

An Aye Aye for An Aye Aye: Making Biodiversity Offsets Sustainable

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I. Introduction	520
II. What is Biodiversity Offsetting?.....	522
III. Vision	526
IV. Offsetting Units	531
A. Introduction	531
B. Time.....	533
C. Space.....	541
D. Type/Currency.....	547
E. Who Does What?	558
V. Metrics.....	563
VI. Conclusion.....	570

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I. INTRODUCTION

In biodiversity offsetting, developers are allowed to degrade an ecosystem and its constituent species in exchange for mitigating, or “offsetting,” the damage elsewhere. The practice is rapidly spreading as a “win-win” solution that allows biodiversity and development to coexist. In this Article, I explore best practices for how jurisdictions may structure their laws to turn Australian koalas, South African fynbos ecosystems, Californian beetles, or a British community woodland into fungible commodities, to be traded like Pokémon cards.

A vision that regards nonhuman individuals, populations, and species as transposable chess pieces on the landscape requires precise legal specifications about who can and cannot do what, when they can or must do it, and where they might do it. Without careful law that reflects underlying philosophical and ecological principles of what we want to persist, and where we want it to persist, biodiversity offsetting will likely be a sop to developers wishing to circumvent ecological protection law.

Whether the practice will be effective depends upon how the law specifies the nuts and bolts of who has to do what, how, and when. Of course, what counts as “success” depends on who is defining the term: robust economic development that nonetheless allows for vestiges of nature to persist? Fully functioning ecosystems that support vibrant human and nonhuman communities? Ecosystem types and species persisting into and through the chaotic Anthropocene era,¹ to allow the majestic pageant of evolution to continue after humans have learned to live sustainably, or have suffered extinction?

In a previous article, I highlighted the controversies surrounding biodiversity offsetting and cautiously advised that—if done right—biodiversity offsetting could, and even should, be part of our revolutionary conservation toolkit for preserving human and nonhuman communities in the

¹The Anthropocene is the current geological era where humans dominate biological and even geological processes on Earth. See Paul Crutzen & Eugene F. Stoermer, *The “Anthropocene,”* GLOBAL CHANGE NEWSL. (The Intl. Geosphere-Biosphere Programme), May 2000, at 17. For a review on our domination, see Tim Caro et al., *Conservation in the Anthropocene*, 26 CONSERVATION BIOLOGY 185, 185 (2011).

Anthropocene.² Those three words—*if done right*—are the focus of this paper. The “if” matters because offsetting can lead to poor results for the human communities in which biodