) 14(1) *Ecology and Society* 26; Patrick Huntjens et al, 'Institutional Design Propositions for the Governance of Adaptation to Climate Change in the Water Sector' (2012) 22(1) *Global Environmental Change* 67; Giorgos Kallis, Michael Kiparsky and Richard Norgaard, 'Collaborative Governance and Adaptive Management: Lessons from California's CALFED Water Program' (2009) 12(6) *Environmental Science & Policy* 631; John T Scholz and Bruce Stiftel (eds), *Adaptive Governance and Water Conflict: New Institutions for Collaborative Planning* (Routledge, 2005).
- <sup>56</sup> Donald R Nelson, W Neil Adger and Katrina Brown, 'Adaptation to Environmental Change: Contributions of a Resilience Framework' (2007) 32(1) *Annual Review of Environment and Resources* 395.
- <sup>57</sup> Rohan Nelson, Mark Howden and Mark Stafford Smith, 'Using Adaptive Governance to Rethink the Way Science Supports Australian Drought Policy' (2008) 11(7) *Environmental Science & Policy* 588.
- <sup>58</sup> Terence P Hughes et al, 'Adaptive Management of the Great Barrier Reef and the Grand Canyon World Heritage Areas' (2007) 36(7) *AMBIO: A Journal of the Human Environment* 586; Per Olsson, Carl Folke and Terry P Hughes, 'Navigating the Transition to Ecosystem-Based Management of the Great Barrier Reef, Australia' (2008) 105(28) *Proceedings of the National Academy of Sciences* 9489; Lisen Schultz et al, 'Adaptive Governance, Ecosystem Management, and Natural Capital' (2015) 112(24) *Proceedings of the National Academy of Sciences* 7369.
- <sup>59</sup> Paula Vandergert et al, 'Blending Adaptive Governance and Institutional Theory to Explore Urban Resilience and Sustainability Strategies in the Rome Metropolitan Area, Italy' (2016) 8(2) *International Journal of Urban Sustainable Development* 126; Tahmina Yasmin, Megan Farrelly and BC Rogers, 'Adaptive Governance: A Catalyst for Advancing Sustainable Urban Transformation in the Global South' (2019) 36(5) *International Journal of Water Resources Development* 1.
- <sup>60</sup> William H Butler, Ashley Monroe and Sarah McCaffrey, 'Collaborative Implementation for Ecological Restoration on US Public Lands: Implications for Legal Context, Accountability, and Adaptive Management' (2015) 55 *Environmental Management* 564; Lance Gunderson and Stephen S Light, 'Adaptive Management and Adaptive Governance in the Everglades Ecosystem' (2006) 39 *Policy Sciences* 323.

#### IV ILLUSTRATING THE CHALLENGE WITH LAW AND ECOLOGICAL RESTORATION

Despite ecological restoration being a current global priority,<sup>61</sup> the law and governance arrangements for ecological restoration are still emerging as states grapple with post-extractive landscapes and liabilities.<sup>62</sup> To investigate the governance of ecological restoration, we discuss two governance case studies from Australia to illustrate the ideas discussed above in Parts II and III.

Land development, particularly through resource extraction, is considered a highly appropriate use of land in Australia. The resource industry in particular has made significant efforts to brand activities in language that associates extraction with ‘frontier development’, ‘prosperity’ and ‘nation-building’, with mining equated with bringing wealth and civilisation to the outback.<sup>63</sup> In this discourse, resource extraction is thus a moral imperative.<sup>64</sup> With the rise of environmentalism in the 1970s and 1980s, a growing recognition emerged that development- and growth-focused industries had serious environmental and social consequences resulting in attempts to bring ‘sustainable development’ to mining and other industries.<sup>65</sup> Resource-rich states began to consider the impact

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<sup>61</sup> For example, the United Nations General Assembly declared 2021–2030 the decade of ecosystem restoration. See <<https://www.decadeonrestoration.org>>.

<sup>62</sup> James Aronson and Sasha Alexander, ‘Ecosystem Restoration Is Now a Global Priority: Time to Roll Up Our Sleeves: News Report from CBD COP11’ (2013) 21(3) *Restoration Ecology* 293; Palmer and Ruhl (n 44); Telesetsky (n 43); Anastasia Telesetsky, An Cliquet and Afshin Akhtar-Khavari, *Ecological Restoration in International Environmental Law* (Routledge, 2016).

<sup>63</sup> David S Trigger, ‘Mining, Landscape and the Culture of Development Ideology in Australia’ (1997) 4(2) *Ecumene* 161 (‘Mining, Landscape and the Culture’); David S Trigger, ‘Citizenship and Indigenous Responses to Mining in the Gulf Country’ in Nicolas Peterson, Will Sanders Geoffrey Brennan (eds), *Citizenship and Indigenous Australians: Changing Conceptions and Possibilities* (Cambridge University Press, 1998) (‘Citizenship and Indigenous Responses’).

<sup>64</sup> Trigger, ‘Mining, Landscape and the Culture’ (n 64); Trigger, (‘Citizenship and Indigenous Responses’ (n 64).

<sup>65</sup> See Brian F Chase, ‘Tropical Forests and Trade Policy: The Legality of Unilateral Attempts to Promote Sustainable Development under the GATT’ (1994) 17(2) *Hastings International and Comparative Law Review* 349; International Council on Mining and Metals, *Planning for Integrated Mine Closure: Toolkit* (Report, 2008); International Council on Mining and Metals, *Sustainable Development Framework: ICMM Principles* (Report, 2015); J S Maini, ‘Sustainable Development of Forests’ (1992) 43(169) *Unasylva* 3; K Freerk Wiersum, ‘200 Years of Sustainability in Forestry: Lessons from History’ (1995) 19 *Environmental Management* 321; World Bank Group and International Finance Corporation, *It’s Not Over When It’s Over: Mine Closure Around the World* (World Bank Group’s Mining Department, Global Mining, 2002).

of industry on landscapes and the cost that closure and rehabilitation has upon future land-use activities.<sup>66</sup>

Mine sites across Australia have become major environmental risks after closure, with an estimated 60,000 abandoned mines.<sup>67</sup> Environmental risk remains an ongoing concern' with '[m]ine closure, complete rehabilitation and relinquishment of the former mine site [being] almost unknown' in Australia.<sup>68</sup> As a result, more stringent government policies and the adoption of sustainable development practices have materialised across many industries in an attempt to reduce the environmental risk and costs of post-extractive landscapes.

Regulation to date, however, has been largely concerned with the rehabilitation of discrete geographical areas — for example, the rehabilitation of a mine site, remediation for pollution or other environmental disasters, or the conservation of a particular species.<sup>69</sup> Such governance approaches are often limited in scope and ambition. We provide two examples of restoration governance within Australia: mine restoration in Queensland, and forest restoration in Tasmania.

### A *Mine Restoration in Queensland*

In Queensland, the Department of Natural Resources and Mines and Energy ('DNRME') is responsible for mine compliance, land access and abandoned mines. The Department of Environment and Science ('DES') is responsible for the environmental management of operating mines and overseeing mine site rehabilitation, which is required under the *Environmental Protection Act 1994* (Qld) ('EP Act Qld'). Rehabilitation is required to reduce disturbance caused by authorised mining activities and to minimise future potential environmental harm. Mining proponents must apply for an environmental authority in order to conduct mine activities, with the application detailing the proposed rehabilitation of the site post operation.<sup>70</sup> This is detailed in a rehabilitation management plan

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<sup>66</sup> Australian Government, *Leading Practice Sustainable Development Program: Mine Closure and Completion* (2006); Australian Government, *Leading Practice Sustainable Development Program: Mine Rehabilitation* (2006).

<sup>67</sup> Alex Mark Lechner et al, 'Mapping and Prioritising Rehabilitation of Abandoned Mines in Australia' (Conference Paper, Life-of-Mine Conference, AusIMM, 10–12 July 2012).

<sup>68</sup> Rod Campbell et al, 'Dark Side of the Boom; What We Do and Don't Know about Mines, Closures and Rehabilitation' (Discussion Paper, The Australia Institute, 2017) 2.

<sup>69</sup> Benjamin J Richardson, 'Restoring Layered Geographies: Ecology, Society and Time' (2017) 26(2) *Griffith Law Review* 154.

<sup>70</sup> EP Act (Qld) s 125(1).

(‘RMP’). The DES assesses the RMP and also assesses rehabilitation for part of,<sup>71</sup> or the part or whole of, a mining project being surrendered.<sup>72</sup>

RMPs are informed by departmental guidelines that establish a rehabilitation hierarchy: the top requires the avoidance of disturbance that will require rehabilitation or the reinstatement of a ‘natural’ analogous ecosystem, through to lower levels that seek to provide rehabilitated land to allow for land use that accords with previous or lower value or, at the most undesirable, leaving the site in an unusable condition or with the potential to generate future pollution or adversely affect environmental values.<sup>73</sup> Mine operators are required to achieve the highest practicable rehabilitation level and identify post-mining land uses that are acceptable to the community, local government and other relevant stakeholders. General rehabilitation goals, that can ensure the safety of humans and wildlife through non-polluting and stable landforms sustaining an agreed post-mining land use, must also be met. Site-specific goals may be applied in relation to endangered species, water, registered heritage, or regional or local planning.

Despite this regulatory framework, the Queensland Audit Office’s review of Queensland’s environmental regulation found the environmental remediation of mines was ‘an unrealised aspiration’.<sup>74</sup> The review found there were serious mine legacy concerns, with the state being left with an increasing number of abandoned mines, with mining bonds often inadequate to meet the cost of rehabilitation.<sup>75</sup> As a result, the government introduced the *Mineral and Energy Resources (Financial Provisioning) Act 2018* (Qld), amending the EP Act (Qld) to incorporate Progressive Rehabilitation and Closure (‘PRC’) Plans into the environmental authority process for both new and existing mines. The PRC Plans include an approved schedule containing completion dates for achieving progressive rehabilitation of mine sites. This step-by-step approach aims to achieve a level of adaptive management throughout the restoration process and limit the risk of state liability for abandoned mines.<sup>76</sup>

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<sup>71</sup> Ibid s 318Z.

<sup>72</sup> Ibid s 264.

<sup>73</sup> Department of Environment and Science, ‘Rehabilitation Requirements for Mining Resource Activities’ (2014) <[https://environment.des.qld.gov.au/\\_\\_data/assets/pdf\\_file/0022/100975/rs-gl-rehabilitation-requirements-mining.pdf](https://environment.des.qld.gov.au/__data/assets/pdf_file/0022/100975/rs-gl-rehabilitation-requirements-mining.pdf)>.

<sup>74</sup> Queensland Audit Office, *Environmental Regulation of the Resources and Waste Industries* (Report, 2013) 15.

<sup>75</sup> Ibid.

<sup>76</sup> State of Queensland, ‘Achieving Improved Rehabilitation for Queensland: Other Associated Risks and Proposed Solutions’ (Discussion Paper, 2018).

## B *Forest Restoration Tasmania*

Tasmania's forest management system is largely regulated under the *Forest Practices Act 1985* (Tas). The Act seeks to 'achieve sustainable management of Crown and private forests with due care for the environment and taking into account social, economic and environmental outcomes'.<sup>77</sup> The forest practices system establishes a tenure-blind approach, regulated by the Forest Practices Code ('FPC'), forest practices plans ('FPPs'), forest practices officers ('FPOs') with independent oversight and reporting by the regulator, and the Forest Practices Authority ('FPA'). The FPA notes that the 'Tasmanian forest practices system is based on an adaptive management approach where results from research and monitoring lead to continuing improvement of the system',<sup>78</sup> with the FPC aiming to provide 'reasonable protection' for the environment.

Under both the FPC and the *Forest Practices Act 1985*, restoration is not a required part of forest activities, but it does occur through the 'best practice' of forest companies or under their FPPs, particularly as all plantation companies operating in Tasmania are certified to either the Australian Forestry Standard and/or the Forest Stewardship Council. Forest restoration is recognised under both of these certification standards, and Tasmanian forestry companies have an economic incentive to meet those standards.<sup>79</sup>

In addition, while not mandatory under the FPC, the FPC does influence forest restoration by setting out requirements in relation to the retention of existing native forest streamside reserves, conservation of riparian values, establishment of native vegetation, and constraints on harvesting.<sup>80</sup> If a forest company intends to undertake restoration, an FPP is required, resulting in a protocol for planning, implementation and compliance reporting. FPPs are generally implemented by FPOs and forest contractors familiar with the requirements of the FPC and technically capable. The desired reforestation standard is generally expressed as stems/ha of eucalypt seedlings 12–24 months after treatment and inevitable mortality in FPPs.<sup>81</sup>

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<sup>77</sup> *Forest Practices Act 1985* (Tas) sch 7.

<sup>78</sup> Graham Wilkinson, 'A Proposed New Format for the Forest Practices Code' (2008) 9(1) *Forest Practices News* 1.

<sup>79</sup> Michael Schofield, 'A Review of Forest Restoration Projects in Tasmania' (Gottstein Fellowship Report, 2017).

<sup>80</sup> Forest Practices Authority, 'Forest Practices Code' (2015) 78.

<sup>81</sup> Schofield (n 79).

### C *Analysis*

Law is never simply a collection of inviolable rules and processes. Laws and governance regimes reflect narratives, stories and worldviews; they are fundamentally the expression of a lifeworld.<sup>82</sup> Therefore, it is not enough to update environmental law's anthropocentric narrative of reason and liberalism by supplementing it with 'scientific description'.<sup>83</sup> Overcoming the alienation of earth systems present in environmental law requires knowledge of alternative ways of being and existing in the world in a way that supports an ecological logic. This knowledge should not be reduced to empirical description<sup>84</sup> or a process of adaptation and learning. Such approaches are at risk of being simply technical and rules-based responses to a much broader ontological concern.

This is demonstrated in the governance case studies above. In both jurisdictions, we can observe a continuing conceptualisation of ecosystems as 'resources', defined by their use value. Rehabilitation governance is largely concerned with future use of the land (particularly in the mining example) or maintaining access to markets through certification (forestry practices in Tasmania). Standards are limited to metrics of disaggregated ecosystem aspects, that is, soil or water quality and stable landforms in the case of mining restoration in Queensland, or single species coverage in the case of forest restoration in Tasmania. Adaptive approaches are included in both of the governance frameworks, but appear to have been largely implemented to facilitate processes that limit state liability in the case of the progressive rehabilitation in Queensland, and to allow for an agile organisation in the case of the independent regulator in forest management in Tasmania. While these are certainly important goals, adaptive management in the case studies did not seek to improve ecological complexity. The complexity inherent in the relationships between the social and ecological components of these systems is assumed to develop on its own over a period of time.

Adaptive approaches have been criticised for their failure to attend sufficiently to questions of agency, power, culture and history.<sup>85</sup> And it is in this

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<sup>82</sup> Aaron Mills, 'The Lifeworlds of Law: On Revitalizing Indigenous Legal Orders Today' (2016) 61(4) *McGill Law Journal* 847.

<sup>83</sup> Kirsten Anker, 'Law As ... Forest: Eco-Logic, Stories and Spirits in Indigenous Jurisprudence' (2017) 21 *Law Text Culture* 191, 198.

<sup>84</sup> *Ibid.*

<sup>85</sup> Muriel Cote and Andrea J Nightingale, 'Resilience Thinking Meets Social Theory: Situating Social Change in Socio-Ecological Systems (SES) Research' (2012) 36(4) *Progress in Human Geography* 475; Debra J Davidson, 'The Applicability of the Concept of Resilience to Social Systems: Some Sources of Optimism and Nagging Doubts' (2010) 23(12) *Society & Natural Resources* 1135; Michael Fabinyi, Louisa Evans and Simon J Foale, 'Social-Ecological Systems, Social Diversity, and Power:

criticism that we can observe a failure to truly break the anthropocentrism of environmental law. Adaptive management and governance, despite their attempts to recognise the sociality of natural systems, still continue a particular worldview in which ecological systems are often framed as a legal 'object' or resource. Agency within these systems is largely limited to the 'human', and questions of diversity, equity and power relations, when raised, are primarily concerned with an environmental justice that centres on the human.<sup>86</sup>

This means that in doing the restoration work, landscapes remain at risk of continuing to be a commodity, or recovery efforts are simply a required intervention for maintaining the use value of private property. Critically, it means that restoration efforts do not add as much to the structural and trophic complexity that is needed in the system, so that at some point human being decisions are not central to sustaining the system. According to the five-star recovery system used in the recent ecological restoration standards of the International Society of Ecological Restoration, ecosystems can accumulate complexity to the point that it is naturally regenerating itself. Using this system, for instance, restoration efforts can help achieve sustainability, but not necessarily complexity for the system under consideration.<sup>87</sup> This distinction is illustrative simply of the opportunities for adaptive governance, and the importance of having substantive goals, as well as process goals for restoration efforts. The mining and forestry examples highlight the lack of this ambition in achieving complexity.

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Insights from Anthropology and Political Ecology' (2014) 19(4) *Ecology and Society* 28; Marc Welsh, 'Resilience and Responsibility: Governing Uncertainty in a Complex World: Resilience and Responsibility' (2014) 180(1) *Geographical Journal* 15.

<sup>86</sup> Chaffin, Gosnell and Cosens (n 12).

<sup>87</sup> See Tein McDonald, Justin Jonson and Kingsley W Dixon, 'National Standards for the Practice of Ecological Restoration in Australia' (2016) 24(S1) *Restoration Ecology* S4 for a discussion of the five-star system that seeks to explain the levels of complexity that a system can achieve, with the highest level being one where there are very high similarities between it and the reference ecosystem. This five-star system was adopted by the 2019 2<sup>nd</sup> edition of the Society for Ecological Restoration as part of its *International Principles and Standards for the Practice of Ecological Restoration*. See also Tein McDonald and Kingsley Dixon, 'National Standards: Reasserting the Ecological Restoration Framework in Uncertain Times' (2018) 19(S1) *Ecological Management & Restoration* 79.

## V BUILDING COMPLEXITY: CHALLENGING LAW'S ANTHROPOCENTRISM WITH RESTORATIVE INPUTS

To help achieve greater ecological complexity through a legal system conducive to a 'future that has a future',<sup>88</sup> we want to explore in this part how the idea of 'restorative inputs' can shape values differently and contribute substantively to law and governance, shifting its ontological commitments. Conceptually, restorative inputs are similar to other innovative ideas, like net-gain, no-net-loss, half-Earth,<sup>89</sup> and a host of others that set abstract limits and conditions on activities so that performance can be measured against them. The idea of restorative inputs is to go beyond technical solutions and reorient the ontological frames of ecological restoration law and governance and move beyond technical solutions and a largely extractive and property-based relationship with the more-than-human world. Restorative inputs aims to create social institutions that reorient ontologies towards more cooperative relationships between human beings and the natural world. The aim, therefore, is not to create more stringent rules to manage the transactional and competitive access arrangements between human beings, but rather to enable cooperative acts and initiatives that can build new ontologically significant social and cultural institutions.

Ecological restoration is not concerned simply with remediating and rehabilitating an ecosystem; it can also shape how humans conceive of and relate to the natural environment by actively working on inputs into achieving greater complexity.<sup>90</sup> By focusing on complexity and native systems, it is a practice that can facilitate the development of a partnership ethic between 'the human' and 'the more-than-human', envisioning 'a better relationship between humans and the rest of the world'.<sup>91</sup> Undertaken with broad stakeholder and community involvement and engagement, ecological restoration can ground and attach people to places in which they live with deep metaphysical or emotional connections, motivating people to care for ecosystems beyond the services they provide or their aesthetics,<sup>92</sup> even instilling a sense of stewardship or

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<sup>88</sup> Arturo Escobar, *Designs for the Pluriverse* (Duke University Press, 2018) 9.

<sup>89</sup> Edward O Wilson, *Half-Earth: Our Planet's Fight for Life* (Liveright Publishing Corporation, 2016).

<sup>90</sup> William R Jordan, *The Sunflower Forest: Ecological Restoration and the New Communion with Nature* (University of California Press, 2003). This book is increasingly recognised as one of the first monograph-length discussions of the significance and benefit of restoration for changing the human-nature relationship.

<sup>91</sup> Dave Egan, Evan E Hjerpe and Jesse Abrams, *Human Dimensions of Ecological Restoration: Integrating Science, Nature, and Culture* (Island Press, 2011); Carolyn Merchant, *Reinventing Eden: The Fate of Nature in Western Culture* (Routledge, 2003).

<sup>92</sup> Afshin Akhtar-Khavari and Benjamin J Richardson, 'Ecological Restoration and the Anthropocene' in Afshin Akhtar-Khavari and Benjamin J Richardson (eds), *Ecological Restoration Law: Concepts and*

responsibility with respect to land and property.<sup>93</sup> In this, restorative inputs into the complexity of a system is similar to terms such as landscape restoration, eco-cultural restoration, focal restoration and reciprocal restoration. Such terms define practices concerned not only with scientific value but also aesthetic, historical and traditional landscape values, reflecting an understanding that the presence of humans can be an integral part of thriving, resilient landscapes.<sup>94</sup> Reciprocal restoration, for example, as Kimmerer explains, is ‘the mutually reinforcing restoration of land and culture such that the repair of ecosystem services contributes to cultural revitalization and renewal of culture promotes restoration of ecological integrity’.<sup>95</sup> Restorative inputs build on these concepts, framed by a commitment to socio-ecological complexity.

### A *Restorative Inputs and Complexity*

As we have identified, ecological restoration is both a complex, systems process, and also an ambition to achieve more than just rehabilitation and remediation.<sup>96</sup> Ecosystems and socio-ecological systems can be considered complex adaptive systems. Markets, regulations and institutions, however, have a tendency to break down landscapes, ecosystems and bioregions into smaller units for the purposes of trade, markets and regulation of rights. Ecosystems are reduced to their components, such as taxonomic richness, water and soil quality, undermining the appreciation of the overall complexity of these systems.<sup>97</sup> Regulation, therefore, does not generally define restoration as a self-sustaining system focused on function and process, but rather promotes an ‘undue

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*Case Studies* (Routledge, 2019) 1; Robyn Bartel and Nicole Graham, ‘Ecological Reconciliation on Private Agricultural Land: Moving Beyond the Human–Nature Binary in Property–Environment Contests’ in Afshin Akhtar-Khavari and Benjamin J Richardson (eds), *Ecological Restoration Law: Concepts and Case Studies* (Routledge, 2019) 93; Gretel Van Wieren, ‘Ecological Restoration as Public Spiritual Practice’ (2008) 12(2–3) *Worldviews: Global Religions, Culture, and Ecology* 237.

<sup>93</sup> Emily Barritt, ‘The Story of Stewardship and Ecological Restoration’ in Akhtar-Khavari and Richardson (n 92) 72; Bartel and Graham (n 92).

<sup>94</sup> Wayne Barbour and Christine Schlesinger, ‘Who’s the Boss? Post-Colonialism, Ecological Research and Conservation Management on Australian Indigenous Lands’ (2012) 13(1) *Ecological Management & Restoration* 36; Egan, Hjerpe and Abrams (n 91); Francisco Moreira, Isabel Queiroz and James Aronson, ‘Restoration Principles Applied to Cultural Landscapes’ (2006) 14(3–4) *Journal for Nature Conservation* 217; Z Naveh, ‘Epilogue: Toward a Transdisciplinary Science of Ecological and Cultural Landscape Restoration’ (2005) 13(1) *Restoration Ecology* 228.

<sup>95</sup> Robin Kimmerer, ‘Restoration and Reciprocity: The Contributions of Traditional Ecological Knowledge’ in Egan, Hjerpe and Abrams (n 91) 258.

<sup>96</sup> Weinstein, Litvin and Krebs (n 42); Palmer and Ruhl (n 44).

<sup>97</sup> Richard B Norgaard, ‘Ecosystem Services: From Eye-Opening Metaphor to Complexity Blinder’ (2010) 69(6) *Ecological Economics* 1219.

emphasis' on physical habitat.<sup>98</sup> This can also result in the prioritisation of certain restoration goals, such as carbon sequestration, over others, resulting in unintended circumstances for objectives such as biodiversity.<sup>99</sup> This can result in the recovery of only part of an ecosystems ecological function, process and socio-ecological benefits.<sup>100</sup> It also risks what Higgs calls *technological restoration* — a scientific-technical practice dominated by elite experts and technicians, concerned with efficiency and uniformity, resulting in restoration as commodity.<sup>101</sup> The practices of rehabilitation and reclamation often used in mine closures and other extractive practices, concerned with ensuring the reparation of ecosystem components, provides an example. The ecosystem services narrative provides another example of where restoration governance and policy internationally is at risk of continuing the ongoing commodification of ecological systems and the reduction of ecosystems into component functions.<sup>102</sup> This has troubling connotations for the governance of ecological restoration:

[E]nvironmental governance can no more succeed around the metaphor of ecosystem services apart from the richness of ecological thinking than mortgage markets can succeed on the myth that housing prices will always rise ... Somehow, we need to make a significant transition toward richer ways of understanding and governing.<sup>103</sup>

A governance framework built around restorative inputs is therefore an attempt to contribute to a deeper articulation of a restorative law and governance framework for ecological restoration, anticipating, fostering and conscientiously defending restoration governance from the ontological and epistemological frameworks of traditional forms of environmental law and governance that continue to disaggregate and commodify the 'natural' world.<sup>104</sup>

A restorative input approach aims to recognise the significance of the whole and the complexity of all the entanglements that come together within a landscape. Scientific knowledge and decision-making is therefore but one part of the process for making good decisions, as historical, cultural and emotional

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<sup>98</sup> Palmer and Ruhl (n 44) 514.

<sup>99</sup> Mark Buckley and Ernie Niemi, 'Climate Change Implications for Ecological Restoration Planning' in Egan, Hjerpe and Abrams (n 91) 177.

<sup>100</sup> David Moreno-Mateos et al, 'The Long-Term Restoration of Ecosystem Complexity' (2020) 4(5) *Nature Ecology & Evolution* 676.

<sup>101</sup> Higgs (n 43).

<sup>102</sup> Higgs et al (n 44); Telesetsky (n 43).

<sup>103</sup> Norgaard (n 97) 1225.

<sup>104</sup> Emille Boulot, 'Restoring Land, Restoring Law: Theorizing Ecological Law with Ecological Restoration' in Geoffrey Garver et al (eds), *From Environmental to Ecological Law* (Routledge, forthcoming).

connections continue to be integral to understanding the natural world.<sup>105</sup> Governance of such landscape-based approaches would necessarily require an orientation to considering ecosystem function, dispersal, stochastic disturbance, self-organisation, trophic complexity and ecological resilience, which mark successful, systems-based ecological restoration.<sup>106</sup> Such an approach focuses on the interactions between ecological system components rather than simply just the components themselves.<sup>107</sup> In addition, the complexity of such landscapes cannot be maintained and realised without meaningfully acknowledging and entrenching *relational* dimensions of the entangled and connected parts of the world into governance decisions and frameworks. How this will translate to governance is the question we explore next, setting out some initial theorisation as to governance tools and mechanisms that would support and foster complexity, rather than reducing and disaggregating it.

## VI RESTORATIVE GOVERNANCE

In this part, we explore key parameters for a governance framework committed to restorative inputs and building complexity through adaptation-oriented approaches. We identify four particular elements. First, the governance of complex systems requires a governance approach that is systems-based, reflexive and responsive to the inherent uncertainty of these systems. Second, governance must ensure that restoration is integrated across the landscape, both spatio-temporally and jurisdictionally. Third, restorative input governance requires a long-term approach, recognising that successful restoration with self-supporting complexity may take centuries or millennia, thus challenging the temporality of traditional environmental law.<sup>108</sup> Finally, as many scholars have identified, there is no one governance solution to questions of complexity. Governance must be heuristic, recognising and responding to the very place-specific nature of complex systems management.

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<sup>105</sup> This theme comes up in this article a fair bit: Andrew Campbell, Jason Alexandra and David Curtis, 'Reflections on Four Decades of Land Restoration in Australia' (2017) 39(5) *Rangeland Journal* 405.

<sup>106</sup> Moreno-Mateos et al (n 100); Andrea Perino et al, 'Rewilding Complex Ecosystems' (2019) 364(6438) *Science* 351; Weinstein, Litvin and Krebs (n 42).

<sup>107</sup> Moreno-Mateos et al (n 100).

<sup>108</sup> See Richardson (n 69).

## A *Systems Thinking and Law*

As noted above, socio-ecological systems are inherently dynamic, exhibiting non-linearities, no central control and behavioural surprise. This means that predicting and managing restoration trajectories ‘has been particularly vexing’.<sup>109</sup> Legal systems have a key role in responding and adapting to these questions of dynamism, uncertainty and complexity in strongly coupled socio-ecological systems,<sup>110</sup> with ecologists arguing that governance should be adaptive, long-term and implemented through networks of stakeholders.<sup>111</sup>

Systems theory, however, has not only been applied just to the physical sciences (although there is significant work done in this space).<sup>112</sup> It has also been applied across the social sciences, including environmental law,<sup>113</sup> policy<sup>114</sup> and management.<sup>115</sup> It has been adopted as a framework for addressing social-ecological issues by environmental governance scholars from around the world, including the Stockholm Resilience Centre,<sup>116</sup> the Resilience Alliance<sup>117</sup> and the

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<sup>109</sup> Weinstein, Litvin and Krebs (n 42) 72; Madhur Anand and Rachele E Desrochers, ‘Quantification of Restoration Success Using Complex Systems Concepts and Models’ (2004) 12(1) *Restoration Ecology* 117; William J Mitsch et al, ‘Creating and Restoring Wetlands’ (1998) 48(12) *BioScience* 1019; Maria C Ruiz-Kaen and T Mitchell Aide, ‘Restoration Success: How Is It being Measured?’ (2005) 12(3) *Restoration Ecology* 569.

<sup>110</sup> Kotzé (n 8).

<sup>111</sup> Hodge and Adams (n 6).

<sup>112</sup> Murray Gell-Mann, *The Quark and the Jaguar: Adventures in the Simple and the Complex* (H Holt, 1994); John H Holland, ‘Studying Complex Adaptive Systems’ (2006) 19(1) *Journal of Systems Science and Complexity* 1; John H Holland, *Complexity: A Very Short Introduction* (Oxford University Press, 1995); Kauffman (n 27); Levin (n 27); Mitchell (n 23).

<sup>113</sup> Kim (n 37); Kim and Bosselmann (n 26); JB Ruhl, ‘Law’s Complexity: A Primer’ (2008) 24(4) *Georgia State University Law Review* 29 (‘Law’s Complexity’); JB Ruhl, ‘Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law’ (1997) 34(4) *Houston Law Review* 933 (‘Thinking of Environmental Law’).

<sup>114</sup> Gerald Andrews Emison, ‘The Potential for Unconventional Progress: Complex Adaptive Systems and Environmental Quality Policy’ (1996) 7 (Fall) *Duke Environmental Law & Policy Forum* 167.

<sup>115</sup> Elinor Ostrom, ‘Coping with Tragedies of the Commons’ (1999) 2(1) *Annual Review of Political Science* 493; Christian Rammel, Sigrid Stagl and Harald Wilfing, ‘Managing Complex Adaptive Systems — A Co-Evolutionary Perspective on Natural Resource Management’ (2007) 63(1) *Ecological Economics* 9; Thomas Dietz, Elinor Ostrom and Paul C Stern, ‘The Struggle to Govern the Commons’ (2003) 302(5652) *Science* 1907.

<sup>116</sup> Folke et al (n 30); Carl Folke et al, ‘The Problem of Fit between Ecosystems and Institutions: Ten Years Later’ (2007) 12(1) *Ecology and Society* 30; Andreas Duit et al, ‘Governance, Complexity, and Resilience’ (2010) 20(3) *Global Environmental Change* 363.

<sup>117</sup> Bobbie Low et al, ‘Redundancy and Diversity: Do They Influence Optimal Management?’ in Fikret Berkes, Johan Colding and Carl Folke (eds), *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change* (Cambridge University Press, 2003) 83.

Complex Adaptive Systems Initiative.<sup>118</sup> The literature shares a common premise that the command-and-control approach to natural resource management has inherent limitations<sup>119</sup> and there is no one-size-fits-all solution;<sup>120</sup> rather, responses need to be context-specific, with institutional diversity,<sup>121</sup> redundancy<sup>122</sup> and self-organisation<sup>123</sup> in a polycentric,<sup>124</sup> nested<sup>125</sup> or network organisational setting.<sup>126</sup> Law itself is a complex adaptive system, with Ruhl arguing we should be 'adaptively managing the complex adaptive legal system to adaptively manage other complex adaptive natural and social systems'.<sup>127</sup>

In our thinking with restorative inputs, we agree with Conant and Ashby that 'every good regulator of a system must be a model of that system'.<sup>128</sup> According to Duit et al's diversity hypothesis, efficacious adaptiveness is achieved when the variety of environmental law's internal order or complexity matches its external order, that is, the variety of the environmental constraints.<sup>129</sup> There are, of course, many approaches to the inherent uncertainty in socio-ecological systems, but adaptive and precautionary approaches would appear to be necessary policy structures.<sup>130</sup> Truly restorative governance requires a systems approach to support the establishment and development of complexity across landscapes, and it is here that the learning processes of adaptive governance can be well applied.

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<sup>118</sup> Marco Janssen, 'Use of Complex Adaptive Systems for Modeling Global Change' (1998) 1(5) *Ecosystems* 457.

<sup>119</sup> Holling and Meffe (n 12).

<sup>120</sup> Elinor Ostrom, Marco A Janssen and John M Anderies, 'Going beyond Panaceas' (2007) 104(39) *Proceedings of the National Academy of Sciences* 15176.

<sup>121</sup> Elinor Ostrom, *Understanding Institutional Diversity* (Princeton University Press, 2005).

<sup>122</sup> Low et al (n 117).

<sup>123</sup> Dietz, Ostrom and Stern (n 115); Folke et al, 'Adaptive Governance of Social-Ecological Systems' (n 30); Per Olsson et al, 'Shooting the Rapids: Navigating Transitions to Adaptive Governance of Social-Ecological Systems' (2006) 11(1) *Ecology and Society* 18.

<sup>124</sup> Elinor Ostrom, 'Polycentric Systems for Coping with Collective Action and Global Environmental Change' (2010) 20(4) *Global Environmental Change* 550.

<sup>125</sup> Dietz, Ostrom and Stern (n 115).

<sup>126</sup> Marco A Janssen et al, 'Toward a Network Perspective of the Study of Resilience in Social-Ecological Systems' (2006) 11(1) *Ecology and Society* 15.

<sup>127</sup> Ruhl (n 10).

<sup>128</sup> Roger C Conant and W Ross Ashby, 'Every Good Regulator of a System Must Be a Model of That System' (1970) 1(2) *International Journal of Systems Science* 89, 89.

<sup>129</sup> Duit et al (n 115); Ruhl, 'Thinking of Environmental Law' (n 112); Ruhl, 'Law's Complexity' (n 113).

<sup>130</sup> Ruhl (n 10); Lance H Gunderson and CS Holling (eds), *Panarchy: Understanding Transformations in Human and Natural Systems* (Island Press, 2002).

## B *Landscape Integration*

A landscape approach recognises that ecosystems are interconnected, and their ecological processes are inherently complex.<sup>131</sup> Ecological restoration should therefore consider the variety of scales with cross-habitat linkages and energy fluxes that exist across the landscape.<sup>132</sup> Decisions regarding restoration would need to consider the natural environment in the context of its restorative conditions. Principle 7 of the second Primer of the International Society for Ecological Restoration contains the idea that restoration efforts can accumulate across a landscape.<sup>133</sup> On this Principle the Primer encourages planning at the landscape level to achieve complexity as it accumulates across the area over time and connects restored areas with one another. More importantly, 'landscape' incorporates both ecological and social elements, addressing spatial and temporal scales.<sup>134</sup> It is the scale at which 'identity to place' emerges.<sup>135</sup> Not only does this require the application of landscape ecology, recognising that ecosystem sustainability varies across spatio-temporal scales, it also requires a recognition that governance will be need to be integrated across multi-level jurisdictional boundaries. Governance that can support partnerships, remove regulatory barriers and coordinate across bioregional scales will be required.

## C *Long-Term Approach*

One of the significant benefits of having a vision for restorative inputs built around complexity and relationality is that it positions governance approaches on a long-term trajectory. Initiatives that are designed to help restore native ecosystems can take decades, centuries or millennia of inputs.<sup>136</sup> Whatever the motivation or strategy, the challenge for governance in relation to long-term initiatives for building complexity will be monitoring, evaluation and adaptation to changing circumstances. Further, integrated schemes that continue to support and sustain one another without affecting the cumulative value of what is being achieved is critical.

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<sup>131</sup> Erica A Newman et al, 'Scaling and Complexity in Landscape Ecology' (2019) 7 *Frontiers in Ecology and Evolution* 293.

<sup>132</sup> Weinstein, Litvin and Krebs (n 42).

<sup>133</sup> See Principle 8 of Society for Ecological Restoration International Science and Policy Working Group, *International Principles and Standards for the Practice of Ecological Restoration* (2<sup>nd</sup> ed, 2019) <<http://ser.org/page/SERStandards>>.

<sup>134</sup> Jianguo Wu and R Hobbs, 'Landscape Ecology: The-State-of-the-Science' in Jianguo Wu and R Hobbs (eds), *Key Topics in Landscape Ecology* (Cambridge University Press, 2007) 271.

<sup>135</sup> Jianguo Wu, 'A Landscape Approach for Sustainability Science' in MP Weinstein and RE Turner (eds), *Sustainability Science: The Emerging Paradigm and the Urban Environment* (Springer, 2012) 441.

<sup>136</sup> Moreno-Mateos et al (n 100).

Instruments found in most current legislation focus more on short-term agendas and transactional opportunities and less on learning how to pass on knowledge and undertake effective succession-planning for the next generation. Funding that recognises the multi-generational nature of ecological restoration becomes a key requirement and can sustain effective restoration over the time that is required.

### D *Multitude of Governance Responses*

As has been eluded to throughout this article, ecological restoration is place- and context-specific. Governance that seeks to incorporate social and ecological system complexity must recognise that universal frameworks do not exist,<sup>137</sup> rather, a suite of policy responses will inevitably be required.<sup>138</sup> As Campbell, Alexandra and Curtis note:

Over the past four decades, we have learnt that land restoration demands long-term approaches, durable policy settings and continuity of resourcing, of both social and biophysical interventions capable of using a full suite of policy instruments — educative, informative, inventive, market and regulatory.<sup>139</sup>

Restorative input governance therefore requires a heuristic framework for the design and operationalisation of regulation acknowledging that governance in this space will be difficult to measure, maintain and replicate under ongoing ecological change.<sup>140</sup> While bottom-up place-specific approaches are certainly effective for adaptive governance implementation, support from higher levels, with cross-scale connections and nesting will be necessary for operationalisation.<sup>141</sup>

Restorative inputs could take many forms and shapes, and its significance would be in terms of facilitating deeper engagement with the impacts and influences that we have on one another and, more importantly, nature. Ontological change is challenging, and disruptive technologies and ideas are needed to help us shift from competitive to cooperative relationships that can enable a different evolutionary socio-ecological platform.

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<sup>137</sup> Ostrom, Janssen and Anderies (n 120).

<sup>138</sup> Garmestani and Benson (n 12).

<sup>139</sup> Campbell, Alexandra and Curtis (n 105) 410.

<sup>140</sup> Sharma-Wallace, Velarde and Wreford (n 54).

<sup>141</sup> Garmestani and Benson (n 12).

## VII CONCLUSION

Without attending to the ontological foundations of law, adaptive governance for restoration will continue to replicate its presuppositions regarding the human–nature binary<sup>142</sup> as demonstrated by the governance frameworks for mine and forest restoration in Queensland and Tasmania. But when practiced with a governance approach that recognises the human as a part of, and dependent upon, the natural world,<sup>143</sup> restoration has the potential to enable what Van Wieren calls a ‘de-centering’ of the liberal subject of environmental law, thus eroding human–nature dichotomies.<sup>144</sup> Decentering the human subject, however, requires a commitment to building on the complexity that is inherent in the ecological systems of which human beings are a part. We have sought to argue that governance approaches to restoration that support human goals and ambitions are not as concerned with building and adding complexity into a system.

By initiating a discussion on a values-led restoration governance, we have outlined a framework for using restorative inputs to bring an additional dimension to adaptive governance processes. Restorative inputs into ‘ecological restoration’ make explicit the need to focus primarily upon the development of complexity, that is, processes including ecosystem function and process. In this we can observe a shift away from solely human agency, to a whole-of-landscape consideration of agency. Restorative inputs are therefore an example of an earth-sustaining ontology, where there is active engagement in the consideration of a mutually beneficial relationship between humans and nature.

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<sup>142</sup> See a similar critique with respect to ecological economics: Vijay Kolinjivadi, ‘Avoiding Dualisms in Ecological Economics: Towards a Dialectically-Informed Understanding of Co-Produced Socionatures’ (2019) 163 *Ecological Economics* 32.

<sup>143</sup> Higgs (n 43).

<sup>144</sup> Van Wieren (n 92). See also Barritt (n 93); Kimmerer (n 97); Higgs (n 43).



# MANGROVE ECOSYSTEMS AND SERVICES: LEGAL RECOGNITION AND PROTECTION IN INDO-PACIFIC ISLAND STATES

ERIKA TECHERA \*

*Mangroves are valuable and highly productive ecosystems providing multiple services, including coastal protection, fishery breeding, birthing and nursery grounds, carbon sequestration and water filtration. Although they are rarely the subject of tailored legal protection, there are some jurisdictions where the ecosystem services provided by mangroves are recognised in law and policy frameworks. This article focuses on Indo-Pacific island states to highlight the ways in which mangroves have been treated in law in these nations, and to make suggestions for how Indo-Pacific island states could enhance their conservation and management.*

## I INTRODUCTION

Mangrove areas are highly productive coastal ecosystems, existing in marine and river environments where freshwater and seawater mix.<sup>1</sup> Mangroves provide myriad goods and ecosystem services of importance to human communities — such as coastal protection,<sup>2</sup> wildlife habitats,<sup>3</sup> carbon sinks<sup>4</sup> and water purification<sup>5</sup> — and they are also of cultural value in many parts of the world.<sup>6</sup> Multiple activities and processes affect mangroves, including land-clearing and

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<sup>1</sup> There are at least 54 species of mangroves, which are found throughout the world: Smithsonian, *Mangroves* <<https://ocean.si.edu/ocean-life/plants-algae/mangroves>>.

<sup>2</sup> Including the amelioration of coastal processes, soil stabilisation and erosion control.

<sup>3</sup> Mangroves are critical habitats for many species, including breeding, spawning, hatching and nursery grounds for fish.

<sup>4</sup> Mangroves sequester carbon, and are sometimes referred to as a 'blue carbon' resource.

<sup>5</sup> Mangroves play a role in the filtration of water.

<sup>6</sup> A Himes-Cornell, SO Grose and L Pendleton, 'Mangrove Ecosystem Service Values and Methodological Approaches to Valuation: Where Do We Stand?' (2018) (Oct) *Frontiers in Marine Science* 376.

coastal reclamation, pollution and eutrophication, and over-harvesting.<sup>7</sup> Increasingly, scientific research is pointing to the impacts of these activities on mangroves, and the ecological cost of the continued declines.<sup>8</sup>

This article explores the integration of law and science, by focusing on whether the scientific value placed upon mangroves is matched by their legal recognition and protection. The purpose is to highlight the ways in which mangroves have been treated in law and to make suggestions for how states could enhance their approaches to ensure that these critical ecosystems are better protected, managed and, if necessary, restored. Law has a critical role to play, for example, in legally protecting mangroves from being harvested or harmed, conserving specific mangrove species and/or managing such species as part of a protected area. Law can mandate specific conservation efforts, including restoration and reforestation, and/or require the implementation of management plans focused on conservation and sustainable utilisation. More broadly, legal frameworks can embed consideration of ecosystem services in decision-making processes surrounding development approvals, requirements for environmental impact assessment and consideration of ecosystem-based management principles.

While mangroves are rarely subject to tailored international law or domestic legislation, they do often feature in habitat, forestry or fisheries laws, and sometimes in protected area management, biodiversity, coastal zone management or climate change regimes. The ways in which they are conserved, managed or restored reflects both the ecosystem services they provide and the particular priorities within each state. By exploring the diversity of legal mechanisms utilised, a suite of legal options can be identified, which will be of value to these and other states seeking to enhance mangrove protection, management and restoration.

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<sup>7</sup> In Mauritius, for example, threats to mangrove areas include 'habitat fragmentation and land use conversion ... due to growing demand for land for development in prime coastal areas': Republic of Mauritius, *National Biodiversity Strategy and Action Plan 2017–2025* (2017) 29. In Fiji, the threats include mangrove-cutting and coastal tourism development: Government of Fiji, *Fiji's Fifth National Report to Convention on Biological Diversity 2009–2014* (Report, 2014) 6 <<https://www.cbd.int/doc/world/fj/fj-nr-05-en.pdf>>. Mangrove encroachment can also be a problem, by over-shadowing or migration into saltmarsh or open intertidal flats: C Harty, 'Planning Strategies for Mangrove and Saltmarsh Changes in Southeast Australia' (2004) 32(4) *Coastal Management* 405.

<sup>8</sup> See, eg, Linwood Pendleton et al, 'Estimating Global "Blue Carbon" Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems' (2012) 7(9) *PLoS ONE* e43542; and Laura Carugati et al, 'Impact of Mangrove Forests Degradation on Biodiversity and Ecosystem Functioning' (2018) 8 *Scientific Reports* art 13298.

The focus of this research is Indo-Pacific island states.<sup>9</sup> These nations are home to important mangrove species and areas, and a range of mangrove values and services is recognised.<sup>10</sup> There are also examples of propagation programmes in the region, which demonstrate political will for their restoration.<sup>11</sup> Mangrove ecosystems are of critical importance to communities for food and livelihoods in these countries, and for coastal protection from extreme weather events associated with the changing climate, but simultaneously these areas will be affected by sea level rise and thermal stress.<sup>12</sup> From a legal perspective, the rationale for focusing on these Indo-Pacific states is to contribute to the limited legal literature about these nations, to examine the ways in which these countries have utilised relevant international laws to protect mangrove areas, and to explore the diverse and innovative domestic legislative interventions. By comparatively analysing these jurisdictions, a toolbox of legal options and approaches can be distilled, which may assist other states in legal capacity building to enhance protection, management and restoration of mangroves.

Although island states face many common challenges, they also have notable differences that complicate comparative analysis. Most Pacific states are legally pluralistic, combining a common law legal system with customary law and traditional land tenure rights.<sup>13</sup> This adds a layer of complexity to the governance landscape in the Pacific region, and can provide a foundation for community-based mangrove governance.<sup>14</sup> This article focuses upon formally recognised,

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<sup>9</sup> In the Pacific, the states considered here include the Federated States of Micronesia ('FSM'), Fiji, Kiribati, Marshall Islands, Palau, Papua New Guinea ('PNG'), Samoa, Solomon Islands, Timor Leste, Tonga and Vanuatu. In the Indian Ocean, they include Madagascar, Maldives, Mauritius and Seychelles.

<sup>10</sup> It is estimated that in Fiji, for example, 38,000 hectares of mangrove remain, which is the third largest in the Pacific: Asian Development Bank, *Environment Assessment (Summary), Country Partnership Strategy: Fiji 2014–2018* (Report, 2014) <<https://www.adb.org/sites/default/files/linked-documents/cps-fij-2014-2018-ena.pdf>>. See also James Sloan, 'How Does the Law Protect Mangroves in Fiji?' [2017] *Ocean Law Bulletin* (13 February 2017) <<http://www.sas.com.fj/ocean-law-bulletins/how-does-the-law-protect-mangroves-in-fiji>>. In Mauritius, several species of mangrove have been identified, including *Bruguiera gymnorrhiza* and *Rhizophora mucronata*, and cover about 20 square kilometres: Chandani Appadoo, 'Status of Mangroves in Mauritius' (2003) 7(1) *Journal of Coastal Development* 1.

<sup>11</sup> A specific mangrove propagation programme was initiated in 1995, involving the planting of 220,000 seedlings, with an 80 per cent success rate; and as of 2009, mangrove cover had extended to 145 hectares: Ministry of Environment and Sustainable Development, Government of Mauritius, *Mauritius Environmental Outlook Report* (Report, 2011) 96.

<sup>12</sup> Ministry of Environment and Sustainable Development, Government of Mauritius, *Mauritius Environmental Outlook Report* (Report, 2011) 90 and 144.

<sup>13</sup> Although most States in the Pacific have majority Indigenous populations, this is not the case in Fiji Islands, where approximately half the population is Indigenous and half is of Indian descent as a result of British indentured labour policies to support plantations.

<sup>14</sup> For example, in Fiji, Vanuatu and the Solomon Islands: Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangroves in Fiji* (Undated Report); Mangrove Ecosystems for Climate Change Adaptation and

state-based law, largely because the foreshore areas where mangroves are located fall below the high-water mark and therefore legally belong to the State.<sup>15</sup> There is little formal recognition of customary law in the Indian Ocean island states, in comparison to the Pacific.<sup>16</sup> Mauritius and Seychelles, for example, had no Indigenous peoples, although periods of slavery have resulted in a strong Creole culture today.<sup>17</sup> In the Indian Ocean, both common law and civil systems are found, although Sharia's law also operates in states such as the Maldives and Comoros. Yet much can be learned from a comparative analysis of the laws, given the shared goal of improving mangrove governance.

This research has involved a desk-based analysis of the ways in which Indo-Pacific island states have utilised international law and domestic legislation to protect, manage and/or restore mangrove ecosystems. The methodology has drawbacks because laws as enacted may not be implemented, complied with or enforced. Further empirical research is, therefore, essential to assess the effectiveness of the laws. Nevertheless, this study is a first step to better understanding the various ways in which mangroves are treated in law, and it contributes to the limited literature on environmental law in Indo-Pacific island states.

The article commences by examining the global legal landscape relevant to mangroves, including both international law and global programmes, and the ways in which Indo-Pacific island countries have engaged at the global level. The next section explores regional developments in each of the Pacific and Indian Ocean areas, given there are no initiatives that span the Indo-Pacific region. This is followed by an analysis of the domestic laws that account for mangroves in Indo-Pacific island states. The article concludes by drawing out the various legal options and approaches to conserve, manage and restore mangroves, which are of value to these and other jurisdictions seeking to enhance legal recognition and protection of these critical ecosystems.

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Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangroves in the Solomon Islands* (Undated Report); and *Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, Review of Policy and Legislation Relating to the Use and Management of Mangrove Ecosystems in Vanuatu* (Undated Report).

<sup>15</sup> Brian Rotich, Esther Mwangi and Steven Lawry, *Where Land Meets the Sea: A Global Review of the Governance and Tenure Dimensions of Coastal Mangrove Forests* (Center for International Forestry Research and United States Agency for International Development, 2016) viii.

<sup>16</sup> Katrina Cuskelly, *Customs and Constitutions: State Recognition of Customary Law Around the World* (International Union for the Conservation of Nature and Natural Resources, 2011) 16. Madagascar recognises customary law, but other states do not.

<sup>17</sup> Again, though, this is not uniform and Mauritius also has a large Indian population.

## II INTERNATIONAL LAW, MANGROVES AND ISLAND STATES

Multiple international instruments, institutions and programs focus on mangrove conservation, management and restoration. The relevant binding instruments fall into three broad categories: first, habitat and area-based instruments such as the *Convention on Wetlands* ('Ramsar Convention')<sup>18</sup> and the *Convention Concerning the Protection of the World Cultural and Natural Heritage* ('World Heritage Convention').<sup>19</sup> Also relevant is the *International Convention for the Prevention of Pollution from Ships* ('MARPOL').<sup>20</sup> Secondly, there are biodiversity and species-based treaties, including the *Convention on Biological Diversity* ('CBD')<sup>21</sup> and *Convention on International Trade in Endangered Species* ('CITES').<sup>22</sup> Thirdly, there are the instruments recognising other values of mangroves, primarily related to climate change: the *United Nations Framework Convention on Climate Change*<sup>23</sup> and the *Paris Agreement*.<sup>24</sup> These international laws have been widely ratified by Indo-Pacific countries as highlighted below.

The Ramsar Convention was the first international instrument to focus specifically on habitats. It recognises the importance of wetlands, which include mangroves, as habitats for flora and fauna.<sup>25</sup> The Convention requires each state to designate at least one wetland area and, thereafter, to promote conservation and wise use of the wetland.<sup>26</sup> This Convention is less well-ratified than others in the Indo-Pacific;<sup>27</sup> nevertheless, it can catalyse the listing and protection of wetland areas, and an examination of the Ramsar List of Wetlands shows that this has occurred: Fiji's Qoliqoli Cokovata, Nooto-North Tarawa in Kiribati, Jaluit and Namdrik Atolls in the Marshall Islands, Aldabra Atoll and Port Launay Coastal

<sup>18</sup> *Convention on Wetlands of International Importance especially as Waterfowl Habitat*, opened for signature 2 February 1971, 996 UNTS 246 (entered into force 21 December 1975) ('Ramsar Convention').

<sup>19</sup> *Convention for the Protection of the World Cultural and Natural Heritage*, adopted 16 November 1972, 1037 UNTS 151 (entered into force 17 December 1975) ('World Heritage Convention').

<sup>20</sup> *International Convention for the Prevention of Pollution by Ships*, adopted 2 November 1973, 1340 UNTS 1841 (entered into force 2 October 1983). As modified by the Protocol of 1978, adopted 17 February 1978, 12 ILM 1319 (combined instrument entered into force on 2 October 1983).

<sup>21</sup> *Convention on Biological Diversity*, adopted 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993).

<sup>22</sup> *Convention on International Trade in Endangered Species of Wild Fauna and Flora*, adopted 3 March 1973, 993 UNTS 243 (entered into force 1 July 1975) ('CITES').

<sup>23</sup> *United Nations Framework Convention on Climate Change*, adopted 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

<sup>24</sup> *Paris Agreement*, adopted 13 December 2015 (entered into force 4 November 2016) UNFCCC, COP Report No 21, Addendum, 21. UN Doc FCCC/CP/2015/10/Add.1.

<sup>25</sup> Wetlands are defined in the Ramsar Convention (n 18) art 1.

<sup>26</sup> *Ibid* arts 2 and 3.

<sup>27</sup> In the Pacific, Fiji, Palau, PNG, Samoa and Vanuatu have ratified, as have Mauritius and Seychelles in the Indian Ocean: Ramsar, *Contracting Parties to the Ramsar Convention* <[https://www.ramsar.org/sites/default/files/documents/library/annotated\\_contracting\\_parties\\_list\\_e.pdf](https://www.ramsar.org/sites/default/files/documents/library/annotated_contracting_parties_list_e.pdf)>.

Wetland in Seychelles, Zones Humides de Sahamalaza, Site Bioculturel d'Antrema, Iles Barren, Mangroves de Tsiribihina and Complexe des lacs Ambondro et Sirave in Madagascar, and Blue Bay Marine Park and Pointe d'Esny Wetland in Mauritius.<sup>28</sup> Furthermore, the Ramsar Convention Secretariat hosts one programme focused specifically on mangroves, although it does not relate to the Indo-Pacific Region.<sup>29</sup> States have implemented the Ramsar Convention in their national governance framework in different ways, including through area-based management laws, as explored further below.<sup>30</sup> For example, Mauritius has established a national Ramsar Committee 'comprising members from all relevant institutions involved with wetlands to assist the Ministry in implementing the provisions contained in the Ramsar Convention and to advise the Ministry on Wetland development issues'.<sup>31</sup>

The World Heritage Convention is another treaty that can be utilised to protect both natural mangrove sites and those areas with cultural values.<sup>32</sup> The Convention is well accepted, with all Indo-Pacific island states having ratified it.<sup>33</sup> It encourages the identification, protection, preservation and presentation of natural and cultural heritage of 'outstanding universal value' to all peoples.<sup>34</sup> The World Heritage Marine Programme focuses on 50 flagship marine protected areas with outstanding universal value, several of which include mangroves.<sup>35</sup> The World Heritage list includes a number of Indo-Pacific sites with mangrove areas, including Nan Madol in the Federated States of Micronesia ('FSM'), Aldabra Atoll in Seychelles, and Tsingy de Bemaraha Strict Nature Reserve in Madagascar.<sup>36</sup> State parties are required to enact appropriate law for such sites,<sup>37</sup> which in most cases is through protected area management provisions (outlined further below). It is also clear that Indo-Pacific states continue to put forward relevant sites for listing. Fiji, for example, has three sites on the tentative list, including the

<sup>28</sup> Ramsar, *Ramsar Sites Information Service*: <<https://rsis.ramsar.org/>>.

<sup>29</sup> Ramsar, *Regional Initiative for the Conservation and Wise Use of Mangroves and Coral Reefs in the Americas*: <[http://archive.ramsar.org/pdf/regional-initiatives/Americas/Americas\\_coral-reefs\\_mangroves.pdf](http://archive.ramsar.org/pdf/regional-initiatives/Americas/Americas_coral-reefs_mangroves.pdf)>.

<sup>30</sup> See, eg, Evan Hamman and Vainuupo Jungblut, 'Wetlands of the Pacific: Towards Effective Law and Governance' in Margaretha Wewerinke-Singh and Evan Hamman (eds), *Environmental Law and Governance in the Pacific: Climate Change, Biodiversity and Communities* (Routledge/Earthscan, 2020) ch 9.

<sup>31</sup> Government of Mauritius, *Wetland Unit* <<http://npcs.govmu.org/English/Documents/Wetland.pdf>>.

<sup>32</sup> Natural and cultural heritage is defined in the World Heritage Convention (n 19) art 1.

<sup>33</sup> UNESCO World Heritage Convention, States Parties Ratification Status: <<https://whc.unesco.org/en/statesparties/>>.

<sup>34</sup> World Heritage Convention (n 19) arts 3–5.

<sup>35</sup> World Heritage Centre, World Heritage Marine Programme: <<https://whc.unesco.org/en/marine-programme/>>.

<sup>36</sup> UNESCO World Heritage Convention, World Heritage List: <<https://whc.unesco.org/en/list/>>.

<sup>37</sup> World Heritage Convention (n 19) art 5.

Sigatoka Sand Dunes with nearby mangroves. The listing of this area, therefore, would be likely to enhance protection.<sup>38</sup>

A further relevant international instrument is MARPOL,<sup>39</sup> which provides for the designation of Particularly Sensitive Sea Areas ('PSSAs'), where special protection is warranted on the grounds of ecological, scientific or socio-economic criteria.<sup>40</sup> Mangroves are explicitly referred to in the Revised Guidelines on PSSAs with reference to ecological criteria.<sup>41</sup> This mechanism has been used to protect an Indo-Pacific mangrove area: Jomard Entrance in Papua New Guinea, which features coral reefs and mangrove areas.<sup>42</sup>

The CBD has an important role to play in protected area management, encouraging *in situ* conservation and requiring parties 'as far as possible and appropriate' to 'establish a system of protected areas' and 'regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use'.<sup>43</sup> Mangroves are specifically referred to in operational objectives under the Marine and Coastal Living Resources Programme, in the Programme of Work to operationalise the Jakarta Mandate.<sup>44</sup> The treaty has been widely endorsed, and all Indo-Pacific island countries are members.<sup>45</sup> As part of their obligations, states must submit national reports; and in these reports, many states have included actions in relation to mangroves.<sup>46</sup> Maldives is one of the few Indo-Pacific states to submit its Sixth National Report; it observes that mangrove areas are important ecosystems providing essential

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<sup>38</sup> *Sustainable Coastal Resources Management for Fiji: A Background Paper prepared for the Fiji National Workshop on Integrated Coastal Management* (2002) <[http://www.crc.uri.edu/download/Fiji\\_National\\_Paper.pdf](http://www.crc.uri.edu/download/Fiji_National_Paper.pdf)>.

<sup>39</sup> The majority of Indo-Pacific island states have ratified the main treaty and at least one of the Annexes: IMO, Status of Conventions: <<http://www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx>>.

<sup>40</sup> IMO, *Particularly Sensitive Sea Areas*: <<http://www.imo.org/en/OurWork/Environment/PSSAs/Pages/Default.aspx>>.

<sup>41</sup> International Maritime Organisation, *Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas*, IMO Assembly Res A.982(24), 24<sup>th</sup> session, Agenda Item 11, IMO Doc A 24/Res.982 (1 December 2005).

<sup>42</sup> Marine Environment Protection Committee, *Designation of the Jomard Entrance as a Particularly Sensitive Sea Area*, MPEC Res MEPC.283(70), IMO Doc MEPC 70/18/Add.1 (28 October 2016) annex 12. In addition, Australia and PNG proposed the Torres Strait as a PSSA: IMO, *List of Special Areas under MARPOL and Particularly Sensitive Sea Areas*, MEPC.1/Circ.778: <[http://www.imo.org/blast/blastDataHelper.asp?data\\_id=30979&filename=778.pdf](http://www.imo.org/blast/blastDataHelper.asp?data_id=30979&filename=778.pdf)>.

<sup>43</sup> *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) art 8.

<sup>44</sup> *Convention on Biological Diversity, Marine and Coastal Biological Diversity*, Conference of the Parties to the Convention on Biological Diversity, 7<sup>th</sup> meeting, Agenda Item 18.2, UN Doc UNEP/CBD/COP/DEC/VII/5 (13 April 2004) 2, 14, 47.

<sup>45</sup> *Convention on Biological Diversity ('CBD')*, List of Parties: <<https://www.cbd.int/information/parties.shtml>>.

<sup>46</sup> CBD, *National Reports*: <<https://www.cbd.int/reports/>>.

services, notes the impacts of waste and pollution, and commits to establishing an inventory and protecting 20 per cent of wetlands and mangroves by 2025.<sup>47</sup> Mangroves also feature, for example, in Fiji's Fifth National Report, where it is noted that 'habitat destruction in the coastal areas for tourism development is a major threat to Fiji's biodiversity in the mangrove, estuaries, reef and foreshore ecosystems'.<sup>48</sup> Mangroves are also recognised for their ability to act as buffers against natural disasters.<sup>49</sup>

CITES is focused on regulating or prohibiting international trade in threatened or endangered species. It creates a framework for the listing of species in one of three appendices, and could potentially regulate international trade in all species of flora and fauna.<sup>50</sup> Although some plants with a poor conservation status have been listed, no mangrove species are included.<sup>51</sup>

In relation to the marine environment, the *United Nations Convention on the Law of the Sea* ('UNCLOS') is the primary instrument that establishes key maritime zones, as well as rights and obligations in relation to ocean areas and resources.<sup>52</sup> All Indo-Pacific island states have ratified it.<sup>53</sup> Mangroves are found in the coastal zone, which is either considered to be land (outside the scope of UNCLOS) or the territorial sea.<sup>54</sup> States have sovereignty over the territorial sea, and the right to exploit resources found there, subject to the obligation to protect and preserve the marine environment.<sup>55</sup> Part XII of UNCLOS sets out some relevant specific provisions, including the obligation to take measures 'necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life'.<sup>56</sup> This provides one of the only international obligations placed upon states to conserve species at risk within their own territory.

Beyond the binding international law referred to above, there are a number of soft law instruments that provide for the protection or sustainable use of

<sup>47</sup> Maldives, *Sixth National Report to the CBD 2014–2018*: <<https://chm.cbd.int/search/reporting-map?filter=nr6>>.

<sup>48</sup> Fiji, *Fifth National Report to CBD 2009–2014*: <<https://www.cbd.int/doc/world/fj/fj-nr-05-en.pdf>> 6–7.

<sup>49</sup> Ibid 10.

<sup>50</sup> CITES (n 22) arts I–V.

<sup>51</sup> CITES, Species Plus: <<https://www.speciesplus.net/>>. Although some species are listed that depend upon mangroves, such as the Mangrove Black-Hawk, Mangrove Hummingbird and Mangrove Monitor: <[https://www.speciesplus.net/#/taxon\\_concepts?taxonomy=cites\\_eu&taxon\\_concept\\_query=mangrove&geo\\_entities\\_ids=&geo\\_entity\\_scope=cites&page=1](https://www.speciesplus.net/#/taxon_concepts?taxonomy=cites_eu&taxon_concept_query=mangrove&geo_entities_ids=&geo_entity_scope=cites&page=1)>.

<sup>52</sup> *United Nations Convention on the Law of the Sea*, adopted 10 December 1982, 1833 UNTS 396 (entered into force 16 November 1994) ('UNCLOS').

<sup>53</sup> For state parties, see <[https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXI-6&chapter=21&clang=\\_en](https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXI-6&chapter=21&clang=_en)>.

<sup>54</sup> UNCLOS (n 52) arts 2–5.

<sup>55</sup> Ibid arts 192 and 193.

<sup>56</sup> Ibid art 194(5).

mangrove environments. The Food and Agriculture Organization's *Code of Conduct for Responsible Fisheries* is the key document covering fisheries management, fishing operations, aquaculture development, integrated coastal zone management, trade and research. Objectives include the 'protection of living aquatic resources and their environments and coastal areas',<sup>57</sup> through, inter alia, conservation of ecosystems and protection and rehabilitation of 'critical fisheries habitats ... such as ... mangroves'.<sup>58</sup> In relation to forest conservation, there is only a soft law instrument: *Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests*.<sup>59</sup> Mangroves are not referred to explicitly, and no state obligations are created. Other relevant international instruments include the *International Tropical Timber Agreement*, which applies only to tropical timbers and focuses on trade, but does refer to conservation in the context of sustainable management.<sup>60</sup> The International Tropical Timber Organization ('ITTO')<sup>61</sup> recognises the value of mangroves, particularly in terms of coastal protection and water quality, and also the threats to these species.<sup>62</sup> A number of mangrove initiatives fall under the auspices of the ITTO,<sup>63</sup> including the development of a Global Mangrove Database and Information System ('GLOMIS').<sup>64</sup> Other non-binding global initiatives include the Forest Stewardship Council,<sup>65</sup> which is a voluntary forest product certification and labelling scheme, with principles

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<sup>57</sup> Food and Agriculture Organization, *Code of Conduct on Responsible Fisheries* <<http://www.fao.org/3/v9878e/v9878e00.htm>> art 2.

<sup>58</sup> Ibid art 6.8.

<sup>59</sup> It recognises the role that forests play, and confirms States' rights to exploit forest resources but also calls for sustainable management. See 'Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests' in *Report of the United Nations Conference on Environment and Development*, UN GAOR, UN Doc A/CONF.151/26 (Vol. III) (14 August 1992) annex III.

<sup>60</sup> *International Tropical Timber Agreement*, opened for signature 26 January 1994, 1955 UNTS 81 (provisionally entered into force 1 January 1997). See also *International Tropical Timber Agreement*, opened for signature 27 January 2006, 2797 UNTS 75 (entered into force 7 December 2011).

<sup>61</sup> Of the Indo-Pacific island countries, only Fiji and PNG are members: International Tropical Timber Organization ('ITTO'), *Members* <[https://www.itto.int/about\\_itto/members/](https://www.itto.int/about_itto/members/)>.

<sup>62</sup> ITTO, *Mangroves* <<http://www.itto.int/feature07>>.

<sup>63</sup> The ITTO hosted the International Conference on Sustainable Mangrove Ecosystems in 2017: <<https://www.itto.int/mangrove2017/>>. The outcome report includes an entire theme devoted to governance, monitoring and law enforcement: ITTO, *Report of International Conference on Sustainable Mangrove Ecosystems: Managing a Vital Resource for Achieving the Sustainable Development Goals and the Paris Agreement* (Report, 2017).

<sup>64</sup> Global Mangrove Database and Information System <<http://www.gloemis.com/>>.

<sup>65</sup> Forest Stewardship Council (Web Page) <<https://www.fsc.org/>>.

addressing ecosystem values. There is future potential for schemes such as this and the soft law instruments to form the basis of a legal treaty.<sup>66</sup>

Mangrove conservation efforts could be assisted through the Reduction of Emissions from Deforestation and Forest Degradation ('REDD') programme under the auspices of the *United Nations Framework Convention on Climate Change* ('UNFCCC').<sup>67</sup> The idea of extending the REDD programme to mangroves and other wetlands was explored in a 2012 workshop.<sup>68</sup> Subsequently, the *Paris Agreement* was adopted, requiring states to set out their mitigation and adaptation efforts to addressing climate change through Nationally Determined Contributions ('NDCs').<sup>69</sup> A number of Indo-Pacific island states include wetlands in their mitigation strategies; other states focus on adaptation, in the context of conservation, coastal zone management and sustainable fisheries.<sup>70</sup> For example, Fiji, Kiribati, Marshall Islands, Madagascar, Mauritius and Seychelles all refer to mangroves in their NDCs.<sup>71</sup> Each State has taken a different approach; for example, Fiji commits to strengthening town planning regulations to conserve existing mangrove areas and to plant mangroves as part of its coastal adaptation plans,<sup>72</sup> and Kiribati includes mangrove conservation and management for mitigation.<sup>73</sup> It has also been recognised that mangroves can protect against natural disasters more broadly. Although there is no international legally binding instrument in this area, there are soft law instruments such as the United Nations Office for Disaster Risk Reduction's *Sendai Framework for Disaster Risk Reduction*.<sup>74</sup> Strengthening governance is a key aspect of the framework, including by mainstreaming and integrating disaster risk reduction in national laws.<sup>75</sup>

<sup>66</sup> See, generally, Feja Lesniewska, *Laws for Forests* (International Institute for Environment and Development, 2005); Constance McDermott, Aran O'Carroll and Peter Wood, *International Forest Policy — The Instruments, Agreements and Processes that Shape It* (United Nations Department of Economic and Social Affairs, 2007).

<sup>67</sup> *United Nations Framework Convention on Climate Change*, opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

<sup>68</sup> See 'REDD+ and Legal Regimes of Mangroves, Peatlands and Other Wetlands: ASEAN and the World' [2013] (1) *International Journal of Rural Law and Policy* <<http://epress.lib.uts.edu.au/journals/index.php/ijrlp/issue/view/271>>.

<sup>69</sup> *Paris Agreement* (n 24) arts 3 and 4.

<sup>70</sup> D Herr and E Landis, *Coastal Blue Carbon Ecosystems. Opportunities for Nationally Determined Contributions* (International Union for the Conservation of Nature and Natural Resources and The Nature Conservancy, 2016) 10.

<sup>71</sup> NDC Registry <<https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>>.

<sup>72</sup> Government of Fiji, *Fiji's Intended Nationally Determined Contribution* (Report, 2015) 8–9.

<sup>73</sup> Republic of Kiribati, *Intended Nationally Determined Contribution* (Report, 2015) 9.

<sup>74</sup> UN Office for Disaster Risk Reduction, *Sendai Framework for Disaster Risk Reduction 2015–2030* (Report, 2015) <<https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>>.

<sup>75</sup> *Ibid* Priority 2.

Beyond the international law instruments, key United Nations bodies have supported important mangrove programmes in the Indo-Pacific. For example, United Nations Environment (together with others) has co-developed the *World Mangrove Atlas* to provide a global distribution map, which benefits all nations, including those in the Indo-Pacific.<sup>76</sup> The United Nations Development Programme ('UNDP') oversaw an Adaptation Fund project, *20,000 Mangroves Strong*, which involved replanting mangroves in Mauritius for coastal protection and livelihoods.<sup>77</sup> Mauritian engagement at regional and global levels has also been of benefit in protecting critical areas. For example, the *Project for Capacity Development on Coastal Protection and Rehabilitation in the Republic of Mauritius* was supported by the Japan International Cooperation Agency ('JICA'), which identified impacts on coastal environments due to loss of mangroves and the need for conservation.<sup>78</sup> International non-governmental organisations ('NGOs') also have programmes of work relevant to mangroves, although few include law and governance aspects.<sup>79</sup> The International Union for Conservation of Nature ('IUCN'), together with the UNDP, leads the *Mangroves for the Future* ('MFF') programme, including work with the Maldives and Seychelles.<sup>80</sup> Relevant to this article, the programme is working to support legal protection of mangroves in the

<sup>76</sup> UN Environment and WCMC, *World Mangrove Atlas*: <<https://www.unep-wcmc.org/resources-and-data/world-mangrove-atlas-1997>>.

<sup>77</sup> United Nations Development Programme, '20,000 Mangroves Strong', *United Nations Development Programme Stories* (Web Page, 3 June 2014) <<https://stories.undp.org/20000-mangroves-strong>>.

<sup>78</sup> Ministry of Environment, Sustainable Development, Disaster and Beach Management of the Republic of Mauritius, *Project for Capacity Development on Coastal Protection and Rehabilitation in the Republic of Mauritius: Final Report* (Report, Japan International Cooperation Agency, 2015).

<sup>79</sup> For example, the International Society for Mangrove Ecosystems is the only global NGO that focuses purely on mangroves and has engaged in projects in Kiribati and Maldives <<http://www.mangrove.or.jp/english/subpage/index.html#pageLink-mokuteki>> and <<http://www.mangrove.or.jp/english/subpage/projects.html#pageLink-now>>. The *Mangrove Action Project* is a network that brings together scientists and NGOs to reverse mangrove degradation: <<http://mangroveactionproject.org>>. It has worked in Timor Leste. IUCN undertook the *Global Status Report on Mangroves: Working Group on Mangrove Ecosystems of the Commission on Ecology, United Nations Environment Programme and World Wildlife Fund, Global Status of Mangrove Ecosystems* (Report, International Union for the Conservation of Nature and Natural Resources, 1983). World Wide Fund for Nature ('WWF') works to conserve mangroves through its 'Oceans, Seas and Coasts' and focus on mangrove forests, with projects in various island states, such as Madagascar: <[http://www.wwf.panda.org/about\\_our\\_earth/blue\\_planet/coasts/mangroves/](http://www.wwf.panda.org/about_our_earth/blue_planet/coasts/mangroves/)>; Trevor G Jones et al, 'Madagascar's Mangroves: Quantifying Nation-Wide and Ecosystem Specific Dynamics, and Detailed Contemporary Mapping of Distinct Ecosystems' (2016) 8(2) *Remote Sensing* 106 <<http://www.mdpi.com/2072-4292/8/2/106/pdf>>. Similarly, The Nature Conservancy has a focus on 'Coasts and Communities', including mangroves, and partners with local NGOs: <<https://www.nature.org/ourinitiatives/urgentissues/oceans/coasts-and-communities/restoration-works-mangroves.xml>>.

<sup>80</sup> *Mangroves for the Future*: <<https://www.mangrovesforthefuture.org/>>.

Seychelles.<sup>81</sup> The IUCN also hosts the *Pacific Mangrove Initiative* ('PMI'), which seeks to promote investment and action in sustainable mangrove futures, with policy and legislation being a key focus.<sup>82</sup> These NGOs can play a powerful role in achieving positive outcomes on the ground, with some also working to overcome governance challenges.

### III REGIONAL MANGROVE GOVERNANCE

Regional approaches allow states to coordinate and collaborate on shared vulnerabilities and concerns. Pacific Island states are members of a number of strong governmental and non-governmental regional organisations leading to the adoption of regional treaties in some areas.<sup>83</sup> The IUCN *Pacific Mangrove Initiative* works with the Secretariat of the Pacific Environment Programme, the UNDP and Fiji, Vanuatu, Papua New Guinea, Samoa, Solomon Islands and Tonga. In addition, the IUCN has completed a valuable global legal assessment of mangrove governance.<sup>84</sup> Relevantly, there are two specific regional projects. The first is the Mangrove Ecosystem for Sustainable Climate Change Adaptation and Livelihoods project ('MESCAL')<sup>85</sup> which involved Fiji, Samoa, Solomon Islands, Tonga and Vanuatu from 2009 to 2013.<sup>86</sup> The second was the Mangrove

<sup>81</sup> Mangroves for the Future, *Mangroves for the Future: Investing in Coastal Ecosystems* <<https://www.mangrovesforthefuture.org/assets/Repository/Documents/2011-MFF-Brochure.pdf>> 5.

<sup>82</sup> IUCN, *Pacific Mangroves Initiative* (Web Page) <<https://www.iucn.org/regions/oceania/our-work/deploying-nature-based-solutions/water-and-wetlands/completed-projects/pacific-mangroves-initiative>>. Key partners include the Secretariat of the Pacific Regional Environment Programme ('SPREP'), the United Nations Development Programme ('UNDP') and Fiji, Vanuatu, Papua New Guinea, Samoa, Solomon Islands and Tonga.

<sup>83</sup> Pacific Community ('SPC'), the Pacific Islands Forum Secretariat, the SPREP, and the Pacific Islands Applied Geoscience Commission.

<sup>84</sup> Lydia Slobodian et al, *Legal frameworks for Mangrove Governance, Conservation and Use: Assessment Summary* (IUCN and WWF Germany, 2018).

<sup>85</sup> IUCN, *MESCAL Project* <<https://www.iucn.org/regions/oceania/our-work/nature-based-solutions/water-and-wetlands/pacific-mangroves-initiative/mangrove-ecosystems-climate-change-adaptation-livelihoods-mescal-project>>.

<sup>86</sup> The project has resulted in five detailed reports: *Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, Review of Policy and Legislation Relating to the Use and Management of Mangroves in Fiji* (Undated Report); *Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, Review of Policy and Legislation Relating to the Use and Management of Mangrove Ecosystems in the Solomon Islands* (Undated Report); *Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, Review of Policy and Legislation Relating to the Use and Management of Mangroves in Samoa* (Undated Report); *Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, Review of Policy and Legislation Relating to the Use and Management of Mangroves in Tonga* (Undated Report); and *Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, Review of Policy and Legislation Relating to the Use and Management of Mangrove Ecosystems in Vanuatu* (Undated Report).

Rehabilitation for Sustainably-Managed Forest project ('MARSH')<sup>87</sup> which was implemented in Papua New Guinea, Solomon Islands and Vanuatu, with policy and legislation as one of the five key focus areas. The Pacific region is well known for its adoption of regional treaties and model law frameworks.<sup>88</sup> Mangrove governance is not currently the subject of such interventions, but there is scope for regional approaches to be adopted in the future.

Regional organisations and initiatives are much less developed in the Indian Ocean. The oldest regional body is the Indian Ocean Commission, but it has a limited membership and a mandate focused on regional economic development.<sup>89</sup> The regional organisation with the broadest membership is the Indian Ocean Rim Association ('IORA'), which has 22 members, including island states and littoral nations. There are no pan-regional Indian Ocean mangrove initiatives, nor any relevant regional policy or treaties. However, the IORA Blue Carbon Hub has recently been established to protect and restore ecosystems, including mangroves.<sup>90</sup> There are many opportunities to enhance regional environmental law in the Indian Ocean, particularly in the context of the blue economy,<sup>91</sup> and it remains to be seen whether IORA will take the lead in this space.<sup>92</sup>

#### IV NATIONAL GOVERNANCE IN INDO-PACIFIC ISLAND STATES

In the majority of Indo-Pacific islands, the value of mangrove ecosystems is recognised, albeit in different ways. Sometimes the interventions have been driven by international environmental law obligations, and in other instances by bottom-up national interests. As noted above, in some cases mangroves are regulated as natural resources under fisheries or forestry laws. In all these cases, species-based and area-based tools are frequently utilised, and sometimes, these protections are connected with the ecosystem services that mangroves provide. Explored below are examples of jurisdictions where fisheries laws recognise that

<sup>87</sup> IUCN, *MARSH Project* <<https://www.iucn.org/regions/oceania/our-work/nature-based-solutions/water-and-wetlands/pacific-mangroves-initiative/mangrove-rehabilitation-sustainably-managed-healthy-forests-marsh-project>>.

<sup>88</sup> See, eg, *Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region*, opened for signature 9 July 1992, [1993] ATS 31 (entered into force 20 May 1993); and SPC, *Policy Brief: Harmonisation of Biosecurity Laws in the Pacific* (2010), <[https://cgspace.cgiar.org/bitstream/handle/10568/52217/Policy\\_brief\\_Harmonisation\\_of\\_biosecurity\\_laws\\_in\\_the\\_Pacific.pdf?sequence=1&isAllowed=y](https://cgspace.cgiar.org/bitstream/handle/10568/52217/Policy_brief_Harmonisation_of_biosecurity_laws_in_the_Pacific.pdf?sequence=1&isAllowed=y)>.

<sup>89</sup> Indian Ocean Commission <<https://www.commissionoceanindien.org/>>.

<sup>90</sup> CSIRO, *IORA Blue Carbon Hub*: <<https://research.csiro.au/iora-blue-carbon-hub/>>.

<sup>91</sup> The blue economy involves the sustainable development of the ocean space to achieve economic, developmental and socio-cultural benefits, commonly including fisheries, shipping, energy and tourism sectors. See, eg, Government of Seychelles, *Seychelles' Blue Economy Strategic Policy Framework and Roadmap: Charting the Future (2018-2030)* (2017): <<https://seymsp.com/wp-content/uploads/2018/05/CommonwealthSecretariat-12pp-RoadMap-Brochure.pdf>>.

<sup>92</sup> Erika Techera, 'Achieving Blue Economy Goals: The Need for Improved Legal Frameworks Across the Indian Ocean' (2019) 1(2) *Seychelles Research Journal* 5.

mangroves provide breeding, spawning or nursery grounds, and others where they are conserved and restored as valuable biodiversity, sometimes in standalone protected area or threatened species laws. Given that land reclamation and development are key threats to mangroves, land use planning laws are also relevant in some nations, and mangroves are sometimes included in climate change policy because they can protect against coastal erosion and also provide carbon sequestration (blue carbon) services. The sections that follow adopt this thematic approach in analysing the domestic legislation.

### ***A Natural Resources Law and Species-Based Legislation***

There are two main forms of species-based natural resource legislation that are of relevance to mangroves: fisheries and forestry. This classification of mangroves as ‘resources’ tends to focus on regulating their utilisation and does not adequately take account of the multiple ecosystem services they provide. Nonetheless, it is clear that these types of laws can provide regulatory and management frameworks for mangroves, can acknowledge them as habitats for fish and as forestry resources, and, more broadly, can recognise the ecosystem services they provide. Many Acts provide for the designation of aquatic or forest reserves, as well as powers to protect individual species of plants or fish that are threatened or endangered.

In terms of fisheries statutes, domestic legislation sits across a spectrum from basic regulation to comprehensive legal frameworks. The Fijian *Fisheries Act 1942*, for example, allows for the designation of protected areas and seasonal restrictions for conservation, protection and maintenance of fish stocks. Papua New Guinea’s *Fisheries Management Act 1998* is an example of more integrated fisheries regulation that ‘promote[s] the management and sustainable development of fisheries’. Section 25 of that Act provides a comprehensive list of objectives and principles, including ecosystem-based approaches. The FSM *Marine Resources Act 2002* is an example of contemporary legislation that seeks to regulate living marine resources more comprehensively. Fishery laws in the Indian Ocean generally provide a similar system of administration as their Pacific counterparts.<sup>93</sup> The Seychelles *Fisheries Act 2014* demonstrates a sophisticated, integrated approach to fisheries management, with a guiding object being an ecosystem approach based on international standards. In the Maldives, s 10 of the *Fisheries Law (Law No 5/87)* relevantly provides for the protection of species,

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<sup>93</sup> *Loi no 2015-053 portant Code de la Pêche et de l’Aquaculture (Madagascar)*; *Fisheries Law of the Maldives 1987 (Maldives)*; *Fisheries and Marine Resources Act 2007 (Mauritius)*; *Fisheries Act 2014 (Seychelles)*.

although it is unclear whether mangroves could be protected. In Mauritius, mangroves receive focused attention through the fishery reserves provisions under the *Fishing and Marine Resources Act 2007*.<sup>94</sup> The Act includes specific reference to mangroves in the offences regime, stating that '[n]o person shall ... except with the written approval of the Permanent Secretary, cut, take or remove [or] damage ... a mangrove plant'.<sup>95</sup> In addition, s 69(1) prevents the discharge of poisonous substances into a wetland. It is notable that this mangrove protection is in a fisheries Act, and highlights that mangroves are recognised as critically important to fisheries resources in Mauritius. The only other country with similar specificity is Madagascar, where art 84 of the *Loi no 2015-053 portant Code de la Pêche et de l'Aquaculture* provides that '[a]nyone who cuts, collects, transports or sells mangrove wood without authorization is liable to a fine of \$10,000 to \$20,000 per hectare of mangrove destroyed and/or imprisonment for six (6) to twelve (12) months'. As noted below, this approach recognises one ecosystem service related to fish and marine species, but can lead to gaps and overlaps where mangroves are located at the land–water interface.

Forestry Acts are less common across the Indo-Pacific, perhaps because many of the countries are low-lying islands and/or have little forest cover. Nonetheless, for those states with high islands, forested areas and industries, such legislation is in place.<sup>96</sup> Papua New Guinea's *Forestry Act 1991* is comprehensive, providing for the declaration of national forests (area-based protection), protected trees (species-based protection), administrative authorities, forest management plans, forest development plans, a licence and permit system and enforcement. Samoa has taken a similar integrated approach in its *Forestry Management Act 2011*.<sup>97</sup> Mauritius and Seychelles have basic conservation legislation for forests,<sup>98</sup> as opposed to legislation that administers a forestry industry. These laws provide species-based protection for listed trees and area-based protection through forest reserves. Under the Seychelles *Breadfruit and Other Trees (Protection) Act 1917*, one species of mangrove is identified: *Heritiera littoralis*. No mangroves are listed under the Mauritius *Forests and Reserves Act 41 of 1983*.

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<sup>94</sup> See, eg, *Proclamation to Declare the Lafayette Fishing Reserve as a Marine Protected Area and to Designate It as a Fishing Reserve* (No 26 of 2000) <<http://extwprlegs1.fao.org/docs/pdf/mat160783.pdf>>, and *Proclamation to Declare the Trou d'Eau Douce Reserve as a Marine Protected Area and to Designate It as a Fishing Reserve* (No 27 of 2000) <<http://extwprlegs1.fao.org/docs/pdf/mat160791.pdf>>.

<sup>95</sup> *Fishing and Marine Resources Act 2007* (Mauritius) s 69(2).

<sup>96</sup> *Forest Decree 1992* (Fiji); *Forestry Act 1991* (PNG); *Forestry Management Act 2011* (Samoa); *Forests Act 1999* (Solomon Islands); *Forests Act 1961* (Tonga); *Forestry Act 2001* (Vanuatu).

<sup>97</sup> *Forestry Management Act 2011* (Samoa) pt III.

<sup>98</sup> *Forests and Reserves Act 1983* (Mauritius); *Forest Reserve Act 1955* (Seychelles); *Breadfruit and Other Trees (Protection) Act 1917* (Seychelles).

Forestry laws continue to develop, with Fiji, for example, preparing a new *Forest Bill 2016*, although it has not yet been enacted.<sup>99</sup> This law would require the classification of forests to include ‘protection forests’ specifically defined as able to include mangrove forests.<sup>100</sup> While there is no Pacific law that specifically targets mangrove forests, other species have received such attention. For example, the *Tongan Sandalwood Regulations 2016* provide species protection for a specific forestry resource under the *Forests Act 1961*. Mangroves could benefit from similar specific regulations, particularly where they are identified as a species at risk due to pre-existing degradation, harvesting for local use, pollution and cumulative impacts from adjacent coastal development.

## B *Protected Area Laws*

Standalone area-based or protected area legislation exists throughout the Indo-Pacific, although not in all jurisdictions.<sup>101</sup> A simple example is the *Samoa National Parks and Reserves Act 1974*, which provides for the establishment of national parks and reserves, their conservation and preservation, and subsidiary acts to carry out the law.

The location of mangroves in the coastal zone also has the potential to create areas that are protected under different Acts. For example, the *National Parks Act 1954* of the Solomon Islands provides land-based protection, while s 19 of the *Fisheries Management Act 2015* allows the designation of a marine protected area. If mangroves were designated under both Acts, this could result in a perverse situation where differing rules would apply on land and in water in the coastal zone. This highlights the importance of having one coordinating agency or authority. The Fijian National Trust, established under the *National Trust for Fiji Act 2000*, is an example of an entity in a position to exercise this role.

Some mangrove areas are specifically protected under area-based laws. For example, Timor Leste includes in its *Regulation No 2000/19 on Protected Places* a provision declaring that wetlands and mangrove areas are protected in East Timor and prohibits pollution, draining, destruction, cutting, damaging or removing mangroves. In Seychelles, mangroves are protected by the *Port Launay Marine*

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<sup>99</sup> *Forest Bill 2016* (Fiji) <<http://www.parliament.gov.fj/wp-content/uploads/2017/03/Bill-No-13-Forest.pdf>>.

<sup>100</sup> *Ibid* cl 13(1).

<sup>101</sup> See, eg, *Palau National Marine Sanctuary Act 2015* (Palau); *National Parks and Reserves Act 1974* (Samoa); *Protected Areas Act 2010* (Solomon Islands); *National Parks Act 1954* (Solomon Islands); *Parks and Reserves Act 1977* (Tonga); *National Parks Act 1993* (Vanuatu); *Loi No 2015-005 portant Refonte du Code de Gestion des Aires Protégées* (Madagascar); *Environmental Protection and Preservation Act 1993* (Maldives); *Native Terrestrial Biodiversity and National Parks Act 2015* (Mauritius); *National Parks and Nature Conservancy Act 1969* (Seychelles).

*National Park Regulations 1981*, which are made under the *National Parks and Nature Conservancy Act 1969*. Yet in Mauritius, as noted above, mangroves benefit from fishery reserves under the *Fishing and Marine Resources Act 2007*. This again creates the potential for confusion among multiple laws. It is possible that the coastlines of these marine reserves could be protected by nature reserves under the *Forests and Reserves Act 1983*. The *Mauritian Native Terrestrial Biodiversity and National Parks Act 2015* provides for the declaration of national parks or special reserves on state-owned land, as well as private conservation areas on private land. The Ile d'Ambre site, for example, contains mangroves areas and is listed as an open reserve.<sup>102</sup> The Act deals somewhat with the issue of overlapping legislation by creating an authority with the potential to coordinate protected areas made under different legislation.

### C *Planning and Environment Laws*

Basic Pacific environment and planning laws often have limited pollution protection mandates, such as litter and environmental levies.<sup>103</sup> However, later instruments tend to be more sophisticated and comprehensive. For example, s 2 of the *Vanuatu Pollution Control Act 2013* incorporates the precautionary principle, which facilitates broader environmental protection. There are also several examples of detailed environmental management legislation in the Pacific.<sup>104</sup> In the *FSM Environmental Protection Act 1980* a principles-based approach, including sustainable development, is used to guide government decision-making. The *Environmental Impact Assessment Regulations 1996* provide more detailed instruction on the content of these assessments. Fiji has the most specific provisions in this regard, requiring that any development that could 'alter ... mangrove areas', 'harm or destroy designated or proposed protected areas including ... mangrove conservation areas', or 'destroy or damage ... mangrove swamp' require the approval of the Environmental Impact Assessment Administrator.<sup>105</sup>

<sup>102</sup> *Native Terrestrial Biodiversity and National Parks Act 2015* (Mauritius), sch 1, pt II.

<sup>103</sup> *Environmental Levy Act 2015* (Fiji); *Litter Promulgation 2008* (FSM); *Solid Waste Management Regulations 1996* (Palau); *Environment Contaminants Act 1978* (PNG); *Waste Management Act 2010* (Samoa); *Waste Management Act 2005* (Tonga); *Garbage Act 1970* (Tonga); *Pollution Control Act 2013* (Vanuatu).

<sup>104</sup> *Environmental Management Act 2005* (Fiji); *Environmental Quality Protection Act* (Palau); *Environment Act 2000* (PNG); *Environmental Planning Act 1978* (PNG); *Land, Surveys and Environment Act 1989* (Samoa); *Environment Act 1998* (Solomon Islands); *Environment Management Act 2010* (Tonga); *Environmental Management and Conservation Act 2002* (Vanuatu).

<sup>105</sup> *Environment Management Act 2005* (Fiji) sch 2, pt 1(j), (n) and (o), respectively. See also *Environmental Management (EIA Process) Regulations 2007*.

All Indian Ocean island states have environmental management laws.<sup>106</sup> The Mauritian *Environmental Protection Act 2002* includes sustainable development as a core principle,<sup>107</sup> which aligns with its related *Planning and Development Act 2004*.<sup>108</sup> The Act provides for prospective planning and approvals to ensure that environmental resources and areas do not become degraded. The requirements include balancing economic development and environmental conservation, exemplifying sustainable development, and going beyond a simplistic approach to refer to ‘society’, ‘people’ and ‘culture’. The Act, therefore, provides a foundation for decision-making that could take into account all the natural and cultural ecosystem values of mangroves. As in the Pacific, mangroves should benefit from such decision-making processes associated with approval of nearby development projects. This is advanced environmental management legislation, and provides a potential example for other countries to follow.

#### D *Biodiversity and Conservation Law*

Every Indo-Pacific island country has a national biodiversity and strategy action plan provided for under the CBD framework,<sup>109</sup> with the general content not differing significantly. Mangroves feature in all of these plans, and extensive references appear in some.<sup>110</sup> While these National Biodiversity Strategies and Action Plans have been driven by ratification of the CBD, other catalysts exist for legislation. For example, the *Native Terrestrial Biodiversity and National Parks Act 2015* of Mauritius is an instance of an Act using the term ‘biodiversity’ in a purely environmental conservation context and not pursuant to the CBD. There are no

<sup>106</sup> *Décret No 99-954 modifié par le Décret No 2004-167 relatif à la Mise en Compatibilité des Investissements avec l'Environnement* (Madagascar); *Environmental Protection and Preservation Act 1993* (Maldives); *Environmental Protection Act 2002* (Mauritius); *Planning and Development Act 2004* (Mauritius); *Environmental Protection Act 1994* (Seychelles).

<sup>107</sup> *Environmental Protection Act 2002* (Mauritius) preamble.

<sup>108</sup> *Planning and Development Act 2004* (Mauritius) s 3(a)(iv).

<sup>109</sup> Government of Fiji, *Biodiversity Strategy and Action Plan* (2003); Government of the Federated States of Micronesia, *National Biodiversity Strategy and Action Plan* (2002); Republic of Palau, *National Biodiversity Strategy and Action Plan* (2005); Government of Papua New Guinea, *National Biodiversity Strategy and Action Plan* (2007); Ministry of Natural Resources and Environment of Samoa, *National Biodiversity Strategy and Action Plan 2015-2020* (undated); Ministry of Environment, Climate Change, Disaster Management and Meteorology of the Solomon Islands, *National Biodiversity Strategic Action Plan 2016-2020* (2016); Department of Environment of the Kingdom of Tonga, *National Biodiversity Strategy and Action Plan* (2006); Environment Unit of the Government of Vanuatu, *National Biodiversity Strategy and Action Plan Project* (1999); Ministry of Environment and Energy of Maldives, *National Biodiversity Strategy and Action Plan* (2015); Government of the Seychelles, *National Biodiversity Strategy and Action Plan 2015-2020* (2014); Government of Mauritius, *National Biodiversity Strategy and Action Plan* (2017).

<sup>110</sup> The Palau plan refers to mangroves 70 times: Republic of Palau, *National Biodiversity Strategy and Action Plan* (2005) <<https://www.sprep.org/att/IRC/eCOPIES/Countries/Palau/53.pdf>>

Pacific island countries that have passed a biodiversity statute, but it is common for biodiversity to be addressed via a number of different laws. For example, the Samoan biodiversity policy identifies the Samoan Constitution, environmental Acts, forest and reserves Acts, the fishery Act and wildlife and biosecurity Acts as relevant to the conservation and utilisation of biodiversity.<sup>111</sup> Relevantly, mangroves do benefit from a variety of conservation laws. For example, in Tonga the *Birds and Fish Preservation Act 1988* specifically prohibits a person from cutting, damaging, removing or destroying any mangrove within a protected area,<sup>112</sup> and the whole of the lagoon in Tongatapu is a protected area under that law, including mangrove and foreshore areas.<sup>113</sup>

### E *Climate Change Laws*

Although the majority of Indo-Pacific island states have climate change policies, rarely has this translated into legislation. Nevertheless, many of the policy documents and strategic planning instruments do refer to mangroves. In Fiji, for example, the National Climate Change Policy reinforces commitments to conserve mangroves as carbon sinks and for resilience to extreme weather events due to climate change, and also recognises that ‘conservation and sustainable management of mangroves will protect a large carbon sink and reservoir, while providing physical foreshore protection, marine breeding grounds, and healthy coral reef systems’.<sup>114</sup> The Green Growth Framework also refers to the planting of mangroves as an adaptation initiative to protect against sea level rise,<sup>115</sup> as well as damage caused by unsustainable exploitation of artisanal fisheries through mangrove harvesting.<sup>116</sup>

All of the Indo-Pacific countries explored here have signed the Paris Agreement, and this has required the preparation of NDC documents. These documents are insightful, as references to mangroves often highlight key values of national importance. For example, in Fiji’s NDC: ‘The planting of mangroves, construction of seawalls and the relocation of communities to higher grounds are part of ongoing adaptation initiatives.’<sup>117</sup> Actions include strengthening the role of local governments in building resilience’, including by reviewing ‘the town

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<sup>111</sup> Ministry of Natural Resources and Environment of Samoa, *National Biodiversity Strategy and Action Plan 2015–2020* (undated) 28–9.

<sup>112</sup> *Birds and Fish Preservation Act 1988* (Tonga) s 7(iii).

<sup>113</sup> *Ibid* sch 3.

<sup>114</sup> Government of Fiji, *National Climate Change Policy* (2012) 8.

<sup>115</sup> *Ibid* 33.

<sup>116</sup> *Ibid* 48.

<sup>117</sup> Government of Fiji, *Fiji’s Intended Nationally Determined Contribution* (Report, 2015) 8.

plan regulations to facilitate the enforcement of zoning and buffer zones for ... mangrove areas'.<sup>118</sup>

Mauritius is one of the few Indo-Pacific nations that has introduced a Climate Change Bill.<sup>119</sup> While such legislation is not essential, its importance is elevated where climate change is not a consideration under broader environmental instruments. Fiji, for example, has not yet enacted legislation implementing adaptation commitments, and the *Environment Management Act 2005* does not mention climate change.

## F *Integrated Governance*

The references to, and dependence upon, multiple pieces of legislation illuminates the dearth of integrated coastal zone management ('ICZM') approaches in legislation. There are no specific ICZM statutes among the Indo-Pacific island countries. However, provisions for the making of ICZM plans do exist in the environmental protections legislation in Mauritius and Seychelles.<sup>120</sup> Under s 51(3) of the *Mauritian Environmental Protection Act 2002*, these plans 'shall be used for coastal zone planning, management and development', although it seems that the primary goal is still 'the preservation and conservation of the environment of the zone' per s 51(2)(a).<sup>121</sup> In the Pacific, some policies have sought to address multiple issues in an integrated way, but these have not translated into legislation, nor do they focus specifically on mangroves.<sup>122</sup> There are, however, some issue-specific holistic policies, such as the *Tonga Climate Change policy*<sup>123</sup> and the *Vanuatu National Sustainable Development Plan*, but again

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<sup>118</sup> Ibid 9.

<sup>119</sup> UNDP, *A Climate Promise: Mauritius' Response to Climate Change* (Report, 2020) <[https://www.mu.undp.org/content/mauritius\\_and\\_seychelles/en/home/news-centre/news/a-climate-promise---mauritius-response-to-climate-change-.html](https://www.mu.undp.org/content/mauritius_and_seychelles/en/home/news-centre/news/a-climate-promise---mauritius-response-to-climate-change-.html)>.

<sup>120</sup> An integrated coastal zone management framework and study, which includes mangroves, was reported in Mauritius's *Fifth National Report to the CBD: Mauritius, Fifth National Report to the Convention on Biological Diversity* (Report, 2015): <<https://www.cbd.int/doc/world/mu/mu-nr-05-en.pdf>> 76.

<sup>121</sup> The *Environmental Protection Act 1994* of the Seychelles makes similar provision in s 11.

<sup>122</sup> For example, the Green Growth Framework for Fiji. Key thematic areas include climate change resilience, waste management, sustainable resources, social development, food security, energy security, sustainable transportation, and technology and innovation. See also Solomon Islands Government, *National Development Strategy 2016–2035* (2016), and Government of Samoa, *Strategy for the Development of Samoa 2016/17–2019/20* (2016) 14.

<sup>123</sup> Department of Climate Change, Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications, *Tonga Climate Change Policy: A Resilient Tonga by 2035* (2016). See also Government of Tonga, *Tonga Strategic Development Framework 2015–2025* (2015).

these do not address mangroves.<sup>124</sup> In the Indian Ocean, ICZM can be seen through initiatives such as the *Arusha Resolution on Integrated Coastal Zone Management in Eastern Africa including Island States* in 1993,<sup>125</sup> the 1996 *Seychelles Second Policy Conference on Integrated Coastal Zone Management in Eastern African and Island States*, and the 1998 *Maputo Declaration from the Pan-African Conference on Sustainable Integrated Coastal Management*.<sup>126</sup> It is not clear that these developments have had any effect on mangroves. The Maldivian *Seventh National Development Plan* is one of the only examples of an integrated policy,<sup>127</sup> but it makes no reference to mangroves.

More broadly, it is argued that integrated governance is critical to the holistic conservation and management of mangroves. Where laws create a patchwork of protection that differs slightly from instrument to instrument, confusion, gaps and challenges can arise. This fragmentation is not necessarily a problem if coordination exists between government entities administering the laws, and if policies and guidelines explain why certain areas are classified under one Act but not another. Institutional fragmentation is also evident in all jurisdictions. In Fiji, for example, multiple agencies have responsibility for mangroves. The Ministry of Lands and Mineral Resources manages state-owned land, including the foreshore and intertidal zones; the Ministry of Forests declares forest reserves and licences extraction of timber; the Ministry of Local Government, Housing, Environment, Infrastructure and Transport implements the *Environment Management Act 2005* and decides on coastal development proposals; and the Ministry of Fisheries administers the *Fisheries Act 1942*. In addition, other key bodies include the National Environment Council, Fiji National Biodiversity Strategy and Action Plan Steering Committee, Protected Areas Committee, Integrated Coastal Management Committee, and Mangrove Management Committee.<sup>128</sup> Similarly, in Mauritius, the Ministry of Social Security, National Solidarity and Environment and Sustainable Development is the focal ministry for international commitments, and includes the Environment Department, with Divisions such as Integrated Coastal Zone Management, Climate Change, Environmental Law and Prosecution, Pollution Prevention and Control,

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<sup>124</sup> Department of Strategic Policy, Planning and Aid Coordination of the Republic of Vanuatu, *Vanuatu 2030: The People's Plan* (2016).

<sup>125</sup> Mauritius, Mozambique, Madagascar, the Seychelles, Tanzania and, later, Kenya were signatories of the Arusha Resolution. See L Celliers et al, 'Pathways of Integrated Coastal Management from National Policy to Local Implementation: Enabling Climate Change Adaption' (2013) 39(C) *Marine Policy* 72, 73.

<sup>126</sup> *Ibid.*

<sup>127</sup> Government of Maldives, *Seventh National Development Plan 2006–2010: Creating New Opportunities* (2007).

<sup>128</sup> Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangroves in Fiji* (Undated Report) iv.

Sustainable Development and Environmental Assessment.<sup>129</sup> Other relevant Ministries include the Ministry of Agro Industry and Food Security, and the Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping.<sup>130</sup> At one level, the *Native Terrestrial Biodiversity and National Parks Act 2015* deals with the issue of overlapping legislation by creating a Council with representation across key Ministries. The legislation does not, however, give the Council overarching authority covering all legislation under which a protected area might be declared.<sup>131</sup> In the absence of integrated legislation, or one overarching agency being given responsibility for mangrove governance, ways and means must be found to harmonise powers for efficient and effective administration.

## V ADVANCING MANGROVE LAWS IN THE INDO-PACIFIC

The above analysis demonstrates that the legal treatment of mangroves in Indo-Pacific island states varies from limited legal consideration that provides linear protection, to more comprehensive governance. It is clear that mangroves are rarely governed specifically or holistically as species or ecosystems, but most states have some laws and policies addressing different issues or uses. Mangroves are, or could be, considered under existing protected area or national parks legislation, as well as through fisheries and forestry regulations that provide for the declaration of reserves. Mauritius provides a good example of a fisheries approach, with Palau and Timor Leste favouring a protected area mechanism. Similarly, wildlife, biodiversity or threatened flora laws could be used to protect mangroves on a species basis, as Seychelles have done in listing a mangrove under its tree laws. The advantage of such approaches is that specific ecosystem services could be identified, providing an opportunity for both mangrove protection and public awareness raising. Clearly, land use planning laws have a critical role to play in preventing developmental impacts, but by themselves they cannot ensure the health of mangroves. In some circumstances, it may be appropriate for particular legal frameworks to respond to acute pressures on mangrove resources, but they do not provide a holistic governance framework, and indeed perverse outcomes could result where mangroves are protected under one statute but are impacted upon by activities in unrelated or weakly regulated areas. Greater integration would ensure that multiple values and cumulative impacts are also addressed.

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<sup>129</sup> See <<http://environment.govmu.org/English/AboutUs/Pages/Mission-and-Vision-Statement.aspx>>.

<sup>130</sup> See <<http://oceaneconomy.govmu.org/English/Pages/default.aspx>>.

<sup>131</sup> *Native Terrestrial Biodiversity and National Parks Act 2015* (Mauritius) s 5.

As with legislation, few states have developed focused mangrove policies, but there are examples of mangroves receiving targeted attention. Mauritius provides a useful case study in this respect. The country has a number of policies that provide general recognition of the value of mangroves and that action must be taken to conserve and manage them.<sup>132</sup> The *Advances in Cross-Sectoral Mainstreaming of Biodiversity in Mauritius* report, for example, identifies 169 hectares of mangrove wetlands as environmentally sensitive areas intended to be the focus of a project to mainstream biodiversity into the management of the coastal zone.<sup>133</sup> The *Ecosystem-Based Adaptation Strategies for a Resilient Mauritian Protected Area Network* report notes the importance of mangroves for freshwater resources as key habitats for many species, including fish, and for shoreline protection; the impacts of clearing mangroves are also acknowledged.<sup>134</sup> The need for ecosystem-based adaptation is emphasised in Mauritius, including restoring mangroves for coastal and lagoon protection.<sup>135</sup> This is particularly important, as climate change has been recognised as impacting on mangrove areas in terms of sea level rise, acidification, extreme weather events, invasive species and anthropogenic pressures.<sup>136</sup>

From a legal perspective, Mauritius has acknowledged that weak governance is an issue.<sup>137</sup> To date, the Indian Ocean states have not benefited from the same level of legal analysis as their Pacific counterparts. In Fiji, as well as Solomon Islands, Vanuatu, Tonga and Samoa, the MESCAL project has mapped the mangrove law and policy landscape.<sup>138</sup> The reports resulting from this project provide critically important information on mangrove governance, and the mapping exercise undertaken is a necessary first step to improving the law. In Fiji, recommendations were made for reform, and the project led to a new draft

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<sup>132</sup> See, eg, Government of Mauritius, *National Forestry Policy* (2006), and the more recent Government of Mauritius, *Strategic Plan (2016–2020) for the Food Crop, Livestock and Forestry Sectors* (2016).

<sup>133</sup> Government of Mauritius, Ministry of Agro-Industry and Food Security, *Advances in Cross-Sectoral Mainstreaming of Biodiversity in Mauritius* (Study Document, 2017) 39.

<sup>134</sup> Government of Mauritius, Ministry of Agro-Industry and Food Security, *Ecosystem-Based Adaptation Strategies for a Resilient Mauritian Protected Area Network* (Report, 2017) 9.

<sup>135</sup> Government of Mauritius, *National Biodiversity Strategy and Action Plan 2017–2025* (2017) vi.

<sup>136</sup> *Ibid* 4.

<sup>137</sup> *Ibid* 34 and 108.

<sup>138</sup> Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangroves in Fiji* (Undated Report); Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangroves in the Solomon Islands* (Undated Report); Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangrove Ecosystems in Vanuatu* (Undated Report); Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangrove Ecosystems in Tonga* (Undated Report); and Mangrove Ecosystems for Climate Change Adaptation and Livelihoods, *Review of Policy and Legislation Relating to the Use and Management of Mangrove Ecosystems in Samoa* (Undated Report).

*Mangrove Management Plan*. For any state wishing to advance mangrove governance, a focused strategy or action plan is essential to provide tailored protection, management and restoration measures. The *Mangrove Management Plan* acknowledges failings of the past and seeks to learn lessons from them.<sup>139</sup> The Plan is comprehensive, recognising high impact areas and activities, fishing, fuelwood and reclamation issues, and emphasising the use of environmental impact assessment processes and zonal plans to address development pressure.<sup>140</sup> This emphasis is appropriate given the specific reference to mangroves in the *Fijian Environmental Management (EIA Process) Regulations 2007*, discussed above, and demonstrates sound use of existing legislative mechanisms.<sup>141</sup>

In order to advance mangrove governance, states should adopt policies that specifically refer to mangroves. As a first step this could involve mangroves being considered in existing fisheries, forestry, wildlife and biodiversity policies. These policies would take into account the ecosystem services provided by mangroves as nursery grounds, timber resources, cultural assets and threatened or endangered species status. Increasingly, and in part driven by the *Paris Agreement*, the coastal protection and blue carbon role that mangroves play may be captured under NDCs. The next step in policy development would involve a targeted mangrove policy that takes into account all the ecosystem services they provide, their conservation and sustainable use (both natural and cultural) and research, education and capacity-building needs. A mangrove policy or plan, such as that in Fiji, would be a solid foundation to move forward, but in order to genuinely advance mangrove conservation, management and restoration, a tailored piece of legislation would be optimal. Madagascar is one of the few jurisdictions with such a law — a quasi-legal *décret* that establishes an entity specifically to deal with the management of mangrove habitats.<sup>142</sup> Yet there are examples of species-based laws to draw upon, such as the Tongan Sandalwood Regulations. These are not, however, comprehensive and tend to focus on single issues, such as extraction or conservation. A tailored mangrove law could address all of the ecosystem goods and services that mangroves provide (including the

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<sup>139</sup> National Mangrove Management Committee, *Mangrove Management Plan for Fiji* (2013) 9–11 (*'Mangrove Management Plan for Fiji'*). Although theoretically all mangroves in Fiji were declared to be forest reserve in 1933, this did not prevent mangrove loss: Working Group on Mangrove Ecosystems of the Commission on Ecology, United Nations Environment Programme and World Wildlife Fund, *Global Status of Mangrove Ecosystems* (International Union for the Conservation of Nature and Natural Resources, 1983) 66.

<sup>140</sup> *Mangrove Management Plan for Fiji* (n 142) 3–5.

<sup>141</sup> Although, it has been noted that the Environmental Impact Assessment process does not appear to have had any positive impact on mangroves or ensured environmental outcomes to date: *Mangrove Management Plan for Fiji* (n 142) 16.

<sup>142</sup> *Décret No 2015-629 portant Création d'une Commission Nationale de Gestion Intégrée des Mangroves* (Madagascar).

forest resources, fish habitat, coastal protection and blue carbon roles), protect individual species and areas at risk, provide for the conservation and management of existing mangroves and their restoration where needed, ensure that activities with impacts on mangroves are considered in planning and development decisions, and acknowledge cultural values and uses. Such an approach would be comprehensive, but may be unrealistic in the context of the Indo-Pacific states. In the absence of such a Mangrove Act, there is a need to enhance existing laws to provide better integrated governance, as noted above. This could be achieved by, for example, granting power to one overarching institution to administer laws related to mangroves, and/or harmonising rules across various pieces of legislation. While possible in theory, integrated governance has proved challenging to achieve in many contexts.<sup>143</sup>

Two further approaches that could be taken are highlighted below. First, a wetlands law could be adopted recognising mangrove habitats and ecosystem services.<sup>144</sup> This approach squarely favours environmental considerations, but could also incorporate socio-cultural values of wetlands. Jamaica, for example, developed a Mangrove and Coastal Wetlands Protection Draft Policy and Regulation that sought to take this approach and may provide useful insights.<sup>145</sup> Secondly, advances could be made through climate legislation. All states appear likely to advance climate laws, driven in part by *Paris Agreement* commitments, and also as mitigation and adaptation become critical. Therefore, this may be one fruitful avenue for development of mangrove-related laws. Although such an approach would favour the ecosystem services mangroves provide, in terms of coastal protection and carbon sequestration, species and area-based measures could also be included. Mauritius has drafted both a Climate Change Bill and a Wetlands Bill.<sup>146</sup> However, Mauritius has also developed draft legislation that seeks to provide more holistic governance through a dedicated statute focused on ecologically sensitive areas.<sup>147</sup> This draft law takes a combined area-based and ecosystem services approach, and it is one of the few laws in the region that incorporates payments for ecosystem services, although it remains in draft form.<sup>148</sup> This example highlights the diversity of legal options and developments

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<sup>143</sup> UNEP, *Integrated Governance: A New Model of Governance for Sustainability* (2014) <[https://www.unepfi.org/fileadmin/documents/UNEPFI\\_IntegratedGovernance.pdf](https://www.unepfi.org/fileadmin/documents/UNEPFI_IntegratedGovernance.pdf)>.

<sup>144</sup> See Hamman and Jungblut (n 30). See also the analysis of wetlands governance in Joanna C Ellison, 'Wetlands of the Pacific Island Region' (2009) 17(3) *Wetlands Ecology Management* 169.

<sup>145</sup> Natural Resource Conservation Authority and USAid, *Mangrove and Coastal Wetlands Protection Draft Policy and Regulation* (1997) <[https://www.nepa.gov.jm/symposia\\_03/policies/mangrove&wetlandsprotectionpolicy.pdf](https://www.nepa.gov.jm/symposia_03/policies/mangrove&wetlandsprotectionpolicy.pdf)>.

<sup>146</sup> See Republic of Mauritius, 'Wetlands Bill in Preparation, Announces Agro Minister' (February 6, 2020) <<http://www.govmu.org/English/News/Pages/Wetland-Bill-in-preparation,-announces-Agro-Minister.aspx>>.

<sup>147</sup> See the draft bill for the *Environmentally Sensitive Areas Conservation and Management Act* (2009).

<sup>148</sup> *Ibid*, pt V.

evident in the Indo-Pacific region, and demonstrates the value of continued research across the Indo-Pacific.

## VI CONCLUDING REMARKS

Mangroves play critical environmental, social and economic roles in Indo-Pacific island countries, and this is reflected in their legal treatment. Several states have drawn attention to, and conserved, mangrove areas using international law. However, as with all international law, its effectiveness will depend largely upon domestic implementation, compliance and enforcement efforts. The recent disastrous oil spill in Mauritius, directly impacting on the protected Pointe D'Esny Ramsar mangrove wetlands, draws sharply into focus the need for vigilant and responsive governance, even where the highest levels of legal protection are in place.<sup>149</sup> This highlights the importance of domestic legal frameworks, which vary greatly between jurisdictions, as noted above. These differences reflect both the range of ecosystem services that mangroves provide and the priorities of the various states. No Indo-Pacific state currently has a holistic, comprehensive and cohesive framework for mangroves that recognises their multiple values and ecosystem services. Mangroves are complex ecosystems providing multiple services, and are found at the land-water interface. This context highlights the need for tailored governance frameworks, yet it does not appear that any Indo-Pacific island nation is developing draft mangrove law. Nevertheless, the Fijian *Mangrove Management Plan*, and the draft Mauritian wetland and climate change Bills, point to positive future legislative developments.

Further legal research is clearly needed to improve mangrove governance in the Indo-Pacific. In the Pacific, states not covered by the MESCAL project would benefit from law and policy analyses. For example, Palau and the FSM both have significant mangrove areas and complex governance frameworks requiring further analysis, and Timor Leste is another valuable jurisdiction to explore in terms of mangroves governance. As noted above, this article has focused on formal governance through state-based laws and institutions, yet customary law and traditional institutions can play an important role in mangrove stewardship. Greater understanding of informal governance mechanisms is essential, as well as how they may enhance mangrove conservation and management.<sup>150</sup> Further

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<sup>149</sup> Adam Moolna, 'Mauritius is Reeling from a Spreading Oil Spill — and People are Angry with How the Government has Handled It', *The Conversation* (12 August 2020) <<https://theconversation.com/mauritius-is-reeling-from-a-spreading-oil-spill-and-people-are-angry-with-how-the-government-has-handled-it-144288>>.

<sup>150</sup> Several useful examples exist of ways in which to strengthen community-based governance. In Vanuatu, for example, the *Environment Protection and Conservation Act 2002* allows for the formal declaration, and legal recognition, of community conserved areas. See Erika J Techera, 'Protected Area Management in Vanuatu' (2005) 2(2) *Macquarie Journal of International and Comparative Environmental Law* 107.

research is also needed to better understand subsistence and artisanal uses of mangroves more broadly. Finally, detailed empirical research is vital to assess the effectiveness of the laws explored above, including their implementation, compliance and enforcement.

This article has explored and analysed the legal efforts that Indo-Pacific island countries have made to conserve, manage and restore mangroves. Although specific legal mechanisms are not automatically transferable to other jurisdictions, collating the legal options and approaches can help to build legal capacity in other island nations. In circumstances where resources are limited, but there is some impetus to conserve and manage mangroves, the analysis can assist states to strengthen their laws and improve mangrove governance. This article makes a small contribution to the literature in this field, and a further step forward in the legal protection of mangroves in the Indo-Pacific region.



# A GLOBAL ASSESSMENT OF THE LAW AND POLICY OF ECOSYSTEM SERVICES

JB RUHL\* AND JAMES SALZMAN†

*This article assesses the approaches that different national governments have employed to provide and conserve ecosystem services, focusing on policy instruments and common-law court decisions. Applying the lessons learned from this review, we address strategies for conservation of mangrove ecosystem services in Australia, focusing on the importance of creating a strong political mandate and demonstrating a clear connection between mangrove conservation and the benefits provided by mangrove services. This requires further research on which beneficiaries would be harmed, and by how much, if the mangrove service flows are reduced. Policy uptake can be slow. It has taken years in other jurisdictions for policies protecting ecosystem services to be adopted, and this will likely be the path in Australia as well.*

## I INTRODUCTION

Humanity has always benefited from our environment. Ecosystem *goods* — the physical items that an ecosystem provides — are obvious. We look to forests for timber, and coastal marshes for shellfish. Less visible, though no less important, our environment also provides *services*. These ecosystem services provide the conditions and processes that sustain human life.<sup>1</sup> If you doubt this, consider how to grow an apple without pollination, pest control or soil fertility.

Once one realises the importance of ecosystem services, three points quickly emerge: (1) landscapes provide a stream of services ranging from water quality and flood control to climate stability, the economic value of which can be significant; (2) the vast majority of these services are public goods and not exchanged in markets, and so landowners have little incentive to provide these positive externalities; and (3) government therefore needs to think creatively about policies to provide these services.

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<sup>1</sup> See, eg, Gretchen C Daily (ed), *Nature's Services: Societal Dependence on Natural Ecosystems* (Island Press, 1997) 3.

This article assesses the different approaches that governments around the globe have employed to provide ecosystem services, spanning the breadth of policy instruments as well as court decisions. We use mangroves in Australia as a common example throughout. In Part II, we use the framework of ‘the Five P’s’ to lay out the different types of government policies to protect ecosystem services, with a particular focus on payments. In Part III, we focus on the role of common-law court doctrines to protect ecosystem services. Part IV recommends policy tools to protect and enhance the services provided by mangrove ecosystems.

## II ECOSYSTEM SERVICES AND THE FIVE P’S

Despite the complexity of environmental law and policy, there are only five basic policy instruments that governments can apply. These can be captured through a simple framework known as ‘the Five P’s’. These include **P**rescriptive Regulation, **P**roperty Rights, **P**enalties, **P**ersuasion, and **P**ayments.<sup>2</sup> There will rarely be one best tool for a particular situation, and much of the challenge in instrument choice lies in identifying each instrument’s particular advantages and disadvantages. In the sections below, each policy approach is set out and applied to the protection of mangrove ecosystem services.

### A *Prescriptive Regulation*

Prescriptive regulations mandate what parties can and cannot do. This is both the most direct and the most common form of environmental law. We see prescriptive regulations at all levels of environmental governance — from hunting permits at the local level and effluent limits under pollution laws at the national level, to restrictions on foreign commerce in endangered species at the international level.<sup>3</sup> Also referred to as *command-and-control regulation*, prescriptive regulation can be very effective in mandating uniform compliance across all actors, preventing problems of free-riders and a race to the bottom. We can see this policy instrument in play with mangroves through the requirement of a permit for development that will destroy or degrade mangroves.<sup>4</sup> No permit, no development.

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<sup>2</sup> See James Salzman, ‘Teaching Policy Instrument Choice in Environmental Law: The Five P’s’ (2013) 23(2) *Duke Environmental Law and Policy Forum* 363.

<sup>3</sup> For a thoughtful defence of prescriptive regulation, see Howard Latin, ‘Ideal versus Real Regulatory Efficiency: Implementation of Uniform Standards and “Fine-Tuning” Regulatory Reforms’ (1985) 37(5) *Stanford Law Review* 1267.

<sup>4</sup> See generally Jody Freeman and Charles D Kolstad (eds), *Moving to Markets in Environmental Regulation: Lessons from Twenty Years of Experience* (Oxford University Press, 2007).

Three unstated assumptions lie behind prescriptive regulation. The first is that the regulator will set the standard at the proper level. This is not a given, either because of inadequate information or agency capture (a classic problem in the context of natural resources such as fish and timber, where industry pressure has led to overfishing and large-scale clearcutting). The second assumption is that the regulator will be able to monitor compliance with the standard. Satisfying both of these assumptions imposes administrative costs that, as result, can sometimes be a good deal higher for prescriptive regulation than for other policy instruments.

The third assumption is that there will be sufficient political will for adoption and enforcement. This is particularly challenging in jurisdictions where development interests are politically powerful. In the case of mangroves, building companies and aquaculture firms fight hard to allow conversion of mangroves, making conservation of services particularly challenging.

## B *Property Rights*

This instrument relies on privatising a resource by creating property rights. Compared to prescriptive regulation, this approach should have lower administrative costs. The government simply creates the property rights (whether for grazing, biodiversity or wetland acres), allocates them initially, and steps back, leaving future allocations to the market. Implicit in a 'property rights' approach is the importance of technology. To enforce your right to exclude, you need both to know that someone is making use of your resource (an issue of monitoring capacity) and to have the ability to exclude others' use.

Prescriptive regulations can be combined with property rights through the use of tradable permits in environmental markets. Here, property rights are created for *use* of the resource. Trading systems use the market to make prescriptive regulation more efficient. The government decides how much of a harmful activity to permit (just as it would with prescriptive regulations), awards private rights to engage in the activity up to the regulatory cap, and then permits those rights to be traded. The market does not play a role in determining the overall level of environmental protection; that is the role of the regulatory regime.

To make this more concrete in the context of ecosystem services, imagine how a trading program would work with mangroves. Policy-makers decide that there should be no net loss of mangroves. The government requires a developer to hold a permit for every hectare of mangrove destroyed. Entrepreneurs create new mangrove areas. These are assessed by a government agency and, if approved, are issued permits that the 'mangrove bankers' can then sell to the developers. If the system works properly, this mitigation or offsets approach will ensure both development and no net loss of mangroves.

Mitigation banks for wetlands and species habitat have grown and now constitute an annual market worth over \$500 million globally.<sup>5</sup> While relatively simple in theory, this strategy can be difficult to implement. It requires a credible regulatory driver and strong institutional infrastructure. Hence, they are only found in developed countries with robust regulatory regimes.<sup>6</sup> Determining the appropriate currency has also proven challenging. Should, for example, an offsets program for mangroves require offsets based on hectares developed or loss of services? Put another way, offsets promise no net loss, but one needs to question further: no net loss of what?

### C *Financial Penalties*

Short of banning an activity, another effective way to limit behavior that degrades natural capital is to make it more expensive, whether through charges, taxes or liability. By increasing the costs of harmful activities, such penalties force the parties to bear the costs of their activities.<sup>7</sup> To use economics language, the polluter internalises the negative externalities of her behaviour. In our mangrove example, developers might be charged a fee based on the area converted or loss of service provision. The fee could be shifted up or down, depending on the desired level of services.

In theory, financial penalties offer an attractive policy instrument, but there are two practical obstacles. The first lies in getting the price right. Markets are efficient when the prices for goods accurately reflect their full environmental and social cost. A key aspect in internalising externalities, then, is valuation. If one agrees that externalities should be internalised — that parties should pay for the harm caused — the obvious question is ‘how much’? How much are mangrove services worth, and can they be accurately measured before development, when the fee would need to be paid?

The second challenge is political. Increasing fees is never easy, and environmental charges can seem harder still. And levying them at charges high enough to influence behavior significantly is easier said than done. In many cases, financial penalties for development that causes loss of services have been intended more for revenue-raising than for serious behavior modification.<sup>8</sup>

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<sup>5</sup> James Salzman et al, ‘The Global Status and Trends of Payments for Ecosystem Services’ (2018) 1(3) *Nature Sustainability* 136, 139 (‘Salzman Trends’).

<sup>6</sup> *Ibid* 138.

<sup>7</sup> See, eg, Paul Ekins, ‘European Environmental Taxes and Charges: Recent Experience, Issues and Trends’ (1999) 31(1) *Ecological Economics* 39.

<sup>8</sup> *Ibid*.

## D *Persuasion*

If prescriptive regulation and market instruments represent ‘hard’ regulatory approaches, then a softer approach may be found in laws requiring information production and dissemination. The theory behind such approaches is that the government can change people’s behavior by forcing them to think about the harm they are causing and by publicising that harm.<sup>9</sup> In the context of mangroves, the government might launch an education campaign about the flood control and biodiversity benefits that mangroves provide, or highlight through public service announcements the harms resulting from loss of mangroves. It could launch a ‘naming-and-shaming’ initiative, calling out developers who destroy mangroves. Information-based approaches like this are often used when there is inadequate political support to impose market or regulatory instruments, or when such instruments are ill-suited to the problem.<sup>10</sup>

## E *Financial Payments*

As noted above, just as government can use penalties to capture negative externalities and make bad activities more expensive, it can use payments to capture positive externalities and make good activities less expensive. In our mangrove example, landowners might be paid for mangrove restoration. This is the approach behind the popular strategy of payments for ecosystem services (‘PES’).

An obscure term just 15 years ago, PES has come of age — whether it is described as ‘natural capital’, ‘nature’s fortune’, or simply ‘investing in nature.’<sup>11</sup> There are now over 500 PES programs around the globe, in both developed and developing countries, with annual transactions worth well over \$10 billion.<sup>12</sup>

In economic terms, PES seeks to internalise the positive externalities generated by natural systems, creating incentives for landholder behavior that ensures service provision. In some circumstances, PES can create additional revenue streams for landholders that, on the margin, can push land management toward conservation rather than development. This approach has been described

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<sup>9</sup> Eric W Orts, ‘A Reflexive Model of Environmental Regulation’ (1995) 5(4) *Business Ethics Quarterly* 779.

<sup>10</sup> *Ibid.*

<sup>11</sup> Gretchen C Daily and Katherine Ellison, *The New Economy of Nature: The Quest to Make Conservation Profitable* (Island Press, 2002); Paul Hawken, *The Ecology of Commerce: A Declaration of Sustainability* (HarperCollins, 2010); Mark R Tercek and Jonathan S Adams, *Nature’s Fortune: How Business and Society Thrive by Investing in Nature* (Basic Books, 2013).

<sup>12</sup> Salzman Trends (n 5).

as ‘making trees worth more standing than cut down’.<sup>13</sup> It is important to recognise, however, that PES captures only a fraction of the values provided by natural systems. Existence values, option values, and many public goods benefits are usually outside the scope of PES mechanisms.

Because PES programs have received extensive attention, we focus on them in particular.<sup>14</sup> There are three broad categories of PES mechanisms:

- *Voluntary PES* — Beneficiaries of ecosystem services agree to compensate landholders for activities that maintain or enhance ecosystem services delivery. There is no sanction for refusing to agree to the transaction. This includes purchase of biodiversity offsets and carbon offsets by extractive industries and companies motivated by corporate social responsibility to reduce their habitat or climate change impacts. These are private transactions where PES operates as a carrot.
- *Subsidy PES* — Public finance payments reward land managers for enhancing or protecting ecosystem services. The buyer is a public entity acting on behalf of the public good and not necessarily a direct beneficiary of ecosystem services enhancement or protection. This includes government programs in Costa Rica and China that pay landholders for reduced deforestation or afforestation activities that enhance flood protection, water quality or other ecosystem services. Here, public funds operate as a carrot.
- *Compliance PES* — Parties facing regulatory obligations compensate other parties for activities that maintain or enhance comparable ecosystem services or goods in exchange for a standardised credit or offset that satisfies their mitigation requirements. This includes water quality trading, wetlands mitigation banking, and the European Union’s emissions trading scheme for greenhouse gases. Because the services are purchased as a means of regulatory compliance, this mechanism operates as a stick.<sup>15</sup>

Within these categories there is a wide range of specific mechanisms, reflecting the creativity of policy-makers and entrepreneurs seeking to create revenue streams for service providers. The table below sets out some of the more common PES approaches.

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<sup>13</sup> James Salzman, ‘The Eleventh Annual Gilbert and Sara Kerlin Lecture — Just What is the Emperor Wearing? The Secret Lives of Ecosystem Services’ (2011) 28 *Pace Environmental Law Review* 591.

<sup>14</sup> Robert Costanza et al, ‘Twenty Years of Ecosystem Services: How Far Have We Come and How Far Do We Still Need to Go?’ (2017) 28(A) *Ecosystem Services* 1.

<sup>15</sup> Salzman *Trends* (n 5) 136.

**Table 1: PES Approaches**

<b>PES Transaction Type</b>	<b>Sector</b>	<b>Dominant Payment Approach</b>	<b>Carrot versus Stick</b>
Public Payment for Water Services ('PWS')	Water	Public Finance	Carrot
Instream Buybacks	Water	Bilateral Deals	Carrot
Trading and Offsets	Water	Credit Trading	Stick
Bilateral PWS	Water	Bilateral Deals	Carrot
Wetland Mitigation	Biodiversity	Bilateral Deals Credit Trading	Stick
Biodiversity Mitigation	Biodiversity	Bilateral Deals Credit Trading	Stick
Voluntary Biodiversity Offsets	Biodiversity	Bilateral Deals	Carrot
Compliance Forest Carbon	Carbon	Offset Trading	Stick
REDD+ Finance	Carbon	Public Finance	Carrot
Voluntary Forest Carbon	Carbon	Offset Trading	Carrot
Certified Commodities	All	Certification and Standards	Carrot

The PES water sector is the most mature in terms of the number of programs, the ages of programs, transaction value, and geographic distribution.<sup>16</sup> Water is the easiest context for PES because the connection between land management in an upper watershed, and the direct health benefits to downstream users appear straightforward. In many cases, transaction costs are low because institutions are already in place to collect funds from diffuse beneficiaries, whether through water utilities, budgets of water agencies or agricultural subsidy programs.<sup>17</sup>

The biodiversity PES sector offsets its losses to ensure that it suffers no net loss. This sector is the least developed in terms of geographic scope and most challenging for countries to put in place. Unlike in water PES, where those who receive clean water and protection from flood are straightforward and local, the beneficiaries of biodiversity are often spread out and the specific benefits indirect or nonmaterial. Institutions that can collect fees for their many beneficiaries — like water utilities — do not exist, and common metrics are difficult to determine. Accordingly, there are only 36 countries that employ biodiversity PES programs, and the most successful initiatives rely on regulatory drivers.<sup>18</sup> The very practice of offsetting is controversial. It faces strong opposition from NGOs that do not wish to endorse habitat destruction.<sup>19</sup>

The compliance mitigation programs that restore stream and wetland habitat benefit from strong regulations backed by credible enforcement and common agreement on currencies of exchange (such as wetland acreage). This sector is the least transparent. Data on transactions or project implementation are not available. Global transactions are estimated at \$2.5–8.4 billion annually — a wide range indicative of the difficulties in tracking payments.<sup>20</sup>

Compliance biodiversity offsets and mitigation remain important conservation mechanisms in a small number of developed countries such as the United States and Germany, but they have not significantly spread to other countries. There are no fully operational compliance-driven programs in Africa. While the European Council adopted a 2020 Biodiversity Strategy calling for the EU ‘to ensure no net loss of biodiversity and ecosystem services’, regulations have not been produced on time and the Commission appears to favor a voluntary rather than regulatory approach.<sup>21</sup> The United Kingdom has similarly backed off

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<sup>16</sup> Ibid 136.

<sup>17</sup> Ibid 140.

<sup>18</sup> Ibid 138.

<sup>19</sup> See, eg, Congressional Research Service, *Wetland Mitigation Banking: Status and Prospects* (Report no 97-849, 1997).

<sup>20</sup> Salzman Trends (n 5) 137.

<sup>21</sup> European Union, *The EU Biodiversity Strategy to 2020* (2011) 24.

mandating offsets in favour of voluntary schemes.<sup>22</sup> These concerns over the effect that offset rules could have on development suggest that many nations will continue to favor voluntary approaches.

Compensatory mitigation banking is particularly relevant to mangrove services. Transactions are estimated at \$3.6 billion per year.<sup>23</sup> But it has not spread geographically. Almost all the growth has only occurred in countries where wetlands are the largest habitat type offset — the United States, Australia, Canada and Germany. It has been introduced in Malaysia on a voluntary basis, in Northern Mariana Islands for compliance purposes, and is in the process of being piloted in Colombia.<sup>24</sup> In developing countries, permittee-responsible mitigation — mitigation by the impacting party or a subcontractor — is the most commonly found option for compliance. However, many countries (including Brazil, Cameroon, China, Colombia, Egypt, India, Mozambique and South Africa) allow developers to compensate in lieu of offsetting, which is generally used to fund conservation projects by the public sector or a Non-Governmental Organisation ('NGO').<sup>25</sup>

Mitigation banks take on the risks and complexity of undertaking an offset from developers. They are created by entrepreneurs who develop habitat to host particular species and then receive credits from regulators that can be sold to developers to offset or mitigate their projects' harms to species populations. Large mitigation banks can achieve economies of scale in design, maintenance and monitoring. This enables them to protect larger, contiguous areas that offer better ecological payoff than smaller, isolated permittee-responsible mitigation projects. An effective mitigation system requires laws, monitoring of compliance, and tough enforcement.<sup>26</sup> Despite the market's size, data on credit prices is hard to find, and relatively little market infrastructure (like brokerages, accounting services and standards) has emerged compared to newer markets like carbon.<sup>27</sup> It also remains unclear whether the currency of exchange adequately reflects ecosystem service values and can meaningfully ensure no net loss.

While the well-known PES success stories continue to generate enthusiasm and interest for PES approaches, a close examination of the experiences to date of the many types of PES mechanisms suggests a more nuanced picture. A small

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<sup>22</sup> Institute for European Environmental Policy, *Biodiversity Offsets: What Did the UK Pilot Scheme Achieve?* (Web Page, 2016).

<sup>23</sup> Salzman Trends (n 5) 139.

<sup>24</sup> *Ibid* 138.

<sup>25</sup> *Ibid*.

<sup>26</sup> James Salzman and JB Ruhl, 'Currencies and the Commodification of Environmental Law' (2001) 53(3) *Stanford Law Review* 607.

<sup>27</sup> See, eg, Ecosystem Marketplace, *State of Biodiversity Markets: Offset and Compensation Programs Worldwide* (Report, 2015).

number of PES mechanisms (chiefly subsidy watershed, compliance habitat and biodiversity, and carbon offsets) account for the majority of growth in number, volume of transactions, size of transactions and geographic spread.<sup>28</sup> The key questions are: (1) Why have some programs grown to scale while others have not? (2) What does this tell us about the broader issue of instrument choice in environmental protection? We suggest that these questions can be addressed through focusing on four key factors: motivated buyers, motivated sellers, metrics, and low-transaction-cost institutions.

As with all exchanges, PES is driven by demand — ie the perceived scarcity of ecosystem services. People do not buy what they feel they do not need. In the PES arena, the scarcity may concern water quality, flood protection, climate stability or biodiversity. If a service is not scarce (or is simply taken for granted), there is no evident need to pay for it. Many PES mechanisms are purely private — eg duck hunters pay farmers to keep grain on their fields or flood them, and cities pay upper watershed land owners to keep trees standing rather than develop. Landholders can choose to enter into these transactions or not. The challenge is that many ecosystem services are public goods whose benefits cannot easily be captured by discrete parties. As a result, complete reliance on private PES transactions will prove insufficient in many settings to ensure the socially optimal level of service provision.

PES instrument design addresses this issue by stimulating transactions through regulation that creates demand. This prevents free-riding and overcomes the collective action costs of organising diffuse beneficiaries. It is thus no surprise that many of the largest PES programs are all based on transactions mandated by compliance PES, such as mitigation banking. This also explains why the PES mechanisms of compliance biodiversity, instream flow and water quality markets remain limited to a small number of developed countries. The necessary governance capacity of laws and institutions to create regulatory demand is absent in most developing countries.

If PES payments are to provide services, then landowners must be paid, and their behaviour must be sufficient to provide the desired service. Moreover, the amount paid to landowners must be competitive with the opportunity costs. Put another way, PES on its own will make trees more valuable standing than cut down only if the service payments to economically motivated landowners are as attractive as the value of timber. But in many settings, the revenue streams from PES will not change landowners' behaviour and may need to be bolstered by regulation or other strategies.

One can also stimulate service provision with subsidies such as watershed PES financed through water utility bills or government payments. Apart from the general debates over whether public funds should be paid to private landowners,

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<sup>28</sup> See generally Salzman Trends (n 5).

a key practical challenge for PES subsidy programs lies in identifying those landholders that are most important for service provision. This requires an assessment mechanism to ensure the funds are spent most efficiently. There is no real benefit in paying everyone to conserve wetlands. The focus should be on wetlands with the potential to provide the greatest level of storm water protection. Most subsidy programs, however, do not condition payments on service provision capacity, either because of the transaction costs or because of concern over achieving the dual goal of poverty alleviation.

## F Summary

The previous sections have set out the policy toolkit for ecosystem services, with a focus on PES. There is no doubt that governments can conserve and promote provision of ecosystem services through application of any of the Five P's. The key question, though, is whether this has happened on the ground.

Numerous governance institutions have embraced ecosystem services as a broad policy goal.<sup>29</sup> Yet, with rare exception, these have not progressed beyond aspirational policy statements and vague regulatory provisions, with little meaningful protection and restoration of ecosystem services on the ground in applied contexts.<sup>30</sup> Despite the capacity to incorporate ecosystem services more widely and deeply into policy decisions and legal instruments, substantive policies and binding legal provisions are hard to find. Generally, agencies do not explicitly incorporate ecosystem services into permits or performance standards; nor are they routinely considered in planning processes. When statutes or agency regulations and policies do mention ecosystem services, implementation on the ground (eg whether to issue a permit) often fails to consider them meaningfully.

Bell-James has found precisely this situation in Australia. She reports that limited Commonwealth authority impedes the development of nationwide policy and legal frameworks. In Queensland, the resource focus of laws has not incorporated a multiple ecosystem services approach; nor has the protection of specific resources (eg fish habitat, coast) led to explicit regulation to protect services. Land development laws provide exceptions and other 'flexibility' mechanisms, allowing developers and local authorities to continue destruction and degradation of mangroves. As a result, mangrove services receive scant legal protections.<sup>31</sup>

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<sup>29</sup> Lynn Scarlett and James Boyd, 'Ecosystem Services and Resource Management: Institutional Issues, Challenges, and Opportunities in the Public Sector' (2015) 115 *Ecological Economics* 3.

<sup>30</sup> Stephen W Posner, Emily McKenzie and Taylor Ricketts, 'Policy Impacts of Ecosystem Services Knowledge' (2016) 113(7) *Proceedings of the National Academy of Sciences* 1760.

<sup>31</sup> Justine Bell-James, 'Integrating the Ecosystem Services Paradigm into Environmental Law: A Mechanism to Protect Mangrove Ecosystems' (2019) 31(2) *Journal of Environmental Law* 291.

The potential for agencies to protect and enhance service provision clearly exists, but they have not fully grasped the opportunity. Where else, then, to look?

### III JUDGING ECOSYSTEM SERVICES

Most of the attention to the law and policy of ecosystem services has focused on the incorporation of the ecosystem services framework by legislatures in statutes and by administrative agencies in their regulations and policies, using the Five Ps.<sup>32</sup> But judges, particularly in common-law systems, can play an important role in the propagation of new scientific models into law and policy, even in the absence of concrete legislation and regulations doing so.<sup>33</sup> This part assesses the role of courts in protecting ecosystem services.<sup>34</sup>

Even without invoking the term ‘ecosystem services’, courts have described specific types of ecosystem services as central to the development or application of legal doctrine. For example, the public trust doctrine, particularly in its American form, explicitly protects the benefits of ecosystem services such as fishing, water supply and navigation.<sup>35</sup> Recently, a Louisiana court identified protection of coastal areas from flooding as another benefit of public trust resources.<sup>36</sup> Courts in the United States have identified specific services in application of other common-law doctrines, such as a Rhode Island state court’s finding that depletion of the pollution filtration effects of a coastal pond would be a public nuisance,<sup>37</sup> and a New Jersey state court’s finding that the benefits of a public coastal dune system construction project must be taken into account when calculating the compensation due for the use of eminent domain to obtain the private lands.<sup>38</sup> These are important judicial pronouncements, but they are few and far between and do not expressly incorporate, and thereby advance, the ecosystem services framework.

An obvious question in response is, so what? As suggested by these decisions, courts could advance protection of ecosystem services without ever mentioning the term. They can point directly to flood control, groundwater recharge, and other benefits of nature. Why would it matter, then, if they adopt the term

<sup>32</sup> JB Ruhl and James Salzman, ‘The Law and Policy Beginnings of Ecosystem Services’ (2007) 22(2) *Journal of Land Use & Environmental Law* 157.

<sup>33</sup> We use the terms ‘judges’, ‘judicial’, and ‘courts’ broadly to include all tribunals ranging from administrative law judges to municipal courts to the highest judicial court of the nation.

<sup>34</sup> This Part is based on a previous study in which one of the authors of this article, JB Ruhl, participated. See Ori Sharon et al, ‘Ecosystem Services and Judge-Made Law: A Review of Legal Cases in Common Law Countries’ (2018) 32(A) *Ecosystem Services* 9. Further background on that study, as well as updates and additional analysis of the results, is provided below.

<sup>35</sup> JB Ruhl and James Salzman, ‘Ecosystem Services and the Public Trust Doctrine’ (2006) 15(1) *Southeastern Environmental Law Journal* 223.

<sup>36</sup> *Avenal v State*, 886 So 2d 1085 (La 2004).

<sup>37</sup> *Palazzolo v State*, 2005 WL 1645974 (RI 2005).

<sup>38</sup> *Borough of Harvey Cedars v Karan*, 70 Atl 3d 524 (NJ 2013).

'ecosystem services' to explain the importance of those benefits? We believe there would be four important benefits. First, the framework provides the language and methodology through which those specific service benefits can be classified, compared and assessed. As courts adopt the framework, they could build a more coherent and comprehensive doctrinal approach to their protection. A case about sediment control from wetlands and another about storm surge protection from dunes seem different at first, but unifying them under the ecosystem services framework emphasises their similarities. Rather than developing wetlands protection doctrine and dunes protection doctrine in parallel channels, courts would be developing an overarching doctrine of ecosystem services. Second, courts command respect. If they start using the terminology and concepts of the ecosystem services framework, so too will parties, experts, lawyers and other judges. Third, judicial endorsement also supports adoption by legislatures and administrative agencies in legislative and regulatory text. Finally, purely as a practical matter, the term 'ecosystem services' is searchable, simplifying the task of finding cases that deal with these benefits of nature.

With all of those potential positive effects, one might expect the express language and concepts of the ecosystem services framework to have crept into judicial opinions through several sources. First, to the extent the framework is expressly embedded in legislation, regulations and policies, litigation involving those authorities would naturally lead courts to adopt the language of the framework. And even if those public authorities do not expressly adopt the ecosystem services framework, in litigation challenging the authorities government attorneys could use the framework as a basis for defending the authorities against claims of overreach. On the flip side, litigants might convince a court that the failure of those authorities to adopt the ecosystem services framework is somehow legally deficient. Also, a plaintiff might use the ecosystem services framework to articulate the injury needed to establish standing to pursue judicial remedies, even if the underlying merits of the litigation do not involve ecosystem services. Judges involved in public-law litigation could also adopt the ecosystem services framework on their own accord to frame and evaluate the dispute. Lastly, as suggested by the common-law doctrinal cases discussed above, parties or judges involved in tort and other common-law litigation could use the ecosystem services framework to describe injury, causation and other relevant features. In short, there are many ways judges could find themselves directly working with the ecosystem services framework in their opinions.

Alas, notwithstanding the many avenues through which courts could adopt and propagate the express formulations and language of the ecosystem services framework, by and large they have not. Using searches for 'ecosystem services' and related terms in legal databases, Sharon et al conducted a survey of case law from seven common-law nations and found that, as of August 2017, only 113 published opinions of judicial tribunals mentioned the concept of ecosystem

services.<sup>39</sup> Most of these opinions (67) fell into a category that Sharon et al described as ‘peripheral’, meaning that the ecosystem services concepts ‘are not central to the arguments or the decision made in the case — they serve to contextualize the central themes of the case or are one of many factors in the decision’.<sup>40</sup> Such cases are not unimportant, however. Although some of them involved a tribunal simply quoting passages from a regulation or pleading, many involved meaningful use of ecosystem services concepts to contextualise the litigation background and implications. Most of these (40) involved land development disputes, primarily in Canada but also from Australia.<sup>41</sup> Other cases involved description of ecosystem services from water resources<sup>42</sup> and general recognition of the benefits of ecosystem services to humans.<sup>43</sup>

Sharon et al sorted the remaining 46 opinions — those going beyond peripheral use — into four categories: (1) cases from the United States involving use of ecosystem services concepts to establish legal standing; (2) cases involving interpretation of existing laws and regulations; (3) cases involving agency valuations of ecosystem services; and (4) cases from the United States involving agency use of ecosystem services to implement a regulatory program.<sup>44</sup> Australia, Canada and the United States accounted for the vast majority of these cases.<sup>45</sup> At least in those three nations, the ecosystem services framework is not a complete stranger to the courts, albeit the relationship is in its earliest of stages. Indeed, a case law update we conducted through Westlaw for those three nations and the United Kingdom revealed no new cases moving beyond peripheral use of the ‘ecosystem services’ term,<sup>46</sup> and we identified no published journal article since

<sup>39</sup> Sharon et al (n 35). The seven nations studied were Australia, Canada, India, Philippines, South Africa, the United Kingdom and the United States. For the methodology, see *ibid* 10–11. Sharon et al focused on common law nations given the prominent role courts play in forming and developing legal doctrine, including in the environmental policy domain (at 10). Only one other empirical study of the use of ecosystem services terminology by courts has been published: Roberto Pastén, Martin Olszynski and Michael Hantke-Domas, ‘Does Slow and Steady Win the Race? Ecosystem Services in Canadian and Chilean Environmental Law’ (2017) 29(B) *Ecosystem Services* 240.

<sup>40</sup> Sharon et al (n 35) 11.

<sup>41</sup> *Ibid* 12, 18–19. For an example from Australia, see *Spencer v Commonwealth* (2015) 240 FCR 282.

<sup>42</sup> For an example from Australia, see *Lee v Commonwealth* (2014) 220 FCR 300.

<sup>43</sup> For an example from Australia, see *Franklin v Valuer-General* [2013] QLC 10.

<sup>44</sup> Sharon et al (n 35), at 16–17, also discussed the connection between ecosystem services and the public trust doctrine, although they found no cases making that connection explicit.

<sup>45</sup> *Ibid* 13–16.

<sup>46</sup> We conducted a case law update through August 2020 using the Westlaw United States and Westlaw International databases, the latter of which covers Australia, Canada, and the United Kingdom among the nations Sharon et al. studied. All of the 13 judicial opinions found using the ‘ecosystem services’ terms during this period did so in ways Sharon et al categorised as peripheral—ie, quoting from party, expert, or other external materials and not addressing the concept in any other manner. There were four such cases from the United States: *Murray Energy Corp v EPA*, 936 F 3d 597 (DC Cir 2019); *Northern Plains Resource Council v US Army Corps of Engineers*, 2020 WL 1875455 (D Mont 2020); *United States v Brace*, 2019 WL 3778394 (WD Pa 2019); *Wilderness*

Sharon et al identifying use of the term by the courts of any nation.<sup>47</sup> While this does not amount to an exhaustive search of every nation's case law, the representative sample provided by Sharon et al and our update strongly point to the conclusion that courts have not meaningfully used the ecosystem services framework in substantive legal contexts.

What explains the dearth of judicial opinions adopting the ecosystem services framework? A partial answer is that if it does not show up in statutes, regulations and policies, litigation over those authorities is unlikely to fuel judicial uptake unless judges reach out to use it on their own accord, which they have done only sparingly.<sup>48</sup> The more statutes and regulations that invoke the ecosystem services framework, the more such cases we can expect to see. But that leaves several of the other avenues described above unaccounted for. Why have they not seen more action? We believe it is largely due to the failure of litigants to appreciate the advantages offered by framing their arguments for courts through the lens of ecosystem services. But it also is due in part to the need for scientific research on ecosystem services to connect with the nitty-gritty practical dimensions of litigation. Greater use of the ecosystem services framework by litigants could, however, help spark that kind of research. We explain what we mean with three example contexts: (1) standing to seek judicial relief; (2) common-law remedies; and (3) environmental impact assessments.

### A Standing

Although all the common-law court systems that Sharon et al studied require some degree of specific personal interest — usually framed in terms of injury caused to that interest — for a litigant to establish standing to seek a remedy in the courts, only in the United States have court opinions dealt with a litigant alleging injury to ecosystem services as the basis for standing.<sup>49</sup> It is not clear

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*Workshop v US Bureau of Land Management*, 342 F Supp 3d 1145 (D Colo 2018). There were three such cases from Australia. See *Parmac Investments Pty Ltd v Brisbane City Council* [2019] QPEC 32; *Walters v Brisbane City Council*, [2019] QPEC 3; *Gloucester Resources Ltd v Minister for Planning* [2019] NSWLEC 7. Canada and the United Kingdom accounted for the remaining six such cases. See, eg, *Peel Investments (North) Ltd v Secretary of State for Housing Communities and Local Government* [2019] EWHC 2143.

<sup>47</sup> We conducted our journal article search update through Westlaw, Science Direct, Google Scholar, and other journal databases.

<sup>48</sup> Sharon et al (n 35), at 14–17, review several cases in which the court addressed agency action under a statute or regulation that the agency defended through by expressly referencing ecosystem services. For an example from Australia, see *Abacus Funds Management v Sunshine Coast Regional Council* [2012] QPEC 46.

<sup>49</sup> Sharon et al (n 35) 13–14.

whether this is because that kind of standing claim is uncontroversial in other nations, or has simply never been advanced.

Once again, so what? Why should litigants in environmental and land use cases frame standing through the ecosystem services framework? For example, a litigant challenging a government permit approving filling of a wetland area could allege loss of groundwater recharge and increased pollution of an adjacent river. What would be the advantage of using the ecosystem services framework to articulate those injuries? To be sure, we are not suggesting that describing the specific services at stake is unnecessary. Rather, upon detailing the different injuries, invoking the ecosystem services framework can help demonstrate the interrelatedness of those seemingly discrete injuries, thereby emphasising the causal relationship between the challenged action and the alleged injury supporting standing.

Alleging injury to the benefits one receives from ecosystem services thus resonates with standing doctrine, but litigants must establish the factual predicates and not simply rely on broad claims. Two cases from the United States illustrate the point. In one, beekeeper and environmental organisations established standing to challenge federal pesticide approvals on the basis that they would suffer diminished ecosystem services provided by bees.<sup>50</sup> In another, however, a court rejected standing based on broad claims that allegedly inadequate wetland habitat offsets imposed in a land development permit would impair enjoyment of ecosystem services from an adjacent lake.<sup>51</sup> Although several factors help explain the different outcomes, specificity of the claim that the challenged action would cause impairment of ecosystem services was one.<sup>52</sup>

This illustrates the feedback between law and science that can be amplified when litigants begin using new scientific concepts, in this case to establish the requisite injury that entitles one to pursue judicial remedies. As litigants leverage scientific research on ecosystem services to establish standing, that demand can send signals into the research community regarding the scale and specificity of field research needed to support the claims. Researchers, for example, could develop methods for relatively fast and accurate measurements of service losses that litigants' experts could apply in the field. As such claims become more successful, litigants will use them more frequently, and so on. The key, of course, is for litigants to start generating that demand by using the ecosystem services framework to frame their alleged injuries.

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<sup>50</sup> *Ellis v Bradley*, 2014 WL 1569271 \*13 (ND Cal 2014).

<sup>51</sup> *Public Employees for Environmental Responsibility v Schroer*, 2017 WL 943942 (ED Tenn 2017).

<sup>52</sup> Sharon et al (n 17) 13–14.

## B *Common Law*

Standing is a gateway into court, but the injury upon which it is based is not necessarily what is at the heart of the litigation. In the pesticide case discussed above, for example, once the injury to ecosystem services had been established, the litigation was largely over the government's process and rationale for approving the pesticide, not about compensating for the injury. By contrast, common-law tort claims are typically about compensating for the injury. Framing injury to ecosystem services as the basis for recovery in tort — eg as a private or public nuisance — thus presents an opportunity for law-science symbiosis even stronger than does the standing doctrine angle.<sup>53</sup>

This will be particularly true when a plaintiff is seeking monetary damages. In the New Jersey state case mentioned above from the United States, in which the court found the filling of a coastal marsh would constitute a public nuisance, the outcome was that the court denied a property takings claim — ie denied the plaintiff just compensation for a land development permit denial. Imagine, however, a scenario in which the pond was filled and nearby landowners suffered loss of ecosystem services in the form of sediment and nutrient abatement and storm surge protection. Those injuries would surely be the basis for standing, but far beyond that the plaintiffs would need to cinch down causation and quantify actual losses in order to recover on the merits. Using the ecosystem services framework to do so would emphasise the causal connection, leverage the burgeoning ecosystem services research literature, and help guide future research at appropriate field-level scales.

## C *Environmental Impact Assessment*

Environmental impact assessment prior to government approval of major actions has become a ubiquitous requirement across many nations. In the United States, for example, the National Environmental Policy Act ('NEPA') requires impact assessment for actions that federal agencies carry out, fund or authorise, which covers a lot of ground.<sup>54</sup> NEPA litigation often involves whether the action agency adequately included and analysed all relevant impacts. Following the pattern described above for standing and common-law actions, those impacts could include effects on discrete ecosystem services, such as the impacts approval of timber harvesting on federal land could have on carbon sequestration and

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<sup>53</sup> JB Ruhl, 'Making Nuisance Ecological' (2008) 58(3) *Case Western Reserve Law Review* 753; JB Ruhl, 'Toward a Common Law of Ecosystem Services' (2005) 18 (Fall) *St Thomas Law Review* 1.

<sup>54</sup> 42 USC 4332 (2)(C)(i).

sediment into waterbodies. NEPA is a broad lens and there is little debate that an agency could use the ecosystem services framework as a way of organising and analysing such effects.<sup>55</sup> Again, why do so?

Whereas the use of the ecosystem services framework in the standing and common-law tort contexts is primarily to improve understanding of causation and degree of injury, NEPA is not a remedial statute. Its central purpose is to improve agency decision-making and communication. We see incorporating the ecosystem services framework into such environmental impact assessment programs as producing several potential advantages. First, if used across the array of agencies conducting assessments, the ecosystem services framework will provide a common language, making assessments more accessible to stakeholders. Doing so will also allow easier and more direct comparison between assessments. Most significantly, however, is that unifying effects under the ecosystem services umbrella demonstrates their interrelatedness and thus allows better trade-off analysis.

To be sure, there are potential downsides to this approach, not the least of which is that new methods and scientific research will be needed.<sup>56</sup> This partially explains why federal agencies in the United States have not widely adopted the ecosystem services framework in their NEPA analyses.<sup>57</sup> To disrupt that inertia, litigants could challenge agency assessments for lack of adequate integration of the ecosystem services framework, arguing that treating the suite of services in an unbundled form understates overall effects and obscures trade-off analysis. Granted, that would be an uphill climb, as courts are reluctant to impose methodology on agencies. In one case from the United States, for example, a court refused to require an agency to quantify in monetary terms all lost ecosystem service benefits in its NEPA analysis of a timber harvesting permit, concluding nothing in existing law or regulation mandated such an approach.<sup>58</sup> But efforts to force agencies to consider impacts on climate in NEPA analyses faced a similar battle before the courts eventually mandated such analyses.<sup>59</sup> Indeed, Australia offers an example of litigants successfully challenging an agency permit approval for lack of adequate attention to ecosystem services impacts in the required economic impact assessment, leading to revocation of permits to expand a coal-mining operation.<sup>60</sup>

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<sup>55</sup> Robert L Fischman, 'The EPA's NEPA Duties and Ecosystem Services' (2001) 20(2) *Stanford Environmental Law Journal* 497.

<sup>56</sup> Carrie Presnall, Laura López-Hoffman and Marc L Miller, 'Adding Ecosystem Services to Environmental Impact Analyses: More Sequins on a "Bloated Elvis" or Rockin' Idea' (2015) 115 *Ecological Economics* 29.

<sup>57</sup> *Ibid.*

<sup>58</sup> *Clinch Coalition v Damon*, 316 F Supp 2d 364, 380 (2004).

<sup>59</sup> David Markell and JB Ruhl, 'An Empirical Assessment of Climate Change in the Courts: A New Jurisprudence or Business as Usual?' (2012) 64(1) *Florida Law Review* 15, 57–65.

<sup>60</sup> *Bulga Milbodale Progress Association Inc v Minister for Planning and Infrastructure* [2013] NSWLEC 48.

#### IV PROTECTION OF COASTAL MANGROVE ECOSYSTEM SERVICES

We have now provided a tour of how policy instruments and courts have protected ecosystem services in a number of nations around the world. Going from the global to the local, what lessons can these experiences tell us about strategies to protect coastal mangrove ecosystem services in Australia?

For Australian mangroves in Queensland, Associate Professor Justine Bell-James has concluded that the law

is not structured in a manner that ensures protection for these ecosystems ... The Queensland legal regime appears to offer reasonably high recognition of mangrove ecosystem functions, but does not take the final step of fully acknowledging and protecting ecosystem services.<sup>61</sup>

So how can this be improved?

The starting point is the importance of politics. We find strong protection for ecosystem service protections where there is a strong political mandate. Political support is necessary for the simple reason that all of the Five P's rely on government initiative. Given all the different interests pushing for governmental intervention, mangrove protection needs to rise near the top. Often (indeed, usually) this is at a local rather than national level, reflecting public concern. This can come about when there are high property values. Owners who wish to maintain protection of their houses from floods will often support policies that keep mangroves (and their storm protection services) in place. More generally, support for protection of services can be expected to increase when there is (1) a perceived connection between ecosystem degradation and loss to human communities, and (2) a clear, credible threat to the ecosystem. Both of these depend on the importance of perceived scarcity.

Indeed, as a general matter, the most effective ecosystem conservation (by both state and non-state actors) is driven from perceived scarcity of an ecosystem service and the resulting threat of harm. Nor is this surprising. When government restricts development or makes it more expensive, it needs a political justification for the pushback that will inevitably follow. Mangroves provide key ecosystem services of protection against storm surges, flood protection and wildlife habitat, among others. When the perceived harm from depleted wetlands is significant, political and private actors are more likely to mobilise to conserve their ecosystem services. As a result, we believe that as a general proposition: *effective policies or court decisions protecting mangroves require a clear connection between mangrove conservation and the benefits provided by mangrove services.*

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<sup>61</sup> Bell-James (n 10).

This places science and communication squarely in the picture. Demonstrating the opportunity cost of not conserving mangroves requires scientific and economic research. A factual case highlighting the economic importance of mangrove service provision will almost always be the precursor to laws and court decisions protecting mangroves. One strategy is to map where the mangroves are located and where their benefits flow. This identifies which beneficiaries would be harmed, and by how much, if the service flows are reduced. Mapping of ecosystem services thus has become a dominant theme in scientific research,<sup>62</sup> but more work is needed to translate that knowledge over to policy domains to influence political support.

Once there is political support to protect mangroves, then the Five P's and courts can come into play, articulating the costs and benefits of different conservation strategies to legislatures, agencies and courts. Does existing law provide the authority to promote the ecosystem services framework? To answer this, lawyers must identify gaps, exceptions and other potential impediments.<sup>63</sup> Working with scientists and economists, they must articulate the relevant benefits and harms to legislatures, agencies and courts in the ecosystem services framework.

## V CONCLUSION

We well realise that incorporating ecosystem services protections into the law, and then ensuring implementation, is far easier said than done. Our three key words of advice, therefore, are: 'Do Not Despair.'

Policy-uptake takes time. Where we have seen the ecosystem services framework penetrate policy and court opinions, the tide shifted slowly. Carbon sequestration, which today dominates discussion of ecosystem services, was not in the climate change policy mix/ecosystem services discussion three decades ago. Wetlands, once deemed a nuisance by the US Supreme Court, were not statutorily protected in the United States until the 1980s and were not recognised in the agency rules as sources of ecosystem services until 2008.<sup>64</sup> The US Forest Service did not recognise national forests in the agency's rules as sources of

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<sup>62</sup> Francesc Baró et al, 'Mapping Ecosystem Service Capacity, Flow and Demand for Landscape and Urban Planning: A Case Study in the Barcelona Metropolitan Region' (2016) 57 *Land Use Policy* 405; Jeannette Sieber and Manon Pons, 'Assessment of Urban Ecosystem Services Using Ecosystem Services Reviews and GIS-Based Tools' (2015) 115 *Procedia Engineering* 53.

<sup>63</sup> For an example, see JB Ruhl, 'Ecosystem Services and the Clean Water Act: Strategies for Fitting New Science into Old Law' (2010) 40(4) *Environmental Law* 1381.

<sup>64</sup> For this history, see JB Ruhl, James Salzman and Iris Goodman, 'Implementing the New Ecosystem Services Mandate of the Section 404 Compensatory Mitigation Program — A Catalyst for Advancing Science and Policy' (2009) 38(2) *Stetson Law Review* 251.

ecosystem services, particularly those beyond provisioning and cultural services such as timber and recreation, until 2012.<sup>65</sup> Coastal dunes, once flattened to make way for development and views, are being reconstructed in recognition of their ecosystem services through the massive project along the New Jersey shore mentioned above.

The necessary work to promote law and policy to conserve mangrove ecosystem services in Australia is underway. This article has set out a pathway for greater appreciation and protection of their valuable ecosystem services.

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<sup>65</sup> For this history, see JB Ruhl and James Salzman, 'Ecosystem Services and Federal Public Lands: A Quiet Revolution in Natural Resources Management' (2020) 91(2) *University of Colorado Law Review* 677.



# ECOSYSTEM SERVICES AS A METAPHOR IN ENVIRONMENTAL LAW: BALANCING INTRINSIC AND INSTRUMENTAL VALUES

JUSTINE BELL-JAMES\*

*The ecosystem services concept is a useful tool in environmental law, as it allows nature to be considered on the same plane of comparison as proposed development. However, the concept has received significant criticism, with many critics arguing that nature should be valued for its intrinsic worth. This article synthesises the ethical objections to the ecosystem services concept, distinguishing objections to the concept itself, and objections to the commodification of nature. It considers how the concept has been used in Australian environmental law to date, drawing on examples from the coastal wetland context. It concludes that most applications have not involved commodification, and have incorporated notions of intrinsic value. It concludes with some observations for future progress in this field, considering how the ecosystem services concept can be balanced with concerns for respecting the intrinsic value of nature.*

## I INTRODUCTION

Across the globe, the natural environment is in crisis, with biodiversity declining at a rate unprecedented in human history.<sup>1</sup> According to the 2019 Intergovernmental Science–Policy Platform on Ecosystem Services (‘IPBES’) Report, ‘nature across most of the globe has now been significantly altered by multiple human drivers’.<sup>2</sup> Wetlands have been particularly degraded, with over 85 per cent of their global surface area lost to date.<sup>3</sup>

Historically, wetlands have not been universally valued as part of the natural landscape, with many viewing them as ‘foul smelling and unhealthy breeding

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<sup>1</sup> Intergovernmental Science–Policy Platform on Ecosystem Services, *Report of the Plenary of the Intergovernmental Science–Policy Platform on Ecosystem Services on the work of its seventh session*, 7<sup>th</sup> sess, UN Doc IPBES/7/10/Add.1 (29 May 2019) 5.

<sup>2</sup> *Ibid* 4.

<sup>3</sup> *Ibid*.

grounds for mosquitos, vermin and disease', and 'obstacles to economic development',<sup>4</sup> as well as prime development sites given their proximity to water.<sup>5</sup> In contrast, other communities highly value wetlands for their intrinsic qualities, including cultural and spiritual values, and as sites for recreation.<sup>6</sup> The growing recognition of the broader ecosystem services that wetlands provide may tip the balance toward their protection; a healthy, well-functioning wetland such as a mangrove forest can store large amounts of carbon dioxide, improve water quality, protect coastal communities from flood and storm impacts, support fish species, and contribute to meeting international environmental and climate change commitments.<sup>7</sup>

As a concept, 'ecosystem services' has its roots in Westman's work on 'nature's services',<sup>8</sup> with the term itself appearing in literature from the 1980s,<sup>9</sup> and the concept experiencing further refinement through the 1990s.<sup>10</sup> The release of the Millennium Ecosystem Assessment in 2005 was a 'seminal moment in ecological research',<sup>11</sup> aiming to change public perceptions of natural ecosystems through increasing understanding of the services they provide, thus slowing their degradation.<sup>12</sup> These developments solidified the notion that the ecosystem services paradigm can be a useful tool in decision-making, as it places nature on the same plane of comparison as development.<sup>13</sup>

Despite the practical attraction of the ecosystem services concept, it does not appeal to everyone, as there are arguments that nature should be valued independently of the benefits it can offer to human beings. The debate about whether nature should be valued for what it is, as opposed to what it does, is nothing new, with scholarship on the intrinsic versus instrumental value of

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<sup>4</sup> Robert L Glicksman, 'Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development' (2014) 62(2) *University of Kansas Law Review* 943, 949.

<sup>5</sup> Office of Technology Assessment, Congress of the United States, *Wetlands: Their Use and Regulation* (Report, March 1984) 37 <<https://www.biodiversitylibrary.org/item/22759#page/3/mode/1up>>.

<sup>6</sup> Ibid.

<sup>7</sup> See, eg, Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Wetlands and Water Synthesis* (Island Press, 2005).

<sup>8</sup> Walter E Westman, 'How Much are Nature's Services Worth?' (1977) 197(4307) *Science* 960, 963.

<sup>9</sup> Paul R Ehrlich and Anne H Ehrlich, *Extinction: The Causes and Consequences of the Disappearance of Species* (Random House 1981).

<sup>10</sup> See, eg, Gretchen C Daily, 'Introduction: What are Ecosystem Services?' in Gretchen C Daily (ed), *Nature's Services: Societal Dependence on Natural Ecosystems* (Island Press, 1997) 1; Lawrence H Goulder and Donald Kennedy, 'Valuing Ecosystem Services: Philosophical Bases and Empirical Methods' in Gretchen C Daily (ed), *Nature's Services: Societal Dependence on Natural Ecosystems* (Island Press, 1997) 23.

<sup>11</sup> Christian Mulder et al, '10 Years Later: Revisiting Priorities for Science and Society a Decade After the Millennium Ecosystem Assessment' (2015) 53 *Advances in Ecological Research* 1, 3.

<sup>12</sup> Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: General Synthesis* (Island Press, 2005) 1.

<sup>13</sup> Justine Bell-James, 'Integrating the Ecosystem Services Paradigm into Environmental Law: A Mechanism to Protect Mangrove Ecosystems?' (2019) 31(2) *Journal of Environmental Law* 291, 292.

nature dating back to the 1970s. This central debate has not yet been resolved. Today, arguments for prioritising the intrinsic value of nature exist within the legal scholarship on wild law, earth jurisprudence and rights of nature,<sup>14</sup> while proponents of the ecosystem services paradigm argue for an approach that integrates concepts of instrumental value as well.

The central argument in this article is that balancing the use of the ecosystem services concept in environmental law with concerns raised in the environmental ethics literature is likely to yield the best results for nature, using coastal wetlands as the frame of reference. This is not to dismiss the plurality of opinions on this topic, and as Piccolo noted, ‘I have seen no environmental philosopher ... argue that a pluralism of viewpoints is unwelcome in solving our current ecological crisis — the opposite has been the case in fact’.<sup>15</sup> However, this article argues that legal recognition of ecosystem services can represent a feasible compromise between environmental protection and prevailing social conditions, and can incorporate notions of intrinsic value. Countries like Australia, the United States and the United Kingdom have deeply conservative governments, and while widespread social change is a noble goal — and likely to become an imperative over the coming years and decades with the intensification of climate change impacts — working within the existing system may yield more effective and timely results. The reality is that nature is often considered less important than economic development in decision-making processes, and elevating nature to an even plane — not higher, but also not lower — is therefore an improvement. In his defence of ecosystem services, Ruhl has argued that ‘this is a classic case of not letting the perfect be the enemy of the good’.<sup>16</sup> Ecosystem services may be characterised as a ‘good’ approach to environmental management, and can be used as a stepping stone in the pursuit of perfection.

Ecosystem services are also ubiquitous, and impossible not to use to some extent. If we breathe air, we are benefitting from filtration services provided by forests. If we eat food, we are benefitting from pollination services provided by bees. Our fundamental reliance on the existence of these services weighs in favour of explicitly protecting them and ensuring that they can be sustained into the future. It would therefore be preposterous to argue that any use of ecosystem services is inherently unethical. Jax et al have argued that juxtaposing an ecosystem services perspective with an ‘ethical perspective’ on nature is not useful and rests on overly narrow interpretations of the terms ‘ecosystem

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<sup>14</sup> See, eg, Peter Burdon (ed), *Exploring Wild Law: The Philosophy of Earth Jurisprudence* (Wakefield Press, 2011).

<sup>15</sup> John J Piccolo, ‘Intrinsic Values in Nature: Objective Good or Simply Half of an Unhelpful Dichotomy?’ (2017) 37 *Journal for Nature Conservation* 8, 9.

<sup>16</sup> JB Ruhl, ‘In Defense of Ecosystem Services’ (2015) 32(1) *Pace Environmental Law Review* 306, 335.

services' and 'ethics'.<sup>17</sup> In particular, there is sometimes a tendency to conflate 'ecosystem services' with 'commodification of nature'. That said, Jax et al did not suggest that the concept be used unreservedly; they also argued that there is a need for responsibility in the use of ecosystem services concepts.<sup>18</sup>

A central premise in this article is that ecosystem services need not be an 'all or nothing' concept. A more nuanced approach may be to view different applications of the ecosystem services concept on a spectrum, which encompasses the full range of ecosystem services, from those we cannot help but use as they are necessary to our survival (at one end), through to ecosystem services that can be monetised and traded on a market (at the other). So conceived, a subjective point on this spectrum will exist at which a person may view the concept as crossing an ethical line.<sup>19</sup>

This article does not intend to draw any conclusions as to where this ethical line ought to be drawn in the context of the use and application of the ecosystem services concept in environmental law and policy. It highlights that many applications of the concept in law would fall on the lower end of the spectrum anyway, as demonstrated, in particular, by instruments that use ecosystem services as a 'metaphor' to allow natural values to be expressed in terms of services to humans. This article instead considers how current and proposed applications of the concept in environmental law can better integrate notions of intrinsic value and other concerns raised regarding its ethical dimensions.

This article will commence with an analysis of the moral and ethical arguments leveraged for and against ecosystem services, summarising the critiques into two categories: (1) those that are opposed to the concept absolutely, and (2) those that are opposed to particular applications of it — generally, measures to commodify nature. It will then consider the various ways that ecosystem services are used in law and policy, and analyse three cases studies of its use in Australia. Following on from this, it will consider how the law can move forward, integrating notions of ecosystem services and intrinsic values, while respecting the key ethical concerns regarding the ecosystem services concept.

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<sup>17</sup> Kurt Jax et al, 'Ecosystem Services and Ethics' (2013) 93 *Ecological Economics* 260, 262.

<sup>18</sup> *Ibid* 265.

<sup>19</sup> See, eg, Thomas Hahn et al, 'Purposes and Degrees of Commodification: Economic Instruments for Biodiversity and Ecosystem Services Need Not Rely on Markets or Monetary Valuation' (2015) 16 *Ecosystem Services* 74.

## II CRITIQUES AND DEFENCES OF THE ECOSYSTEM SERVICES CONCEPT

Although the ecosystem services concept has gained momentum in both the conservation movement and the law and policy realm, it is acknowledged that it is not a universally popular concept. Within the literature on ecosystem services, there are numerous critiques of the idea, many of which are met with counter-critiques by other scholars. A majority of critiques are concerned very broadly with the ethical ramifications of valuing nature for what it can do, rather than what it is. Two recent works by Luck et al<sup>20</sup> and Schröter et al<sup>21</sup> have synthesised and classified the large body of literature on this topic. Luck et al characterise ethical objections as being directed at the following aspects of ecosystem services: the anthropocentric framing, its role as an economic metaphor, monetary valuation, commodification, sociocultural impacts, changes in motivations, and equity implications. With some overlap, Schröter et al characterise critiques as being directed at: the anthropocentric framing, the exploitative human–nature relationship, conflict with biodiversity conservation outcomes, the economic–value focus, commodification of nature, vagueness of definitions, and the normative nature of the concept.

While these detailed syntheses of the literature are extremely useful, it is not the object of this article to undertake a fine-grained analysis of all facets of the critiques. For brevity, these critiques will be categorised more broadly in this paper as (a) those that are in opposition to ecosystem services as a concept generally, and (b) those that are in opposition to the separation, monetisation and commodification aspects of the concept.

### *A Opposition to the Concept of Ecosystem Services: Anthropocentrism vs Ecocentrism, and Intrinsic vs Instrumental Value*

Many of the objections contained in Luck et al's and Schröter et al's summaries are captured by the decades long debates as to whether we should take an ecocentric or anthropocentric approach to nature,<sup>22</sup> and whether nature should

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<sup>20</sup> Gary W Luck et al, 'Ethical Considerations in On-Ground Applications of the Ecosystem Services Concept' (2012) 62(12) *BioScience* 1020.

<sup>21</sup> Schröter et al, 'Ecosystem Services as a Contested Concept: A Synthesis of Critique and Counter-Arguments' (2014) 7(6) *Conservation Letters* 514.

<sup>22</sup> See, eg, Suzanne C Gagnon Thompson and Michelle A Barton, 'Ecocentric and Anthropocentric Attitudes Towards the Environment' (1994) 14(2) *Journal of Environmental Psychology* 149. The authors note at 149 that 'ecocentric individuals value nature for its own sake and, therefore, judge that it deserves protection because of its intrinsic value. In contrast, anthropocentrists feel that the

be valued for its intrinsic or its instrumental value.<sup>23</sup> These concepts are generally presented as being dichotomous and irreconcilable. In fact, the meaning of ‘intrinsic value’ is not always expressed with clarity and explicitly defined, and Justus et al have noted that many scholars instead implicitly define it by reference to what it is not — that is, instrumental value.<sup>24</sup> Newman, Varner and Linquist have defined intrinsic value as something that ‘has value in and of itself, independently of its serving the ends, purposes, or goals of others’.<sup>25</sup> This is juxtaposed against instrumental value, which ‘refers to the value things have as means to some end, purpose, or goal’.<sup>26</sup>

Importantly, the distinction between intrinsic and instrumental value does not hinge upon the ability to assign a dollar value to a thing, and to have instrumental value does not mean that a thing’s value must be quantifiable in monetary terms. For example, a famous work of art has instrumental value because of the pleasure that human beings derive from viewing it.<sup>27</sup> Davidson has suggested that, in this instance, the value ascribed to the work of art can still be instrumental; its existence value, or the satisfaction humans get from its existence, is a cultural ecosystem service. Davidson has argued that intrinsic value can be conceptualised from either a deontological or a consequentialist perspective, involving valuing either nature’s moral status or its wellbeing, respectively.<sup>28</sup> However, in either case, the focus is on nature itself, without regard to its relationship to humans.

The debate as to whether nature should be valued for its intrinsic value or its instrumental value has continued for several decades and shows no signs of slowing down. The debate has its foundations in the concept of ‘deep ecology’, which emerged in the 1970s. Naess has distinguished between ‘shallow ecology’, whereby humans fight against pollution and resource depletion in order to better the health of human beings in developed countries, and ‘deep ecology’, which recognises that humans are merely part of a complex web of intrinsic relations.<sup>29</sup>

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environment should be protected because of its value in maintaining or enhancing the quality of life for humans.’

<sup>23</sup> See, eg, James Justus et al, ‘Buying into Conservation: Intrinsic versus Instrumental Value’ (2009) 24(4) *Trends in Ecology and Evolution* 187.

<sup>24</sup> *Ibid* 187–8. See also Lynn A Maguire and James Justus, ‘Why Intrinsic Value Is a Poor Basis for Conservation Decisions’ (2008) 58(10) *BioScience* 910.

<sup>25</sup> Jonathan A Newman, Gary Varner and Stefan Linquist, *Defending Biodiversity: Environmental Science and Ethics* (Cambridge University Press, 2017) 26.

<sup>26</sup> *Ibid*.

<sup>27</sup> Justus et al (n 23) 188.

<sup>28</sup> Mark D Davidson, ‘On the Relation between Ecosystem Services, Intrinsic Value, Existence Value and Economic Valuation’ (2013) 95(C) *Ecological Economics* 171.

<sup>29</sup> Arne Naess, ‘The Shallow and the Deep, Long-Range Ecology Movement. A Summary’ (1973) 16(1–4) *Inquiry* 95.

Deep ecology does not involve short-range, single-issue goals, but rather encourages drastic transformation of human values towards nature.<sup>30</sup>

In 1985, in a seminal essay, Soulé argued that ‘biotic diversity has intrinsic value, irrespective of its instrumental or utilitarian value ... [S]pecies have value in themselves, a value neither conferred nor revocable, but springing from a species’ long evolutionary heritage and potential or even from the mere fact of its existence’.<sup>31</sup> Since Soulé’s essay there has been a wealth of literature published on the topic of intrinsic value, and Sandler has summarised three different accounts of it: interest-based intrinsic value, valuer-dependent intrinsic value, and intrinsic objective value.<sup>32</sup> Interest-based intrinsic value arises when something has interests that humans ought to care about for their own sake. For example, species have interests, whereas rocks do not.<sup>33</sup> Valuer-dependent intrinsic value provides that something has intrinsic value if it is valued for what it is, not what it can do.<sup>34</sup> Finally, something possesses objective intrinsic value simply by virtue of its existence, irrespective of whether anyone recognises its value.<sup>35</sup> The latter category seems to align more with Davidson’s concept of intrinsic value discussed above.

Vucetich, Bruskotter and Nelson have argued that the implication of accepting the intrinsic value of nature is its practical importance to decision-making processes: ‘it would be unacceptable to harm or exploit an aspect of nature possessing intrinsic value unless there is compelling reason to do so — the burden of proof is on one wishing to harm or exploit’.<sup>36</sup> If their line of reasoning is accepted, it follows that a decision-maker solely focused on the instrumental value of an ecosystem could plausibly sacrifice it if a proposed development would offer a greater range of services. In contrast, an intrinsic-value approach means that the preservation of nature would prevail absent compelling reasons to harm it. Maguire and Justus have disagreed with this proposition and argue that intrinsic value is a poor basis for conservation decisions, because decision-making requires tradeoffs, which in turn requires the comparative evaluation of competing claims. If intrinsic value is weighed against an economic interest, in practice it is likely to be cast aside. However, they argue that values associated

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<sup>30</sup> See, eg, Bill Devall, ‘The Deep Ecology Movement’ (1980) 20(2) *Natural Resources Journal* 299, 303.

<sup>31</sup> Michael E Soulé, ‘What Is Conservation Biology?’ (1985) 35(11) *BioScience* 727, 731.

<sup>32</sup> Ronald Sandler, ‘The Value of Species and the Ethical Foundations of Assisted Colonisation’ (2009) 24(2) *Conservation Biology* 424.

<sup>33</sup> *Ibid* 426.

<sup>34</sup> *Ibid* 427.

<sup>35</sup> *Ibid* 429.

<sup>36</sup> John A Vucetich, Jeremy T Bruskotter and Michael Paul Nelson, ‘Evaluating Whether Nature’s Intrinsic Value is an Axiom of or Anathema to Conservation’ (2015) 29(2) *Conservation Biology* 321, 327.

with intrinsic value such as aesthetic, spiritual, cultural and existence value can be captured as a category of instrumental value, but in a form that can be evaluated comparatively and used in conservation decision-making.<sup>37</sup>

In a recent piece, Batavia and Nelson have defended intrinsic value. They argue that it should be central to the ecosystem services paradigm for logical, practical and ethical reasons. Logically, the ecosystem services paradigm is aimed at preserving human wellbeing, and human wellbeing is an intrinsic value itself, albeit an anthropocentric one — practically because it motivates, and ethically because we are moral agents who should treat anything possessing intrinsic value as an end rather than simply a means.<sup>38</sup>

Schröter and Oudenhoven have also argued that the concept of ecosystem services integrates notions of intrinsic value. Although the concept is inherently anthropocentric, they note that ‘humans ... do not want to merely survive, but to live a life worth living. To achieve this, relationships with nature need to go beyond being a utilitarian toolbox.’<sup>39</sup> They argue that the focus of debate going forward should be on how to use the ecosystem services concept in a progressive and collaborative way, to conserve biodiversity for both the good of humanity and for its own sake.<sup>40</sup>

Given that these debates have persisted for decades, it is unsurprising that calls have been made for a conceptual framework that balances these competing viewpoints. Some of these calls come from the community of scholars advocating for a ‘wild law’ or ‘earth jurisprudence’ approach. The theory of wild law proceeds on the basis that ‘one of the primary causes of environmental destruction is the fact that our governance systems are designed to perpetuate human domination of Nature, instead of fostering mutually beneficial relationships between humans and the other members of the Earth community’.<sup>41</sup> Wild law instead maintains that humans and nature are both the holders of rights, and these rights are interconnected.

Emerging from the conservation biology literature is the relational-values approach, which has been proposed as a third alternative to intrinsic and instrumental value. Chan et al have suggested a move beyond the intrinsic versus instrumental value juxtaposition, stating that while these ‘are often presented as stark alternatives, many important concerns may be better understood as

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<sup>37</sup> Maguire and Justus (n 24).

<sup>38</sup> Chelsea Batavia and Michael Paul Nelson, ‘For Goodness Sake! What Is Intrinsic Value and Why Should We Care?’ (2017) 209 *Biological Conservation* 366.

<sup>39</sup> Matthias Schröter and Alexander PE van Oudenhoven, ‘Ecosystem Services Go Beyond Money and Markets: Reply to Silvertown’ (2016) 31(5) *Trends in Ecology and Evolution* 333, 334.

<sup>40</sup> *Ibid.*

<sup>41</sup> Cormac Cullinan, ‘A History of Wild Law’ in Peter Burdon (ed), *Exploring Wild Law: The Philosophy of Earth Jurisprudence* (Wakefield Press, 2011) 12, 13.

relationships with both aspects'.<sup>42</sup> They advocate for a relational-values approach, which focuses on human interactions with nature, noting that 'caring for and attending to places can be essential for perpetuating cultural practices and core values', with relational values defined as 'preferences, principles, and virtues associated with relationships, both interpersonal and as articulated by policies and social norms'.<sup>43</sup> However, the relational-values approach has not been universally embraced; for example, Piccolo has argued that intrinsic value remains important, and that 'a moral concern for our own good ... ought not to substitute for a genuine moral concern for nature's own good'.<sup>44</sup> Stålhammar and Thorén acknowledge the benefits of the relational-values framing, but raise questions as to how it relates to existing concepts of value.<sup>45</sup>

One interesting facet of the relational-values approach is that it may have some parallels with indigenous perspectives on nature. Discussing the relationship between the Ngarrindjeri peoples and nature, Hemming et al have noted that 'Ngarrindjeri and indigenous peoples internationally understand their humanity and their Indigenous sovereignty as being constituted in inextricable relations with the non-human world ... [Their] philosophy expresses the interconnectivity between the lands, waters and all living things.'<sup>46</sup> Hemming et al argue that the ecological character description ('ECD') process for Ramsar wetlands is at odds with the Ngarrindjeri worldview, which is

based on principles of connectivity, responsibility, reciprocity and mutuality — where humans are connected as part of the whole 'ecosystem'. In the first instance, the ECD framework compartmentalises Ngarrindjeri lands and waters into ecosystem components, processes and services. This does not align with Ngarrindjeri rights and responsibilities, which rely on the connectivity between lands and waters and all living things.<sup>47</sup>

In this sense, the human-nature relationship is viewed as symbiotic — it is permissible for humans to rely on nature, but the relationship is reciprocal. The particular concern raised with the ecosystem services approach by Hemming et al was the segregation of different ecosystem service values, rather than considering them holistically. Nature is more than the sum of its parts and should be respected as such.

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<sup>42</sup> Kai MA Chan et al, 'Why Protect Nature? Rethinking Values and the Environment' (2016) 113(6) *PNAS* 1462, 1463.

<sup>43</sup> *Ibid* 1462–3.

<sup>44</sup> Piccolo (n 15) 11.

<sup>45</sup> Sanna Stålhammar and Henrik Thorén, 'Three Perspectives on Relational Values of Nature' (2019) 14(5) *Sustainability Science* 1201.

<sup>46</sup> Steve Hemming et al, 'Ngarrindjeri Vision for the Ecological Character Description of the Coorong and Lower Lakes' in Luke Mosley et al (eds), *Natural History of the Coorong, Lower Lakes and Murray Mouth Region* (Royal Society of South Australia, 2019) 494, 494.

<sup>47</sup> *Ibid* 496–7.

While these alternative perspectives on the value of nature have introduced fresh perspectives to the debate, they have not resulted — and arguably have not intended to result — in a universally agreed-upon approach to values. This admittedly brief review of the extensive literature on environmental ethics has showed that there remains a wide spectrum of viewpoints on whether nature should be valued for what it is, or what it does, or some combination thereof. For theorists at one end of the spectrum who take a strict approach to respecting nature for its pure intrinsic value, the ecosystem services concept is unlikely to be palatable under any circumstances. However, there is also recent literature that suggests that the intrinsic versus instrumental value classifications may not be quite as dichotomous as initially thought. There are also scholars who argue for respect for nature's intrinsic value as part of a fuller assessment of environmental values. In this instance, the ecosystem services concept may be acceptable, subject to ethical caveats. It seems that for many commentators, the subjective ethical line may be crossed when one separates out the various services provided by nature, which may also be accompanied by the monetisation and commodification of those services. Thus, the concept of commodification needs to be explored in further depth.

### ***B Opposition to the Separation, Monetisation and Commodification of Nature, and Focus on Economic and Monetary Values***

The ecosystem services concept may be used as a purely theoretical construct to explain the different functions performed by nature. In this vein, Redford and Adams have suggested that 'ecosystem services have now become the central metaphor within which to express humanity's need for the rest of living nature'.<sup>48</sup> Alternatively, the concept may be used as a basis for monetising and commodifying nature. For example, payment for ecosystem service ('PES') approaches involve financial incentives provided to parties who create or protect particular environmental services, paid by the beneficiaries of those environmental services (often governments).<sup>49</sup>

For some, the distinction between using ecosystem services as a metaphor, and using it as a basis to commodify nature, is where their ethical line is drawn. For example, Silvertown has distinguished between the anthropocentrism of the concept on one hand, and the monetisation of nature on the other. He argues that

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<sup>48</sup> Kent H Redford and William M Adams, 'Payment for Ecosystem Services and the Challenge of Saving Nature' (2009) 23(4) *Conservation Biology* 785.

<sup>49</sup> See, eg, Paul J Ferraro, 'The Future of Payments for Ecosystem Services' (2011) 25(6) *Conservation Biology* 1134.

nature should not be commodified, but recognising nature's anthropocentric values can mean that 'it is possible to use the concept of ecosystem services in a more nuanced way to build upon the moral case for biodiversity conservation and not to displace or devalue it by monetization'.<sup>50</sup>

This is backed by further vocal opposition to the monetisation and commodification of nature. McCauley has stated that the underlying object of the ecosystem services narrative is to identify ecosystem services, quantify their economic value, and bring conservation into the realm of market-based mechanisms.<sup>51</sup> He strongly criticised this marketisation of nature, as it implies 'that nature is only worth conserving when it is, or can be made, profitable'.<sup>52</sup> Kosoy and Corbera have argued that commodifying ecosystem services can actually be detrimental, as it reduces their value to single services rather than valuing them holistically. They argue that these issues can be addressed while maintaining the commodification approach, such as through bundling services and acknowledging multiple values. However, this would not satisfy McCauley's central concern, which was the need for nature to turn a profit in order for protection to be justified. An alternative and more radical approach would follow the lines of environmental ethics and discard commodification, instead treating the environment as a public good.<sup>53</sup> The problem of separating out nature's multiple values has also been highlighted by Boon and Prahalad, who pose the following question:

Do free-market speculators prefer wetlands as carbon stocks, or as bird habitats, or as areas that inspire artists, or as areas where people can maintain their mental health, or as areas that protect against shoreline erosion? Such economic analysis requires that complex dynamic ecosystem functions be reduced to suit the limited confines of economic models, based almost completely on narrowly determined human needs and desires.<sup>54</sup>

It is also important to note that the concept of 'commodification' is more complex than it appears at first sight. Hahn et al have identified seven degrees of commodification within ecosystem services policy, defining the degree of

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<sup>50</sup> Jonathan Silvertown, 'Have Ecosystem Services Been Oversold?' (2015) 30(11) *Trends in Ecology and Evolution* 641, 647.

<sup>51</sup> Douglas J McCauley, 'Selling Out on Nature' (2006) 443 *Nature* 27, 27.

<sup>52</sup> *Ibid* 27.

<sup>53</sup> Nicolás Kosoy and Esteve Corbera, 'Payments for Ecosystem Services as Commodity Fetishism' (2010) 69(6) *Ecological Economics* 1228, 1234–5.

<sup>54</sup> Paul I Boon and Vishnu Prahalad, 'Ecologists, Economics and Politics: Problems and Contradictions in Applying Neoliberal Ideology to Nature Conservation in Australia' (2017) 23(2) *Pacific Conservation Biology* 115, 119.

commodification as ‘the extent to which the value of biodiversity or an ecosystem service has become a tradeable commodity’.<sup>55</sup> These seven degrees are as follows:

- Zero is no commodification, including appreciating ecosystems for their intrinsic value. This may include designating areas as nature reserves, and it aligns with paradigms such as the rights of nature.<sup>56</sup>
- One involves a shift to framing nature according to its instrumental value, but without explicit efforts at valuation.<sup>57</sup>
- Two involves ‘new property rights and liabilities involving measurements of biodiversity or ecosystem service units but without monetary valuation or price signals’ — for example, biodiversity offsets.<sup>58</sup>
- Three involves ‘deliberate efforts to express or “demonstrate” the value of nature in monetary terms’. This is a step towards commodification.<sup>59</sup>
- Four involves taxes and subsidies to enhance ecosystem values.<sup>60</sup>
- Five includes markets for ecosystem services, tradeable biodiversity offsets, etc.<sup>61</sup>
- Six is financialisation or complete commodification and involves a commodity being re-packaged and re-sold as financial instruments.<sup>62</sup>

Hahn et al concluded that any use of the ecosystem services concept involves commodification in at least an analytical, if not normative, sense, because of their instrumental value focus.<sup>63</sup> Thus, a person’s ethical ‘line’ may not be drawn between commodification or no commodification, but rather at a particular degree of commodification. For example, degrees zero, one and two on Hahn et al’s scale might fall within the ‘ecosystem services as a metaphor’ categorisation, while degrees three and above are true examples of monetisation and commodification. Degree two may be a grey area, though, as it could involve the separation of distinct ecosystem services, if not the monetisation of them.

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<sup>55</sup> Hahn et al (n 19) 75.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid.

<sup>58</sup> Ibid 76.

<sup>59</sup> Ibid.

<sup>60</sup> Ibid 77.

<sup>61</sup> Ibid 78.

<sup>62</sup> Ibid.

<sup>63</sup> Ibid 81.

In summary, these sources suggest that there are two distinct but interlinked problems raised by critics of ecosystem services: first, the separation of an ecosystem into its constituent parts; and, second, commodification and monetisation of those parts (or some of those parts). It also indicates that it is important to distinguish between ecosystem services as a concept or a metaphor on the one hand, and commodification schemes such as payment for ecosystem services on the other. For example, Schröter et al have urged caution in conflating 'ecosystem services' with 'payment for ecosystem services'.<sup>64</sup> Indeed, the following discussion will demonstrate that, in the Australian context, most applications of the ecosystem services concept in law have been in the metaphorical sense, with few examples of true commodification schemes.

### III HOW ECOSYSTEM SERVICES IS — AND CAN BE — USED IN LAW

While there is a wealth of scholarship debating the ethical boundaries of the ecosystem services concept, what is currently lacking in the literature is a discussion of the ethical implications of the ecosystem services concept as it is used in law and legal frameworks. This is unsurprising, as the literature on ecosystem services and law generally is also quite scant, and the law has lagged behind scientific developments on this issue by several decades.<sup>65</sup> Writing in 2010, Ruhl noted that the ecosystem services concept had only begun to penetrate United States environmental policy in the previous few years.<sup>66</sup> Progress has been even slower in Australia, and in a 2020 review of wetland law and policy, Bell-James, Boardman and Foster could identify no piece of Australian legislation referring explicitly to ecosystem services, although there is some recognition of the concept in policy.<sup>67</sup> While progress has been gradual and slow, there have been a number of analyses of how the concept can be translated into legal and policy frameworks.

In 2012, Luck et al noted that the ecosystem services concept was becoming more visible in government policy and programs, including payment for

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<sup>64</sup> Schröter et al (n 21).

<sup>65</sup> This lag between scientific and technological developments and legal response has been observed in many areas: see, eg, Frederick K Beutel, 'The Lag between Scientific Discoveries and Legal Procedures' (1953) 33(1) *Nebraska Law Review* 1; Lyria Bennett Moses, 'Recurring Dilemmas: The Law's Race to Keep Up with Technological Change' [2007] *University of New South Wales Faculty of Law Research Series* 21.

<sup>66</sup> JB Ruhl, 'Ecosystem Services and the Clean Water Act: Strategies for Fitting New Science into Old Law' (2010) 40(4) *Environmental Law* 1381, 1383.

<sup>67</sup> Justine Bell-James, Tessa Boardman and Rose Foster, 'Can't See the (Mangrove) Forest for the Trees: Trends in the Legal and Policy Recognition of Mangrove and Coastal Wetland Ecosystem Services in Australia' (2020) 45 *Ecosystem Services* 101148.

ecosystem services schemes, spatial planning, greening of national accounting schemes, and strategic considerations in high-level policy and lawmaking.<sup>68</sup> The authors observed that the concept can be used purely as a communication tool to help people understand the importance of nature, and it can also be used to influence policy and assist with decision-making.<sup>69</sup> This was echoed by Jax et al, who noted that it may be used to denote a generic idea regarding the role of nature in sustaining human life; it can be used at the policy level to support decision-making, for example by making clear the trade-offs arising from different land-use policy decisions; or, finally, it can be used to measure, monetise and commodify nature.<sup>70</sup>

Writing from a legal perspective, Pardy has stated that there have been at least three approaches proposed for the protection of ecosystem services in law: first, a regulatory approach, whereby law restricts actions that may affect ecosystem services; second, payment for ecosystem services schemes; and, third, the creation of markets for ecosystem services.<sup>71</sup>

In 2015, Ruhl produced a detailed analysis of the current themes in ecosystem services law and policy in the United States, and he noted that the concept had gained traction in five different legal and policy realms: government payment programs, regulatory programs, public lands programs, impact assessment programs, and common law.<sup>72</sup> PES schemes include payments to farmers for improving water flows into the watershed.<sup>73</sup> Regulatory programs require government agencies to take ecosystem services into account in decision-making processes.<sup>74</sup> Public land management programs are those that incorporate ecosystem services considerations into decisions regarding public land.<sup>75</sup> Impact assessment programs have received a lot of traction in the United States recently, with ecosystem service impacts factored into some decision-making regarding infrastructure projects.<sup>76</sup> Finally, ecosystem services have been considered in some judicial decisions; for example, a court upheld a development refusal as runoff from the development would affect a marshland, thereby constituting nuisance.<sup>77</sup>

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<sup>68</sup> Luck et al (n 20) 1020.

<sup>69</sup> Ibid 1021.

<sup>70</sup> Jax et al (n 17) 265.

<sup>71</sup> Bruce Pardy, 'The Logic of Ecosystems: Capitalism, Rights and the Law of 'Ecosystem Services'' (2014) 5(2) *Journal of Human Rights and the Environment* 136, 138.

<sup>72</sup> Ruhl (n 16) 320.

<sup>73</sup> Ibid 321.

<sup>74</sup> Ibid 322.

<sup>75</sup> Ibid.

<sup>76</sup> Ibid 323.

<sup>77</sup> Ibid 324.

Building on these categories, Bell-James, Boardman and Foster have categorised current approaches in Australia. They identify three main ways in which the ecosystem services concept has been used, either explicitly or implicitly, in Australia in the context of coastal wetlands.<sup>78</sup> First, it has been utilised in development approval laws and policies, such as laws and policies that require impacts on a wetland to be taken into account in making a decision about development. This aligns with Ruhl's impact assessment program category. Second, the concept has been adopted in the context of resource conservation laws that require the consideration of impacts on a wetland in decision-making that is not related to development. Finally, there are protected areas laws and policies that allow a decision-maker to declare an area as being of a class of protected areas and therefore subject to limits on use therein. This partially aligns with Ruhl's public lands programs category.<sup>79</sup> There are also emerging regimes for providing monetary benefits related to nature restoration (payments for ecosystem services), for example through the Federal Climate Solutions Fund/Emissions Reduction Fund and Queensland Land Restoration Fund, both of which provide financial incentives and/or carbon credits for restoration projects.<sup>80</sup> To date, there are few true commodification schemes in Australia that allow for generation of tradeable credits.<sup>81</sup> Further, even in the contexts identified, the ecosystem services concept has not always been incorporated in law, and decision-makers are often simply required to consider impacts on the resource — not the services provided by that resource.<sup>82</sup>

What these analyses demonstrate is that there are many different ways that the ecosystem services concept can be used in law, with these different mechanisms aligning with different points on the Hahn et al commodification scale. In many instances, the concept is used only in the metaphorical context contemplated by Redford and Adams, in the sense that a decision-maker is only required to consider ecosystem services provided by a resource in determining whether to allow an aspect of the environment to be harmed. They need not take the additional step of quantifying the monetary value of the services provided, and determining whether this value exceeds the monetary value of a proposed development. For example, Queensland decision-makers must aim to ensure that

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<sup>78</sup> Bell-James, Boardman and Foster (n 67).

<sup>79</sup> Ibid.

<sup>80</sup> See discussion in Justine Bell-James and Catherine E Lovelock, 'Legal Barriers and Enablers for Reintroducing Tides: An Australian Case Study in Reconverting Poned Pasture for Climate Change Mitigation' (2019) 88 *Land Use Policy* 104192.

<sup>81</sup> But see, eg, *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002* (NSW), which provides for credits to be issued for increases in water quality. These credits can then be traded on a market.

<sup>82</sup> See, eg, Bell-James (n 13).

development does not impact on coastal processes, which includes the role of wetlands in filtration and flood mitigation.<sup>83</sup> In this respect, the purpose of the legal requirement is to place nature on the same plane of comparison as development.<sup>84</sup> In Australia, certainly, there are as yet few examples of the higher parts of the Hahn et al commodification scale reflected in law or policy.

This analysis also shows that, despite lingering debates as to the appropriateness of the ecosystem services concept, it already permeates decision-making and law and legal processes, and has in some cases resulted in the delivery of environmental benefits. It has also rarely been used in the context of that part of the spectrum of ecosystem service narratives that is of most concern to scholars. To further demonstrate this point, the following sections will analyse three different applications of the ecosystem services concept in Australia, aligning with the three categories identified by Bell-James, Boardman and Foster: resource protection, development approval, and protected areas.

### ***A Ecosystem Services in Resource Conservation Laws and Policies***

A review of legislation and policy protecting wetlands in Australia has shown that some of the strongest and most consistent protection is delivered through fisheries legislation.<sup>85</sup> Because of the fisheries focus, wetland protection is not an explicit purpose of that legislation. For example, the purpose of the *Fisheries Act 1994* (Qld) is 'to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to apply and balance the principles of ecologically sustainable development, and promote ecologically sustainable development'.<sup>86</sup> 'Fish habitat' is broadly defined to include 'plants associated with the life cycle of fish',<sup>87</sup> which incorporates wetlands. These wetland plants (including mangroves and saltmarsh) are prima facie protected under the legislation, as a person must not unlawfully remove, destroy or damage a marine plant<sup>88</sup> without obtaining the requisite approval.<sup>89</sup>

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<sup>83</sup> *Coastal Protection and Management Act 1995* (Qld) and Queensland Department of Infrastructure, Local Government and Planning, *State Development Assessment Provisions: State Code 8: Coastal Development and Tidal Works* (2017) PO1.

<sup>84</sup> See Bell-James (n 13) 292.

<sup>85</sup> See, eg, *Fisheries Act 1994* (Qld); *Fisheries Management Act 1994* (NSW); *Fisheries Act 1995* (Vic); *Fisheries Act 1988* (NT); *Fisheries Management Act 2007* (SA). See also Kerry Lee Rogers et al, 'The State of Legislation and Policy Protecting Australia's Mangrove and Salt Marsh and Their Ecosystem Services' (2016) 72 *Marine Policy* 139.

<sup>86</sup> *Fisheries Act 1994* (Qld) s 3(1).

<sup>87</sup> *Ibid* Dictionary sch 1.

<sup>88</sup> *Ibid* s 123(a).

<sup>89</sup> Queensland Department of Infrastructure, Local Government and Planning, *State Development Assessment Provisions: State Code 11: Removal, Destruction or Damage of Marine Plants* (2017).

Similarly, the primary object of the *Fisheries Management Act 1994* (NSW) is 'to conserve, develop and share the fishery resources of the State for the benefit of present and future generations'.<sup>90</sup> Mangroves, seagrasses and other declared marine vegetation are protected in circumstances where they are located in a 'protected area',<sup>91</sup> unless there is a permit to harm marine vegetation.<sup>92</sup>

The motivator for these legislative protections is inherently economic. The economic benefits of fisheries protection are quantifiable, with scientists noting a direct negative impact on fisheries production as a result of wetland degradation, and a corresponding increase in production where efforts are made to repair affected wetlands.<sup>93</sup> On the flipside, it has been recognised that, at the global scale, overexploitation through fishing has had a negative effect on wetlands.<sup>94</sup> Policymakers therefore face the challenge of striking a delicate balance between ensuring the continued health of wetlands and the sustainability of the fishing industry. In Queensland, policy underpinning fisheries legislation attempts to address this balance by requiring that any development involving the removal, destruction or damage of marine plants 'maintains the extent, distribution, diversity and condition of marine plant communities and protects the ecological functions to which they contribute'.<sup>95</sup> Significantly, this incorporates some recognition of the intrinsic value of wetlands, as well as their holistic value as more than just a habitat for fish.

There are certainly criticisms that can be levelled against the fisheries focus of much wetland protection law. The focus on a single ecosystem service is at odds with some views of nature,<sup>96</sup> and scientists have also argued that prioritising nature for provision of a single service does not necessarily lead to co-benefits.<sup>97</sup> It also means that nature may not be deemed important enough to conserve where a cost-benefit analysis does not favour preservation. On the other hand, protection through fisheries legislation has slowed the degradation of wetlands and delivered an environmental benefit in a situation where environmental factors may otherwise have been overlooked. However, this preservation has been an end product, rather than a means. These themes will be explored in further case studies.

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<sup>90</sup> *Fisheries Management Act 1994* (NSW) s 3(1).

<sup>91</sup> *Ibid* ss 204(2), 204A, 205. 'Protected areas' include any public water land, any area subject to an aquaculture lease, and the foreshore.

<sup>92</sup> *Environmental Planning and Assessment Act 1979* (NSW) s 91A.

<sup>93</sup> Colin Creighton et al, 'Repairing Australia's Estuaries for Improved Fisheries Production — What Benefits, at What Cost?' (2015) 66(6) *Marine Freshwater Research* 493.

<sup>94</sup> Intergovernmental Science-Policy Platform on Ecosystem Services (n 1) 5.

<sup>95</sup> Queensland Department of Infrastructure (n 89) [11.1].

<sup>96</sup> See, eg, Kosoy and Corbera (n 53) 1234–5.

<sup>97</sup> Scott C Atkinson et al, 'Prioritising Mangrove Ecosystem Services Results in Spatially Variable Management Priorities' (2016) *PLOS ONE* DOI:10.1371/journal.pone.0151992.

## B *Development Approval Laws and Policies*

The fisheries context is one example of where a healthy, well-functioning wetland is not only harmonious with, but also crucial to, a major economic industry. Preserving wetlands is therefore advantageous to nature and the economy. One of the challenges with using ecosystem services in laws regarding development decision-making is that these win-win situations will not always occur, and there will be situations where preservation of a natural feature, like a wetland, does not stack up against the proposed economic use. This is the concern raised by Vucetich, Bruskotter and Nelson, who have argued for intrinsic value to be incorporated into decision-making,<sup>98</sup> while Maguire and Justus have argued that intrinsic values should be incorporated into decision-making as a form of instrumental value.<sup>99</sup> For example, if the cultural and recreational values associated with nature are considered as part of a balancing of values, it may tip the scales towards its preservation or protection.

A glance at the decisions made under Australia's national environmental legislation, the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), shows that development typically prevails. Of 6403 referrals received in an almost 20-year period, a total of 21 proposals have been refused<sup>100</sup> — a mere 0.3 per cent. Importantly, this is also a regime where ecosystem services are not explicitly part of the decision-making framework, but the broad discretion given to decision-makers means that ecosystem services can be considered.

Of the few projects that have been refused, ecosystem services have sometimes factored into the decision-making context. One such project was the proposed canal estate at Ralphs Bay in Lauderdale, Tasmania.<sup>101</sup> Opposition to the project focused on the ecosystem services provided by the bay, including denitrification of water, habitat for a wide range of species and migratory birds, and aesthetic, community and recreational values.<sup>102</sup> Ultimately the project was refused, with ecosystem services cited as a reason for refusal, and the decision-maker concluding that the likely ecological and social impacts of the development

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<sup>98</sup> Vucetich, Bruskotter and Nelson (n 36) 327.

<sup>99</sup> Maguire and Justus (n 24).

<sup>100</sup> Australian Government Department of the Environment and Energy, *Annual Report 2018–2019, Appendix 4A: Statistics and Other Information* (Report, 2019) <<https://www.transparency.gov.au/annual-reports/department-environment-and-energy/reporting-year/2018-2019-57>>. Note that this figure, which is current to May 2020, includes actions deemed 'clearly unacceptable' at the referral stage, and actions not approved at the approval stage.

<sup>101</sup> Australian Government, Department of the Environment and Heritage, *EPBC Act Referral no 2006/3193*.

<sup>102</sup> Jane MacDonald and Jess Feehely, 'Ralphs Bay Saved: A Tasmanian Story' (2010) 1(2–3) *National Environmental Law Review* 38, 38.

would outweigh the economic benefits.<sup>103</sup> However, this was not an easily won victory; it was the outcome of years of targeted campaigning and legal action.<sup>104</sup>

A large-scale, multi-year community campaign also influenced the outcome in another high-profile project refusal — the Traveston Crossing Dam. This project was proposed by the Queensland State Government in 2005 as a solution to extensive and prolonged drought in the south-east of the State. As a major infrastructure project, it required a number of approvals at both the State and Commonwealth levels. After a lengthy and controversial environmental impact assessment process,<sup>105</sup> the Queensland Government recommended it be approved, subject to approximately 1200 conditions.<sup>106</sup> However, the project was refused approval at the Commonwealth level, due to likely significant impacts on listed threatened species and communities,<sup>107</sup> namely, the Mary River cod, the Mary River turtle and the lungfish.

The proposed dam was to be constructed on the Mary River in South East Queensland, which was recognised as one of the last remaining spawning sites of the Queensland lungfish, a species dating back 180 million years. Importantly, key habitats for the lungfish had been destroyed by other dam and weir development.<sup>108</sup> Although these species do not provide a service for humans that can be valued economically, the existence value of such endemic species is a clear cultural value.

While the refusal of approval was a win for this cultural value, both in substance and in effect, there were many more complex issues underpinning the refusal. There had been a heavily coordinated opposition effort, spearheaded by an unlikely alliance of environmentalists, farmers, indigenous peoples and landholders.<sup>109</sup> The dam would have resulted in the acquisition and flooding of high-quality agricultural land, homes, communities, and sites of Aboriginal significance. It was also viewed as a sacrifice of peri-urban land and values as a

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<sup>103</sup> Ibid 46.

<sup>104</sup> See *ibid* for a detailed analysis of the process.

<sup>105</sup> See, eg, Kim de Rijke, 'The Symbolic Politics of Belonging and Community in Peri-Urban Environmental Disputes: The Traveston Crossing Dam in Queensland, Australia' (2012) 82(3) *Oceania* 278.

<sup>106</sup> Queensland Government Coordinator-General, *Coordinator-General's Evaluation Report: Traveston Crossing Dam Stage 1* (Report, October 2009) <<http://www.statedevelopment.qld.gov.au/resources/project/traveston-crossing-dam/traveston-crossing-dam-synopsis-full-report.pdf>>.

<sup>107</sup> Notice of Proposed Decision 2006/3150.

<sup>108</sup> Larissa Waters, 'Queensland and the Traveston Dam' in Tim Bonyhady and Andrew Macintosh (eds), *Mills, Mines and Other Controversies: The Environmental Assessment of Major Projects* (Federation Press, 2010) 125, 148–9.

<sup>109</sup> de Rijke (n 105).

solution to a water crisis in a major city (Brisbane),<sup>110</sup> epitomising the city/country divide that has permeated discourse in environmental decision-making in Queensland.<sup>111</sup>

In some ways, the Traveston Dam example is the reverse of the wetland protections under fisheries laws in the example above. In the fisheries context, the economic protection of fish habitat was the motivator for protection of wetlands, with protection of the more intrinsic values of wetlands a by-product of this. In the Traveston Dam example, the intrinsic value of a handful of endemic species was the stated motivation for the decision, with flow-on effects for societal and economic values. Although it may be tempting to point to the Traveston Dam example to prove that intrinsic values are well integrated in development approval laws and policies, the decision is a statistical outlier, making it very much the exception rather than the rule.

What these examples do demonstrate is that the current system for environmental assessment and approval in Australia, heavily influenced by administrative discretion, does not favour environmental protection. The examples where projects have been refused have involved appeals based on both ecosystem services and intrinsic value, indicating a place for both framings. However, these examples have also arisen in contexts where communities and environmental groups have fought hard for ecosystem services and intrinsic value to influence the outcome, suggesting a need for those concepts to permeate the decision-making framework at a deeper level.

### C *Protected Areas*

Protected areas that are quarantined from development offer the strongest protections for nature at this point in time. For example, the object of the *Nature Conservation Act 1992* (Qld) is the 'conservation of nature', and that conservation object is not expressed as a factor to be weighed against development, economic, social or any other competing interests.<sup>112</sup> Nature is defined to include 'all aspects of nature', and includes, without limitation, 'ecosystems and their constituent parts, all natural and physical resources, natural dynamic processes and the characteristics of places, however large or small that contribute to their biological

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<sup>110</sup> Julie Matthews, Tim Smith and Robert Mangoyana, 'The Conquest of Peri-Urban: Sustainability and Postcolonialism' (2009) 5(4) *International Journal of Environmental, Cultural, Economic and Social Sustainability* 1.

<sup>111</sup> See, eg, Rowena Maguire et al, *Environmental, Planning and Climate Law in Queensland* (LexisNexis, 2020) 30.

<sup>112</sup> *Nature Conservation Act 1992* (Qld) s 4.

diversity and integrity or their intrinsic or scientific value'.<sup>113</sup> The Act achieves this through the declaration of various classes of protected areas, such as national parks, conservation parks, resource reserves and nature refuges on private land, and the management of wildlife therein.

A national park may be declared by regulation,<sup>114</sup> and must be managed to:

- (a) provide, to the greatest possible extent, for the permanent preservation of the area's natural condition and the protection of the area's cultural resources and values; and
- (b) present the area's cultural and natural resources and their values; and
- (c) ensure that the only use of the area is nature-based and ecologically sustainable; and
- (d) provide opportunities for educational and recreational activities in a way consistent with the area's natural and cultural resources and values ...<sup>115</sup>

This provides a strong degree of protection for nature, in that there is little scope for discretion; unlike a development approval law, a decision-maker does not have scope to weigh up development potential against environmental protection goals. However, the regime does not exist purely to protect intrinsic values; the very fact that 'cultural resources and values' are mentioned introduces a human concept of valuation into the law. It also allows for some human use and enjoyment of national parks, although in a manner consistent with protection of environmental values. What this indicates is that, at this point in time, even the laws most aligned with intrinsic views on nature incorporate notions of instrumental value, yet strong environmental protection has still been delivered.

#### IV ETHICAL USE OF THE ECOSYSTEM SERVICES CONCEPT IN LAW AND LEGAL FRAMEWORKS

Several broad observations about the current legal framework may be drawn from the case studies outlined above. First, ecosystem services as a concept already informs some environmental law and policy and decision-making in Australia, although not always in an overt way. Second, in discretionary decisions, lobbying for the consideration of ecosystem services and intrinsic value has resulted in better outcomes for the environment. Third, law can and does incorporate notions of the intrinsic value of nature, although generally not exclusively. Even the strongest recognition of intrinsic value (in protected areas law) also incorporates notions of instrumental value (eg recognition of cultural value). Finally,

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<sup>113</sup> Ibid s 8.

<sup>114</sup> Ibid s 29(1)(b).

<sup>115</sup> Ibid s 17(1).

incorporating intrinsic value as a form of instrumental value has still resulted in robust protection of natural areas, as well as allowing it to be considered as part of the decision-making framework in discretionary decisions.

If one is to accept that the ecosystem services concept is valid to integrate into decision-making — acknowledging this does not appeal to everyone — there are already examples of it working in practice that can be built upon. In many instances, the ecosystem services concept is not expressly integrated into legislation, but doing so would ensure its consideration in decision-making processes — especially if it were coupled with a decrease in administrative discretion. Ensuring that notions of intrinsic values are incorporated into this legislation and decision-making processes will not necessarily appease the strongest critics of the ecosystem services paradigm, but it will go some way towards ensuring that their valid concerns are taken into account.

The incorporation of the intrinsic value concept into legislation could be supplemented by guidance within the literature as to how that concept can be used ethically. Jax et al argue that three ethical questions must be considered: who makes the choices regarding use, which values are included or highlighted and which are excluded or obscured, and who is impacted by choices regarding ecosystem service use.<sup>116</sup> Decisions must be made on a participatory basis, including the viewpoints of those who are affected by ecosystem services.<sup>117</sup> Policy-makers must also be careful to ensure that non-monetary values are not obscured by monetary values,<sup>118</sup> and it must be accepted that the ecosystem services narrative may be used in different ways.<sup>119</sup> There is also a need to consider trade-offs and conflicts, and to understand that the provision of an ecosystem service and the preservation of biodiversity are not always the same thing.<sup>120</sup> For example, Bell-James and Lovelock discuss how removal of bund walls may increase the extent of saltwater wetlands and provide a carbon sequestration service, but this may occur at the expense of freshwater wetlands and biodiversity such as birds, which are dependent on these habitats.<sup>121</sup>

Luck et al argue that the context is essential when determining the ethical bounds of the ecosystem services concept:

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<sup>116</sup> Jax et al (n 17) 262–5.

<sup>117</sup> *Ibid* 264.

<sup>118</sup> *Ibid*.

<sup>119</sup> *Ibid* 265.

<sup>120</sup> *Ibid* 266.

<sup>121</sup> Justine Bell-James and Catherine E Lovelock, 'Legal Barriers and Enablers for Reintroducing Tides: An Australian Case Study in Reconverting Poned Pasture for Climate Change Mitigation' (2019) 88 *Land Use Policy* 104192.

[A]pplications of the ecosystem services concept that involve the monetisation or commodification of nature raise a raft of ethical issues that are not necessarily pertinent to using the concept to raise awareness or develop strategic arguments. Therefore, it is vital to recognise the context dependence of ethical concerns to ensure that the most relevant concerns are addressed for a given application.<sup>122</sup>

Where the concept is being used as a metaphor without commodification, Luck et al argue that the anthropocentric framing of the concept can be addressed by using multiple metaphors to describe nature, and not just by relying on ecosystem services (eg stewardship of nature). The ethical considerations regarding commodification can be addressed by using non-monetary measures of valuation as well.<sup>123</sup> Schröter et al suggest that the concept can be used ethically, especially where notions of intrinsic value are integrated. It may also be a way to reconnect an increasingly modernised society with nature.<sup>124</sup> Similarly, Ruhl suggests that the ecosystem services concept can be used to complement consideration of ecological and intrinsic values, rather than to replace those values.<sup>125</sup>

A recent example from Victoria may address some of these issues, as well as concerns regarding the separation of ecosystem services. Victoria's Marine and Coastal Policy 2020 recommends the use of an ecosystem service-based approach to manage the marine and coastal environment in a way that sustains ecosystems to meet both their intrinsic needs and the needs of humans.<sup>126</sup> Following on from this, the policy suggests that 'the ability of marine and coastal ecosystems to support the provision of goods and services must be maintained'.<sup>127</sup> These goods and services are very broadly defined in Appendix 3 to include air purification, climate regulation, regulation of water flows, food and water services, as well as recreation, aesthetic and spiritual experience, inspiration for culture, art and design, and cultural heritage.<sup>128</sup> While some flaws exist with this policy — for example, it is non-binding — it is a good example of drawing together ecosystem services, both intrinsic and instrumental, to require that they be considered holistically. It could also be used as a model for developing binding rules about protecting and sustaining ecosystem services, including in other contexts.

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<sup>122</sup> Luck et al (n 20) 1027.

<sup>123</sup> Ibid 1025.

<sup>124</sup> Schröter et al (n 21) 515.

<sup>125</sup> Ruhl (n 16) 332.

<sup>126</sup> Victoria State Government, *Marine and Coastal Policy* (March 2020) <[https://www.marineandcoasts.vic.gov.au/\\_\\_\\_data/assets/pdf\\_file/0027/456534/Marine-and-Coastal-Policy\\_Full.pdf](https://www.marineandcoasts.vic.gov.au/___data/assets/pdf_file/0027/456534/Marine-and-Coastal-Policy_Full.pdf)> 2.1.

<sup>127</sup> Ibid 2.3.

<sup>128</sup> Ibid Appendix 3.

## V CONCLUSIONS

There are many criticisms of the ecosystem services concept, with opponents either against the concept absolutely, or against the commodification of nature. This article has not entered into the debate regarding commodification. Rather, it has demonstrated that most applications of the ecosystem services concept in Australia to date do not involve commodification, and instead involve it being used as a metaphor for nature.

This article has also argued that the ecosystem services concept can be used in law in an ethically defensible way, by integrating anthropocentric values (eg carbon sequestration, shoreline protection) with intrinsic values, and ensuring that they are considered holistically in decision-making. It is acknowledged that this is not an approach that will appease the strongest critics of ecosystem services, but it aims to strike a balance between their concerns and the need to ensure more robust protection for the natural environment.

Further, it is acknowledged that separation and commodification of ecosystem services are increasingly common in Australia's policy framework — for example, through the Emissions Reduction Fund. In addition to the ethical concerns raised regarding commodification, there is a risk that nature simply may not win when balanced against other considerations. For example, when considering the storm surge protection capacity of mangroves, in some instances allowing mangroves to retreat inland will be economically sound, perhaps due to the economic value of carbon sequestered. However, in other areas, defending multi-million dollar coastal properties with hard structures while sacrificing wetlands may be more defensible from a purely economic perspective. Untangling these complex issues is beyond the scope of this article, but it is an area in need of further analysis.

# WORKPLACE SAFETY, DEADLY JELLYFISH AND TOURISTS: A NOVEL APPROACH TO AN EMERGENT PROBLEM

LYNDA CROWLEY-CYR\*

*This article considers the hazards posed by marine stingers (notably Irukandjis) to recreational divers and snorkelers through the lens of Queensland's unique workplace health and safety regulatory regime. The sustainability of diving and snorkelling tourism is highly dependent on the quality and safety of the services provided. The regime already contemplates the role of operators, the impact of sting-protective swimwear and other matters. An independent review of the State's workplace laws in 2017 influenced changes to the law to improve its clarity, enforcement and prosecutions. However, this article argues that in relation to the management of marine stinger risks, with further slight adjustments to enhance clarity and consistency, the regulatory framework could achieve greater effectiveness in terms of compliance. This is important in a harmonised regulatory system. Other jurisdictions in Australia facing dangerous jellyfish hazards can refer to Queensland's laws as a model of industry standards for the provision of safer recreational water activities. The article concludes with practical recommendations.*

## I INTRODUCTION

Since the summer of 2019, Australia's tourism businesses have endured the effects of severe drought, catastrophic bushfires, and then the onslaught of COVID-19. The COVID-19 pandemic is of unprecedented scale and impact on the global tourism industry.<sup>1</sup> Domestically, travel restrictions and border closures, social distancing and other public health measures have and will continue to

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<sup>1</sup> On 28 July 2020, the United Nations World Tourism Organization ('UNWTO') reported that the lockdowns imposed in response to the COVID-19 pandemic led to a 98 per cent fall in international tourist numbers in May relative to 2019, which translates into a fall of 300 million tourists and US\$320 billion in international tourism receipts. See UNWTO, 'Impact of COVID-19 on Global Tourism Made Clear as UNWTO Counts the Cost of Standstill' (Web Page, July 2020) <<https://www.unwto.org/news/impact-of-covid-19-on-global-tourism-made-clear-as-unwto-counts-the-cost-of-standstill>>.

affect the lives and livelihood of tourism businesses. Health and safety risks and public/tourist risk-perception are of unparalleled importance as tourism businesses plan for the future. Tourists, especially international tourists, may have become more risk-averse than previously.<sup>2</sup> However, the virus has also triggered an opportunity for public authorities and tourism industries to review all health and safety risks with greater vigour, including marine stinger risks to recreational divers and snorkelers.

The economic value of diving and snorkelling tourism is highly dependent on the quality and safety of the services provided. Participants with little or no experience in these ocean sports are likely to place greater trust in service providers to keep them safe from known hazards. Australia's rich tropical waters are home to two of the world's deadliest jellyfish: 'box jellyfish' (*Chironex fleckeri*),<sup>3</sup> and Irukandjis<sup>4</sup> (collectively known as 'marine stingers').<sup>5</sup> Experts say the frequency of encounters involving marine stingers with humans (though invariably underestimated) is increasing.<sup>6</sup> Such encounters are inherently risky because they can be life-threatening.<sup>7</sup> The emotional and financial costs of serious stings are significant to those affected, even catastrophic, as they can cause brain haemorrhages, long-term health complications, or death.

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- <sup>2</sup> Past research points to a negative relationship between risk perception and intention to travel. See, eg, Rob Law, 'The Perceived Impact of Risks on Travel Decisions' (2006) 8(4) *International Journal of Tourism Research* 289; Ignatius Cahyanto et al, 'The Dynamics of Travel Avoidance: The Case of Ebola in the US' (2016) 20 *Tourism Management Perspectives* 195.
- <sup>3</sup> Full grown, the bell-shaped body is around 25 cm in height and has multiple tentacles up to three metres in length that can kill humans in two to three minutes through mass envenomation. See John Williamson et al (eds), *Venomous and Poisonous Animals: A Medical and Biological Handbook* (NSW University Press, 1996) 70.
- <sup>4</sup> Full grown, Irukandjis' bells are the size of a thimble, with four threadlike tentacles of around 35 cm long. See Williamson, *ibid* 269.
- <sup>5</sup> Box jellyfish and Irukandjis score a danger rating of 10/10 and 9/10, respectively. See Jude Dineley, 'Australia's Dangerous Animals: The Top 30' *Australian Geographic* (Web Page, 28 March 2013) <<https://www.australiangeographic.com.au/topics/wildlife/2013/03/australias-dangerous-animals-the-top-30/>>.
- <sup>6</sup> See Lisa-ann Gershwin et al, 'Marine Stingers: Review of an Under-Recognized Global Management Issue' (2010) 38(1) *Coastal Management* 21, 27; Chris Honnery, 'Awash with Tiny Threats', *The Courier Mail* (Brisbane, 8 January 2019) 21.
- <sup>7</sup> See Gershwin et al (n 6), 27; JH Barnes, 'Cause and Effect in Irukandji Stings' (1964) 1(24) *Medical Journal of Australia* 897; P Fenner et al, 'Further Understanding of, and a New Treatment for "Irukandji" (Carukia Barnesi) Stings' (1986) 145(11-12) *Medical Journal of Australia* 569; P Fenner and I Carney, 'The Irukandji Syndrome: A Devastating Syndrome Caused by a North Australian Jellyfish' (1999) 28(11) *Australian Family Physician* 1131; M Little et al, 'Severe Cardiac Failure Associated with Presumed Jellyfish Sting. Irukandji Syndrome?' (2003) 31(6) *Anaesthesia and Intensive Care* 642; and MA Corkeron, 'Magnesium Infusion to Treat Irukandji Syndrome' (2003) 178(8) *Medical Journal of Australia* 411.

Marine stinger hazards also carry significant economic impacts on local and national economies. For instance, an early and modest estimate of the annual financial cost of retrieving and treating Irukandji stings in Queensland in 1999 was in the range of \$1–3 million.<sup>8</sup> Today, the cost is predictably much higher. Public fear and apprehension following news reports of stings can have devastating economic impacts on tour-boat businesses, the wider diving/snorkelling tourism sector, and the communities that depend on tourism revenue for their livelihood.

In many of the world's tropical regions, encounters between people and marine stingers occur during water activities such as snorkelling and diving. Tourism businesses facilitate encounters where they provide boat-based and reef water activities. Further, experts predict that with rising sea temperatures, the numbers and geographic spread of these jellyfish will also rise.<sup>9</sup> For these reasons, such jellyfish are an acknowledged 'global coastal management issue' for most of the world's coastal tourism destinations<sup>10</sup> and a significant health hazard<sup>11</sup> in Australia. This arguably brings the management of risks to health and safety posed by recreational water activities within the scope of Australia's workplace health and safety ('WHS') laws. Yet, Queensland is the only jurisdiction that has enacted specific regulation for the management of marine stinger hazards by recreational water activities providers.

Part II of this article provides an overview of Queensland's unique regulatory approach. An independent review of the State's workplace laws in 2017 has influenced changes to the law to improve its clarity, enforcement and prosecutions, to better protect people from hazardous workplace incidents.<sup>12</sup> This part concludes that Queensland's unique regime is an exemplar for all tourism businesses and public authorities having to manage similar jellyfish hazards and risks. However, it argues that minor changes to clarify the obligations of water activities providers could strengthen their compliance with statutory objects and help better safeguard the lives of recreational snorkelers and divers. Part III turns the focus to the relevant code of practice to suggest minor adjustments to marine stinger provisions, notably to clarify the circumstances where a person

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<sup>8</sup> Peter Fenner, 'Irukandji Envenomation in Far North Queensland' (1999) 170(10) *Medical Journal of Australia* 512.

<sup>9</sup> Lisa-ann Gershwin, *Stung! On Jellyfish Blooms and the Future of the Ocean* (University of Chicago Press, 2013). See also Aylin Woodward, 'Thousands of Animals around the World are at Risk of Extinction. But not Jellyfish — They're Thriving in Warm, Polluted Water', *Briefing, Business Insider Australia* (online, 31 October 2019) <<https://www.businessinsider.com.au/jellyfish-thriving-climate-change-warm-oceans-2019-10?r=US&IR=T>>.

<sup>10</sup> These jellyfish are present in much of the world's usable oceans and seas. See Gershwin et al (n 6) 21.

<sup>11</sup> Lisa-ann Gershwin et al, 'Biology and Ecology of Irukandji Jellyfish (Cnidaria: Cubozoa)', in Michael Lesser (ed), *Advances in Marine Biology* (Elsevier, 2013) 1.

<sup>12</sup> Tim Lyons, *Best Practice Review of Workplace Health and Safety Queensland* (Final Report, 3 July 2017) ('Best Practice Report').

conducting a business or undertaking ('PCBU') is to supply sting-protective swimwear as personal protective equipment ('PPE') and the timing, form and content of safety information for prospective customers. The suggested amendments relate to at-risk snorkelers and divers and aim to help eliminate ambiguity and promote consistency in the messaging that operators are statutorily required to provide. This part concludes that such adjustments could improve compliance by duty-holders with their statutory obligations and, consequently, better protect the health and safety of their guests. The article concludes with specific recommendations.

## II QUEENSLAND'S RECREATIONAL WATER ACTIVITIES REGULATION

In 1995, recreational diving and snorkelling businesses operating in Queensland became subject to a regulatory regime that included the *Workplace Health and Safety Act 1995* (Qld) ('WHS Act 1995') and Regulations, and the *Compressed Air Recreational Diving & Recreational Snorkelling Code of Practice 1995* ('CARDRS Code'). Tour-boat operators that transport visitors by vessels to recreational diving and snorkelling sites in Queensland, notably at the Great Barrier Reef ('the Reef') and Whitsunday islands, became subject to this statutory regime. Vessels and ocean sites used to conduct these water activities are essentially marine workplaces.<sup>13</sup>

Under the 1995 Workplace Health and Safety ('WHS') regime, employers or self-employed persons, industry workers, and WHS regulators relied on codes of practice to provide guidance on how to achieve compliance with statutory health and safety obligations. Codes of practice were mandatory for duty-holders, insofar as they set minimum standards for the control and management of exposure to described risks. By 2005, the *CARDRS Code* included provisions on managing the risk of 'marine jellyfish stings'.<sup>14</sup> While duty holders could adopt and follow an approach not described in a code of practice, the alternative had to create an equivalent or higher level of protection against the risk.<sup>15</sup> As such, codes were admissible as evidence in proceedings against duty-holders suspected of breaching their statutory duty to manage exposure of prescribed risks.

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<sup>13</sup> In North Queensland, for example, control of an ocean site generally involves an operator holding a valid permit for the temporarily use of the site to conduct business operations, such as those issued by the managing Reef Marine Part Authority.

<sup>14</sup> *Compressed Air Recreational Diving and Recreational Snorkelling Code of Practice 2005* (Qld) ss 1.2.18 and 2.2.11.

<sup>15</sup> *Workplace Health and Safety Act 1995* (Qld) s 42 ('WHS Act 1995').

Then, in 2009, during the reformation<sup>16</sup> and subsequent national harmonisation<sup>17</sup> of Australia's workplace laws, the question arose as to whether proposed model WHS laws should regulate recreational diving and snorkelling businesses. Queensland was the only jurisdiction in support of such regulation. Workplace Health and Safety Queensland ('WHSQ') had reported 81 fatalities associated with these activities between 1998 and 2010.<sup>18</sup> With a well-established and lucrative diving and snorkelling tourism sector, the Queensland Government argued that the laws were necessary to reassure the public that safety is a priority and that appropriate enforceable standards are in place.<sup>19</sup>

Queensland's industry stakeholders supported the new scheme. They shared concerns about the potential for serious damage to the sector's image from 'intensive media scrutiny' following 'any recreational diving or snorkelling incident'.<sup>20</sup> For example, new reports of two Irukandji sting fatalities on the Reef in 2002<sup>21</sup> led to an estimated '\$65 million' loss in tourism revenue.<sup>22</sup> Around that time, tour-boat operators were conducting around 1.2 million diving trips and 2.3 million snorkelling trips each year, injecting an annual \$1.4 billion into Queensland's economy.<sup>23</sup> Research studies confirm that tourists are less willing to travel to tourism destinations following media coverage of health and safety risks at those destinations, leading some preferring to vacation at home.<sup>24</sup>

Ultimately, Queensland enacted a standalone regime, fashioned on the WHS model laws three-tiered framework of regulation (WHS Act, Regulations and Codes). The regime includes the *Safety in Recreational Water Activities Act 2011*

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<sup>16</sup> The 2008 National Review into Model Occupational Health and Safety Laws influenced the reform. For an insightful historical overview of the process, see Richard Johnstone, Elizabeth Bluff and Alan Clayton, *Work Health and Safety Law and Policy* (Thomson Reuters, 2012).

<sup>17</sup> The harmonised scheme involved the creation of national model WHS laws (including the model WHS Act, WHS Regulations and Codes of Practice). All jurisdictions except Victoria and Western Australia implemented their version of the model laws by 2013. Safe Work Australia, the Australian Government's statutory agency, coordinated the harmonisation process.

<sup>18</sup> 22 of these fatalities (16 snorkelling and 6 diving) occurred between 2006 and 2010: Queensland Government, *Report of the Recreational Dive and Snorkelling Industry Reference Group* (2011) 12 <[https://www.worksafe.qld.gov.au/\\_\\_data/assets/pdf\\_file/0004/82516/dive-reference-group-report.pdf](https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0004/82516/dive-reference-group-report.pdf)>.

<sup>19</sup> Queensland, *Second Reading Safety in Recreational Water Activities Bill*, Legislative Assembly, 10 May 2011, 1284 (CR Dicks) <<https://www.parliament.qld.gov.au/documents/tableOffice/HALnks/110510/Safety.pdf>>.

<sup>20</sup> Queensland Government (n 18) 11.

<sup>21</sup> See Peter Fenner and John Hadok, 'Fatal Envenomation by Jellyfish Causing Irukandji Syndrome' (2002) 177(7) *Medical Journal of Australia* 362.

<sup>22</sup> R Williams, 'Update on Irukandji Issues', in *Report Presented to the Queensland Government Irukandji Task Force Meeting* (24 February 2004, Townsville, Queensland), in Gershwin n (6) 26.

<sup>23</sup> Overseas visitors undertook almost half of these trips. See Queensland Government (n 18) 11.

<sup>24</sup> Sara Dolnicar, 'Understanding Barriers to Leisure Travel: Tourist Fears as a Marketing Basis' (2005) 11(3) *Journal of Vacation Marketing* 197.

(‘SRWA Act’), *Safety in Recreational Water Activities Regulation 2011* (‘SRWA Regulation’), and *Recreational Diving, Recreational Technical Diving and Snorkelling Code of Practice 2011* (‘RDRTDS Code’). The object of the SRWA Act is to protect consumers of recreational diving and snorkelling activities from harm to their health, safety and welfare through the elimination or minimisation of risks arising from those activities.<sup>25</sup> The RDRTDS Code provides updated guidance for the control and management of water activity hazards, including marine stinger hazards. The SRWA Act operates in conjunction with the *Workplace Health and Safety Act 2011* (Qld) (‘WHS Act 2011’).<sup>26</sup> In the event of any inconsistencies, the WHS Act 2011 provisions prevail.<sup>27</sup>

Whether Queensland’s regulatory scheme has lowered the number of sting-related incidents is difficult to discern. There are no official reports on the number of stings managed by tour-boat operators or any prosecutions or penalties issued for failure to control marine stinger hazards published on the WHSQ website. Media reports remain the main source of information on serious sting incidents associated with recreational diving and snorkelling tour boats.

A review of Queensland’s workplace laws following high-profile workplace fatalities in 2016 was the catalyst for recent reforms.<sup>28</sup> The *Best Practice Review of Workplace Health and Safety Queensland Report* (‘Best Practice Report’)<sup>29</sup> identified defects in the State’s WHS regime associated with the harmonisation process and made 58 recommendations. Despite sharing similar frameworks, the 1995 and 2011 WHS regimes were found to be markedly different in their enforceability. The 2011 regime introduced a multifaceted enforcement regime based on the State’s National Compliance and Enforcement Policy and enforcement pyramid<sup>30</sup> that encourages compliance through a responsive regulatory model, which combines deterrence and accommodative regulation.<sup>31</sup> The Best Practice Report notes that since the introduction of the WHS Act 2011, WHSQ overemphasised ‘encouraging and assisting compliance’ at the expense of appropriate use of powers and

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<sup>25</sup> *Safety in Recreational Water Activities Act 2011* (Qld) s 3 (‘SRWA Act’).

<sup>26</sup> *Ibid* ss 3(3) and 4(2).

<sup>27</sup> *Ibid* s 4(3).

<sup>28</sup> At Eagle Farm Racecourse, two construction site workers died when crushed by a concrete slab. Three weeks later, four fatalities were due to failures relating to the Thunder River Rapids Ride at Dreamworld. See WorkCover Queensland, ‘Company Fined over Eagle Farm Double Fatality’ (Media Release, 6 September 2018) <<https://www.worksafe.qld.gov.au/news/2018/company-fined-over-eagle-farm-double-fatality>>; Coroners Court of Queensland, *Inquest into the Deaths of Kate Goodchild, Luke Dorsett, Cindy Low and Roozbeh Araghi at Dreamworld, Findings and Recommendations* (February 2020).

<sup>29</sup> Best Practice Report (n 12).

<sup>30</sup> National Compliance and Enforcement Policy <<https://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/national-compliance-enforcement-policy>>.

<sup>31</sup> Best Practice Report (n 12) 2.

punitive sanctions to ‘direct compliance’ at times when it was necessary to encourage improvement in standards.<sup>32</sup> The recommendations include that WHSQ develop a new policy that ‘more precisely identifies the use of “directed compliance” as a vital, widely available tool’ with which to measure, annually, the assessment and reporting of compliance–performance against the policy.<sup>33</sup>

The Best Practice Report also notes that since harmonisation of the law, the status of codes of practice have shifted from mandatory to recommendatory,<sup>34</sup> introducing uncertainty for those who rely on codes for guidance on how to comply with statutory obligations.<sup>35</sup> The first National Review of the Model WHS Laws in 2018 (‘National Report’) made a similar finding of confusion and complexity regarding codes of practice.<sup>36</sup> In the marine stinger hazard context, the most significant of the Best Practice Report’s recommendations include the restoration of codes of practice to their previous mandatory status, and their review every five years to keep them up-to-date and improve their effectiveness.<sup>37</sup> Section 26A of the *WHS Act 2011* now makes compliance with codes of practice approved by the Minister mandatory. This provision captures the *RDRTDS Code*.<sup>38</sup>

In terms of encouraging compliance with statutory obligations under the *SRWA Act*, inspectors can issue an improvement notice for a contravention, a prohibition notice in circumstances where an activity involves a serious and imminent risk to a person’s health and safety, or an infringement notice where a person has committed an infringeable offence. There are three categories of offences applicable to infringements by duty-holders. Category 1 offences are crimes and attract the most severe penalties. Reckless conduct in breach of s 21 of the *SRWA Act* requires a duty-holder to, without excuse, expose an individual to a risk of death or serious injury. Penalties include fines of up to 3,000 penalty units or five years’ imprisonment for individuals; up to 6,000 penalty units or five years’ imprisonment for PBCU’s or their officers; and for bodies corporate, up to

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<sup>32</sup> Ibid 29.

<sup>33</sup> Ibid, Recommendation 9.

<sup>34</sup> See, eg, the *RDRTDS Code Recreational Diving, Recreational Technical Diving and Snorkelling Code of Practice 2018* (Qld) 5 (‘*RDRTDS Code*’), states that it recommends a course of action rather than create any legal requirement.

<sup>35</sup> Such as employers, unions and the regulator. See Best Practice Report (n 12) 22.

<sup>36</sup> Marie Boland, *Review of the Model Work Health and Safety Laws* (Final Report, Safe Work Australia, December 2018) 25 (‘National Report’) <[https://www.safeworkaustralia.gov.au/system/files/documents/1902/review\\_of\\_the\\_model\\_whs\\_laws\\_final\\_report\\_0.pdf](https://www.safeworkaustralia.gov.au/system/files/documents/1902/review_of_the_model_whs_laws_final_report_0.pdf)>.

<sup>37</sup> Best Practice Report (n 12) Recommendations 5, 9.

<sup>38</sup> *SRWA Act* (n 25) s 43.

30,000 penalty units.<sup>39</sup> A lack of intention or motive to cause harm by the wrongdoer is irrelevant. However, category 1 prosecutions are rare. To date, there have only been two convictions against an individual director in relation to a workplace death due to reckless conduct.<sup>40</sup> The National Report notes that this is likely due to the difficulties in proving ‘recklessness’, which requires proof of a conscious choice to take an unjustified risk.<sup>41</sup> Category 2 and 3 offences involve only the potential imposition of modest fines for statutory breaches.<sup>42</sup>

As enforcement tools, these offences provide options for remedying breaches of mandatory statutory requirements. However, as noted in the Best Practice Report, they do not apply to breaches of a requirement in a code of practice.<sup>43</sup> This is despite the fact that regulators, prosecutors and courts<sup>44</sup> can rely on adherence to codes of practice as evidence of the minimum technical and industry safety standards required to discharge health and safety duties in specific circumstances.<sup>45</sup> Category 1 to 3 offences focus on the level of exposure to risk rather than the consequence of any breach of duty.<sup>46</sup>

The Queensland Government has given effect to many of the Best Practice Report’s recommendations by passing the *Work Health and Safety and Other Legislation Amendment Act 2017* (Qld). The amendments included introducing industrial manslaughter provisions to the *WHS Act 2011* and the *SRWA Act*.<sup>47</sup> The new provisions took effect on 23 October 2017. The first industrial manslaughter conviction for a breach of s 34C of the *WHS Act 2011* was on 11 June 2020 in *R v Brisbane Auto Recycling Pty Ltd*,<sup>48</sup> suggesting a rebalance of WHSQ’s priorities in favour of ‘hard’ compliance work to improve protection of workers. The new offence carries up to 20 years’ imprisonment for PCBUs or 100,000 penalty units

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<sup>39</sup> Ibid s 21. Unlike in other jurisdictions, only category 1 offences and industrial manslaughter offences are crimes in Queensland’s workplace laws. See *SRWA Act* ss 21(3), 25C(2) and 25D(2). See also *Workplace Health and Safety Act 2011* (Qld) (‘*WHS Act 2011*’) ss 31(3), 34C(2) and 34D(2).

<sup>40</sup> The first case involved the death of a worker who fell from a roof at a construction site, but the conviction was overturned in 2019, based on a misdirection to the jury by the judge on the application of the statutory provision: *R v Lavin* [2019] QCA 109. The second conviction for reckless conduct by two directors of a car-wrecking and recycling business was in *R v Brisbane Auto Recycling Pty Ltd* [2020] QDC 113. It involved the death of a worker, killed by a reversing forklift. Both cases were for breaches of the reckless conduct provision, s 31, of the *WHS Act 2011* (n 39).

<sup>41</sup> National Report (n 36) 14.

<sup>42</sup> *SRWA Act* (n 25) ss 22 and 23. Volunteers are exempt from liability pursuant to s 25.

<sup>43</sup> Best Practice Report (n 12) 21.

<sup>44</sup> For example, Coroners Courts investigating suspicious deaths or civil courts in negligence proceedings against services providers.

<sup>45</sup> Guidance on the general risk-management process that PCBUs are to follow is in the *WHS Act 2011* (n 39), and in the *How to Manage Work Health and Safety Risks Code of Practice 2011* (Qld).

<sup>46</sup> National Review (n 36) 12.

<sup>47</sup> *WHS Act 2011* (n 39) pt 2A, and *SRWA Act 2011* (n 25) pt 2A.

<sup>48</sup> [2020] QDC 113.

for bodies corporate (around \$13,345,000), and up to 20 years' imprisonment for senior officers.<sup>49</sup> It applies to PCBUs and their 'senior officers' who negligently cause the death of a worker through, or as a result of, carrying out work during the course of employment.<sup>50</sup>

However, in Queensland, the industrial manslaughter offence only extends to the negligently caused death of a worker. This raises the question of why the terms of imprisonment for the negligently caused death of a worker are four times higher than those that apply to the death of an individual caused by reckless conduct. Both are criminal offences that involve the death of a person at a workplace, but the approach used to determine culpability differs. For example, for criminal negligence, an objective standard of behaviour (the 'reasonable individual') applies to determine culpability. Assessments of reckless conduct require the use of both an objective test to determine whether the commission of the act was reasonably foreseeable and a subjective test to determine whether the accused wilfully took an initial action that is inherently risky, or did not take steps to ensure that the risk posed to workers was controlled.<sup>51</sup>

Despite suggesting less culpability than intention to cause harm, recklessness ('indifference to the realised possible risks and consequences of one's actions') nevertheless suggests more culpability than criminal negligence ('inattention ... and not taking care').<sup>52</sup> This raises questions as to why the Best Practice Report did not criticise the significant disparity in the penalties for the two statutory offences. Perhaps this is because category 1 offences are directly referable to the WHS Prosecutor, as part of a newly established Office of Workplace Health and Safety Prosecution.<sup>53</sup> The WHS Prosecutor can seek to

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<sup>49</sup> *SRWA Act* (n 25) ss 25C and 25D; *WHS Act 2011* (n 39) ss 34C and 34D. The value of penalty units can change, but as at 13 March 2020, it is \$133.45 per penalty unit as prescribed by the *Penalties and Sentences Regulation 2015* (Qld) s 5A(1).

<sup>50</sup> *Ibid.*

<sup>51</sup> *R v Brisbane Auto Recycling Pty Ltd* [2020] QDC 113, [58], where a worker died after being crushed by a reversing forklift operated by a co-worker. See also: *Orr v Cudal Lime Products Pty Ltd* [2018] NSWDC 27, where an occupant of a residence on quarry grounds was electrocuted and killed due to a worker's faulty electrical work on a switchboard; *R v Watts* [2020] ACTSC 91, where a worker was killed by a crane that overturned while moving a large generator; and *Anderton (VWA) v Jackson* (Magistrates Court, Victoria at La Trobe Valley, Judge AJ Rafter SC, 19 December 2018), where a worker was killed when a large industrial bin being lifted by a forklift operated by the business owner, fell to the ground, while the worker was inside the bin transferring scrap metal to a larger bin.

<sup>52</sup> Allan White, 'Carelessness, Indifference and Recklessness' (1961) 24(5) *Modern Law Review* 592, 594.

<sup>53</sup> The Office of the Work Health and Safety Prosecutor ('OWHSP') is as an independent statutory office established in Queensland under the *WHS Act 2011* (n 39) to conduct and defend proceedings for breaches of workplace laws. The OWHSP began operations on 18 March 2019. See OWHSP, *Annual Report 2018-19*, 4 <<https://www.parliament.qld.gov.au/documents/tableOffice/TabledPapers/2019/5619T1989.pdf>>.

increase the penalties ordered by courts in appropriate cases.<sup>54</sup> A priority of the WHS Prosecutor is to provide greater ‘efficiency, effectiveness and transparency’ in the conduct of prosecutions for breaches of workplace laws.<sup>55</sup>

The National Report has recommended changing the model WHS laws to include ‘gross negligence’ to category 1 offences and shifting to a more robust, consequence-focused industrial manslaughter offence than presently exists in Queensland, by expanding the offence beyond the death of a ‘worker’ to include the death of third parties such as clients, customers, visitors or neighbours of the workplace.<sup>56</sup> This may influence future adjustments to Queensland’s WHS laws.

In summary, organisations and employers need to be aware of the changing laws and regulations so that they can implement safe work systems and practices. Having a firm understanding of their obligations and responsibilities, duty-holders can put in place the highest level of risk-management procedures to avoid significant penalties and, most importantly, protect the lives of their customers. Employers and organisations rely on codes of practice to guide them in complying with their statutory duties.

The next part of this article considers the marine stinger provisions of the *RDRTDS Code* and suggests that the marine stinger management provisions lack clarity concerning the use and supply of sting-protective swimwear as PPE, and the timing, form and content of marine stinger safety advice. This can lead to a lack of compliance with WHS requirements and endanger lives, rather than assisting operators in meeting their obligations of keeping people safe.

### III THE DUTY TO KEEP PARTICIPANTS SAFE

The introduction of the *SRWA Act* made PCBU, operating in Queensland, duty-bound to protect the health, safety and wellbeing of all those under their control or supervision, by eliminating or minimising hazards or risks,<sup>57</sup> at the ‘highest level as is reasonably practicable’.<sup>58</sup> This is determined through a consideration and balancing of relevant matters, including the following listed in s 15 of the *SRWA Act*:

- the likelihood of the hazard or risk occurring;
- the degree of harm that might result from the hazard or risk;

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<sup>54</sup> Ibid 4.

<sup>55</sup> Ibid 6.

<sup>56</sup> National Report (n 36) 19. Subsequent to the National Report, the *Workplace and Health Safety Act 2011* (NSW) added ‘gross negligence’ as an alternative form of Queensland’s s 31 through the *Work Health and Safety Amendment (Review) Act 2020* (NSW), assented to on 10 June 2020 and commencing on that date.

<sup>57</sup> *SRWA Act* (n 25) s 3(1)(a), (2).

<sup>58</sup> Ibid s 3(2).

- what the person knows about the hazard or risk, and ways to eliminate or minimise the risk;
- the availability and suitability of ways to eliminate or minimise the risk; and
- the cost associated with available ways to eliminate or minimise the risk, including whether the cost is grossly disproportionate to the risk.

This approach is consistent with assessments of breach of duty and causation in personal injury claims for negligence at common law<sup>59</sup> and pursuant to Australia's civil liability legislation.<sup>60</sup>

Under the *SRWA Act*, s 16 sets out the statutory obligations of recreational water activity providers. Without limiting its scope, the duty provision encompasses the safe use, handling, maintenance and storage of plant, structures and substances provided to activity participants.<sup>61</sup> To prevent injuries, the provision further requires operators to give their customers safety information, training, instruction and supervision, and to monitor conditions at activity sites.<sup>62</sup> Under this statutory provision, operators would also be responsible for the maintenance of safety equipment supplied to participants, including PPE. Essentially, PPE includes anything worn to minimise risks to health and safety.<sup>63</sup> In the present context, this would include five-millimetre wetsuits and full-body Lycra suits, as scientifically tested swimwear that significantly reduce the risk of Irukandji and box jellyfish stings.<sup>64</sup>

Section 17 requires operators' officers (such as company directors) to exercise due diligence in ensuring the business and its employees comply with their health and safety obligations.<sup>65</sup> Australia's courts, including the High Court, have interpreted employer obligations as involving positive action in keeping abreast of technological and scientific knowledge associated with the business operations,<sup>66</sup> and in considering and responding to the needs of accident prevention in accordance with 'changing ideas of justice and increasing concern

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<sup>59</sup> See *Wyong Shire Council v Shirt* (1980) 146 CLR 40, 47–8 (Mason J).

<sup>60</sup> Civil liability legislation collectively refers to legislation introduced to reform the law of negligence in 2002–2003. The statutes enacted in marine stinger jurisdictions, except the Northern Territory which continues to rely on the common law, include the *Civil Liability Act 2003* (Qld), *Civil Liability Act 2002* (NSW), *Civil Liability Act 2002* (WA), and *Wrongs Act 1958* (Vic).

<sup>61</sup> *SRWA Act* (n 25) s 16(2)(a)–(b).

<sup>62</sup> *Ibid* s 16(2)(c)–(d).

<sup>63</sup> Safe Work Australia <<https://www.safeworkaustralia.gov.au/ppe>>.

<sup>64</sup> L Gershwin and K Dabinett, 'Comparison of Eight Types of Protective Clothing against Irukandji Jellyfish Stings' (2009) 25(1) *Journal of Coastal Research* 117.

<sup>65</sup> *SRWA Act* (n 25) s 17.

<sup>66</sup> *New South Wales v Fahy* (2007) 232 CLR 486, 519 [102] (Kirby J) ('*Fahy*'); *Stokes v Guest, Keen & Nettlefold (Bolts and Nuts) Ltd* [1968] 1 WLR 1776, 1783.

with safety in the community'.<sup>67</sup> Merely prescribing a safe system is not enough for operators and their officers to discharge their obligations. They must enforce the system.<sup>68</sup>

### ***A Marine Stinger Risk-Management***

In terms of managing marine stinger risks, the *RDRTDS Code* provides control measures mainly in ss 2.7 and 6.5. Section 2.7 (the safety advice provision) applies at times of the year when 'people are at risk of severe marine jellyfish stings'. The provision states that operators 'should ensure that people diving/snorkelling are advised of the risks of marine jellyfish, where to access first aid, and appropriate precautions (eg use of stinger suits where appropriate)'. It refers to s 6.5 for additional information.

Section 6.5 offers more detailed information, such as: the lethality of marine stingers; when they present risks and when these are most severe depending on locality, conditions and times of the year; what to expect from stings; and first-aid treatments. It mentions the use of neoprene wetsuits and Lycra body suits as offering a 'high degree of protection' from marine stingers, since 'most stings occur on parts of the body that are typically covered by [such] protective clothing'.<sup>69</sup> The section details that such protective swimwear should be made of 'synthetic smooth fabrics' to lessen the chance that tentacles will stick, possibly leading to secondary marine stings, and that the fabric's mesh should be 'no greater than 200 microns' and should cover 'over 75% of the body's skin surface'.<sup>70</sup> Finally, it recommends that the swimwear is inspected regularly 'for holes, loose threading, broken or damaged zippers and other causes of decreased effectiveness, and where required replaced or repaired'.

However, the *RDRTDS Code* does not articulate a positive obligation on operators to supply sting-protective swimwear or to compel customers to wear protective suits when engaging in water activities in circumstances where marine stinger hazards and risks are predictable. Meanwhile, pursuant to s 44(2) of the *SRWA Act*, a court can have regard to a code of practice as evidence of compliance or otherwise with a duty or obligation under the Act. Arguably, by returning codes of practice to a mandatory status in Queensland, one plausible interpretation of the provisions, in light of the objects of the *SRWA Act* and PBCUs statutory duties, could be that operators are duty-bound to supply stinger suits as PPE and compel

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<sup>67</sup> *Bankstown Foundry Pty Ltd v Braistina* (1986) 160 CLR 301, 309; *Mihaljevic v Longyear (Australia) Pty Ltd* (1985) 3 NSWLR 1, 9, 18.

<sup>68</sup> *Fahy* (n 66) 519 [103] (Kirby J).

<sup>69</sup> *RDRTDS Code* (n 34) 40–1.

<sup>70</sup> *Ibid* 41.

their customers to wear sting-protective swimwear when a stinger risk exists. Since operators control marine sites where their customers dive or snorkel,<sup>71</sup> to do less when marine stinger hazards are present could put participants and others, like rescuers, at an unreasonable risk of harm.

Essentially, when determining compliance with the duty to protect against risks, a regulator or a court must weigh up the s 15 matters relevant in assessing what was 'reasonably practicable' in the circumstances.<sup>72</sup> The relevant matters in the present context can be summarised broadly as balancing the likelihood and magnitude of the risk of harm caused by marine stingers against the availability and cost of adopting suitable responses to eliminate or minimise the risk.

Reasonable recreational water activity providers and operators know of marine stinger risks in Queensland's coastal regions. Information about the probability and seriousness of marine stinger harm is readily available from scientific and medical literature, and is summarised in s 6.5 of the *RDRTDS Code*. The risk can be catastrophic if a sting occurs out at sea. Delays in reaching emergency care due to distance from a hospital increases the risk of life-threatening and debilitating complications. Emergency airlifting the victim from the operator's vessel to the nearest hospital is often required to minimise such delay. Children and people with pre-existing conditions are particularly vulnerable.

Sting-protective swimwear is readily available as a means of significantly reducing the risk of stings. Generally, divers will wear neoprene wetsuits for thermal comfort. However, snorkelers are less likely to wear wetsuits, particularly in warmer tropical waters, as wearing them may contribute to a feeling of overheating. Being lighter and easier to wear, Lycra suits provide the highest level of reasonably practicable protection against marine stinger risks for snorkelers. Arguably, the cost of buying, storing and maintaining protective swimwear as PPE by operators is not grossly disproportionate to the risk of injury pursuant to s 15(e) of the *SRWA Act*. The average retail cost of a full-body Lycra suit with hood, for example, is around AUD90. These suits are durable and reusable.

On balance, the supply of Lycra suits as sting protection appears to provide a reasonably practicable response in meeting operators' duty to eliminate or significantly minimise the risk of stings and is not grossly disproportionate to those risks. If so, the *RDRTDS Code* should clearly state that operators are to supply sting-protective swimwear, including Lycra suits, to their customers as PPE

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<sup>71</sup> Control of an ocean site generally involves a provider holding a valid permit to use the site to conduct business operations with or without conditions, such as those issued by the managing Reef Marine Park Authority.

<sup>72</sup> Section 15 matters also appear in the Queensland Government, Office of Industrial Relations, *How to Manage Work Health and Safety Risks Code of Practice* (at 1 January 2012) 6.

when marine stinger risks exist. Ensuring that people wear Lycra suits before they engage in water activities may also assist operators who encounter difficulties with knowing what is required in order to comply with their duty to provide marine stinger safety advice to their customers.<sup>73</sup>

### **B *Duty to Provide Safety Information***

The *RDRTDS Code* is unclear on how operators are to communicate the required marine stinger safety message effectively to their customers. Section 2.7, while briefly stating that the advice should contain marine stinger risks, first aid and precautions, is unclear whether any of the additional information in s 6.5 should form part of the safety message.

Section 4.5 offers some confusing guidance on when and how operators can give safety advice to their customers, but not on the content of various types or means of communication. In regard to timing, for example, the provision broadly states that opportunities for ‘briefing snorkelers’ with information and advice about safe snorkelling occur ‘from the time the snorkeller [sic] makes a booking until they enter the water’. As for the means of communication, the section states that a briefing ‘can be combined with’ the distribution of brochures, signs and posters with various images, the showing of safety films, and the provision of translated materials to non-English-speaking customers. The provision then lists what operators need to cover when advising customers about the snorkelling environment and potential problems, including the location and availability of wetsuits, as either a ‘floatation device’ or a means of managing the ‘risks of sun exposure’.<sup>74</sup> There is no reference or information concerning Lycra suits or sting-protection generally.

The need to inform snorkelers of marine stinger protection is also absent from the *RDRTDS Code*’s Appendix 7 titled ‘Recreational diving and snorkelling compliance checklist’ for use by operators. The *RDRTDS Code* describes the checklist as ‘an example of a tool’ that duty-holders can develop to self-assess their levels of compliance with their statutory duties. Only three checks contained in the nine-page document relate to marine stingers — namely, whether divers and snorkelers have been advised of the risks of marine stings; whether crewmembers are taking appropriate precautions (although it is unclear what this may mean); and whether ‘appropriate first aid and PPE [is] available where a jellyfish risk exists’. An updated 2018 version of this document, located on the WHSQ website, offers no additional marine-stinger-related checks. The website

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<sup>73</sup> SRWA Act (n 25) s 16(2)(c).

<sup>74</sup> *RDRTDS Code* (n 34) 33.

also provides a publication titled 'safety information for divers and snorkelers', in several languages, and a 'snorkelling sense' video, in which participants are wearing Lycra suits. However, neither of these resources contain or provide examples of marine stinger advice or information on protection.<sup>75</sup>

The absence of clear examples and guidance on how to brief snorkelers about marine stinger safety means that operators will self-manage this requirement. Operators are free to decide the content, form and timing of the advice. The *Code's* failure to specify the timing and specific details of what must be conveyed at safety briefings potentially undermines the quality of the safety message to their customers because it introduces an element of variability. For instance, s 4.5, while it provides further opportunity to communicate safety information through additional tools, offers no specific information on what, how and when it is most effective to communicate marine stinger safety information to customers. This raises questions about the consistency of messaging and effective communication of the importance of wearing sting-protective swimwear to protect against potentially life-threatening jellyfish stings.

In terms of the means of communication listed in s 4.5, operators could interpret the provision as suggesting that they can discharge their duty to provide safety information to customers by erecting a sign at the entrance of their tour boat. Such a sign could include specific information on marine stingers, including the use of protective swimwear. Operators might then give their customers a more general safety briefing that simply mentions the three points in s 2.7.

Such an interpretation of the *RDRTDS Code* is highly problematic unless operators supply sting-protective swimwear to their customers as PPE, and ensure that everyone who intends to enter the water is wearing the swimwear when marine stingers exist. This is mainly because studies have shown the complexity and serious limitations associated with communicating health and safety risks through signage.<sup>76</sup> Research studies have found that to be effective in communicating risks, signs must be noticed, identify the hazard, explain the consequences of exposure to the hazard and encourage behaviours that may reduce risk of injury or death.<sup>77</sup> The transmission of all the marine stinger safety information can occur through appropriate text, but the challenge would be to

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<sup>75</sup> Worksafe Queensland, 'Snorkelling Sense' (Web Page, 13 October 2016) <<https://www.worksafe.qld.gov.au/forms-and-resources/films/snorkelling-sense>>.

<sup>76</sup> For a list of such studies, see M Wogalter, 'Purposes and Scope of Warnings', in Michael Wogalter (ed), *Warnings and Risk Communication* (Lawrence Erlbaum Associates, 2006) 3–9. See also Tamar Ben-Bassat et al, 'Expert Evaluation of Traffic Signs: Conventional vs Alternative Designs' (2019) 62(6) *Ergonomics* 734.

<sup>77</sup> Michael Wogalter, Vincent Conzola and Tonya Smith-Jackson, 'Research-Based Guidelines for Warning Design and Evaluation' (2002) 33(3) *Applied Ergonomics* 219.

remain sufficiently brief so that customers are likely to read the sign.<sup>78</sup> For the most part, people on holiday tend to be relaxed, unobservant and quickly lose interest in reading signs with lengthy text, especially in stimuli-rich environments<sup>79</sup> like diving/snorkelling tour-boats heading out to sea.<sup>80</sup> Even well-designed signs with pictograms or symbols can be misconstrued or ignored if they are unclear or difficult to decode.<sup>81</sup> The same principles apply to brochures handed to customers.

Location of safety signs is also important in terms of noticeability.<sup>82</sup> The entrance of a boat is not the optimum location. Recreational tour boats tend to have narrow entrances and customers can feel pressured to embark relatively quickly so that the adventure can begin. This can decrease the likelihood that they will see, read and understand a safety information sign. For example, studies have found that many visitors to North Queensland, notably international tourists, do not know what marine stingers are, or that they pose a serious health risk.<sup>83</sup> One study found 80 per cent of 109 beachgoers who had seen and read the official marine stinger warning signs located nearby did not know of Irukandjis, the danger they present, or how to protect against them.<sup>84</sup>

Many factors are at play. Tourists who visit Queensland to engage in recreational diving/snorkelling can come from vastly different backgrounds. Some are non-English-speaking. Some come from locations where jellyfish are not harmful or cause only minor stings. Moreover, even locals of the Reef region who are aware of marine stinger hazards often misunderstand the true temporal

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<sup>78</sup> Gabriel K Rousseau and Michael S Wogalter, 'Research on Warning Signs', in Michael S Wogalter (ed), *Handbook on Warnings* (Routledge, 2006) 147.

<sup>79</sup> Bernadette Matthews, Robert Andronaco and Austin Adams, 'Warning Signs at Beaches: Do They Work?' (2014) 62 (February) *Safety Science* 312.

<sup>80</sup> Ibid; Christian Brannstrom et al, "'You Can't See Them from Sitting Here": Evaluating Beach User Understanding of a Rip Current Warning Sign' (2015) 56 (January) *Applied Geography* 61.

<sup>81</sup> RJ Jacobs, AW Johnston and BL Cole, 'The Visibility of Alphabetic and Symbolic Traffic Signs' (1975) 5(7) *Australian Road Research* 68; TJ Babbitt Kline et al, 'Visibility Distance of Highway Signs among Young, Middle-Aged, and Older Observers: Icons are Better than Text' (1990) 32(5) *Human Factors* 609.

<sup>82</sup> Shawn K Davis and Jessica L Thompson, 'Investigating the Impact of Interpretive Signs at Neighborhood Natural Areas' (2011) 16(2) *Journal of Interpretation Research* 55.

<sup>83</sup> Around half of the 208 national and international tourists surveyed while travelling on a ferry did not know what an Irukandji was, and half of the international tourists mistakenly assumed that unsafe behaviours were safe. See Simone L Harrison et al, 'Reported Knowledge, Perceptions and Behaviour of Tourists and North Queensland Residents at Risk of Contact with Jellyfish that Cause "Irukandji Syndrome"' (2004) 15(1) *Wilderness & Environmental Medicine* 4.

<sup>84</sup> Lynda Crowley-Cyr, 'Are Warning Signs Effective in Communicating Jellyfish Hazards?' (2018) 34(2) *Journal of Health Safety Environment* 181.

and spatial danger.<sup>85</sup> Merely informing such individuals as to the possible presence of jellyfish, the potential severity of their stings, and the location of first aid in no way conveys the true nature of marine stinger risks. Even referring to the jellyfish as ‘dangerous’ fails to convey their potentially life-threatening and debilitating sting hazard.

If tour-boat operators do not supply sting-protective swimwear, then they must clearly inform their customers of the marine stinger risks, the appropriate sting-protective suits to acquire, and the requirement for such suits to be worn for participation in water activities. This raises the issue of timing of this specific advice. Customers must have sufficient time to locate and acquire appropriate protective swimwear. Even if they comprehend the safety advice, customers may find it confusing. There are numerous types and brands of sting-protective swimwear in stores and online. Some are labelled as ‘stinger suits’, but this does not mean that they comply with the design requirements of protective swimwear described in the *RDRTDS Code*. Studies have shown that where the costs of complying (eg the amount of time, money or effort to comply) with risk warnings are higher, compliance can lessen.<sup>86</sup> Further, customers who purchase appropriate swimwear may forget to bring it on the day and, if prevented from engaging in the activities paid for, may become disgruntled or even resentful. In a highly competitive environment such as Queensland’s recreational diving/snorkelling tourism sector, negative comments and reviews, through word of mouth or online, can have deleterious economic impacts on individual businesses.

This article suggests a few minor adjustments to s 4.5 to improve its clarity and consistency with other safety provisions in the *RDRTDS Code* as follows. The location and availability of Lycra suits as PPE to protect against marine stinger risks should be included in the list of information that operators must cover when advising customers about the snorkelling environment and potential problems. Like wetsuits, Lycra suits also protect against the ‘risks of sun exposure’. With regard to ‘briefing snorkelers’ about safe snorkelling, clearer guidance on the appropriate use and content of so-called ‘additional tools’ is needed to avoid misunderstandings or misinterpretations of the provision that could leave operators exposed to a possible finding of non-compliance with their statutory duty. For example, the provision’s reference to the use of signs to deliver health and safety information should remind operators of the need to comply with Australian and international standards for safety signs. It should also provide

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<sup>85</sup> Ibid; Jennifer J Sando, Kim Usher and Petra Buettner, “‘To Swim or Not to Swim’: The Impact of Jellyfish Stings Causing Irukandji Syndrome in Tropical Queensland” (2010) 19(1–2) *Journal of Clinical Nursing* 109.

<sup>86</sup> Michael S Wogalter, Scott T Allison and Nancy A McKenna, ‘Effects of Cost and Social Influence on Warning Compliance’ (1989) 31(2) *Human Factors* 133; Thomas A Dings, Stephen S Wreggit and Jill A Hathaway, ‘Warning Variables Affecting Personal Protective Equipment Use’ (1993) 516 (5–6) *Safety Science* 655.

information on how to communicate marine stinger risks based on current research studies on effective warning signage.

A WHSQ standardised script example of what can be included in brochures and signs may bring even more clarity and consistency to the meaning of s 4.5 of the *RDRTDS Code*. Finally, it is also recommended that the multi-lingual ‘safety information for divers and snorkelers’ and ‘snorkelling sense’ video available on the WHSQ website is amended to include examples of marine stinger advice and, notably, information on how to protect against these hazards and risks.

Greater clarity on the timing, form and content of marine stinger safety advice could assist operators to better self-manage the advice they give their customers, and in a more confident, accurate and balanced way, which informs customers of marine stinger risks without creating unnecessary fear or anxiety. Moreover, only where operators back up the advice they give with the supply of sting-protective PPE, and with proper supervision of the appropriate use of such swimwear, can the safety message be more relaxed or general, allowing their customers to enjoy their water activities with greater safety and confidence.

#### IV CONCLUSION

This article has considered the hazards posed by marine stingers to recreational divers and snorkelers through the lens of Queensland’s unique workplace health and safety regulatory regime. The regime already contemplates the role of operators, the impact of stinger-protective swimwear, and other matters. However, it has been argued that with enhanced clarity and consistency, the regulatory framework could achieve greater effectiveness in terms of compliance. This is important in a harmonised regulatory system. Other jurisdictions in Australia facing dangerous jellyfish hazards, like Western Australia, the Northern Territory and even New South Wales, or overseas, can refer to Queensland’s laws as a model of industry standards for the provision of recreational water activity.

This article also proposes that the Queensland Government could better meet its health and safety policy objectives, including maintaining public confidence and the sustainability of the lucrative recreational diving and snorkelling industry, if it collaborated with operators to help alleviate the cost of supplying sting-protective suits. For example, if the Government negotiates with Lycra suit manufacturers or suppliers to purchase the suits in bulk, it can then on-sell them to operators at cost. This would assist operators economically, particularly when their business operations are interrupted and impacted by Australia’s natural disasters (such as the summer 2019 bushfires) and major health crises (such as the COVID-19 pandemic), which drastically impact tourism operators and communities.

This approach, coupled with minor statutory adjustments to make it clear that operators are duty-bound to supply Lycra suits to their customers, is

arguably the most efficient and effective option in terms of minimising the risks and costs of stings. Moreover, the reduction of sting injuries that can flow from a 'wear it to participate' approach would have a direct impact on the substantial annual costs of retrieving and treating injured tourists, as well as other related costs, including the emotional and financial consequences to those who are stung, and the adverse reputational effects on operators and the wider tourism industry.

Finally, the proposed collaborative approach could expand to include hotels and resort operators, so that Lycra suits can be more widely supplied to all tourists, supporting and reinforcing safety messages on beach signs and in the popular media in marine stinger regions. It can also help to increase public awareness that the Queensland Government considers marine stingers to present very serious harms that require a protective response by everyone.

Specific recommendations of this article are as follows:

1. Lycra suits are a risk-mitigating response to marine stinger hazards. They are affordable, practical and reasonably practicable. For this reason, they should be recognised as best-practice industry standard and endorsed in the *RDRTDS Code*, confirming that they are mandatory. Any tension that might arise from economic imperatives to keep costs down would then be effectively neutralised by a universal requirement.
2. PBCUs are best placed to supply sting-protective suits and supervise their correct use. Alternatively, if customers can provide their own suits, further recommendations should be developed to ensure that those suits adhere to the standards mentioned in the *RDRTDS Code*, and that where they are reused, their integrity is maintained.
3. For the same reasons that PCBUs are best placed to ensure PPE is worn during water activities, they are also best placed to deliver comprehensive, consistent and up-to-date safety information about marine stinger risks to their customers. This information should be populated into other health and safety risks advice associated with diving and snorkelling. Further, to ensure compliant and consistent messaging, the determination of timing, form and content of the information, taking into consideration customer demographics, should be a joint initiative of industry associations and WHS regulators and safety officers.
4. Australia should establish a national reporting system to capture real-time data about sting incidents.<sup>87</sup>

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<sup>87</sup> Lynda Crowley-Cyr and Lisa-ann Gershwin, 'Going to the Beach this Easter? Here are Four Ways We're Not Being Properly Protected from Jellyfish', *The Conversation* (18 April 2019) <<https://theconversation.com/going-to-the-beach-this-easter-here-are-four-ways-were-not-being-properly-protected-from-jellyfish-112955>>.



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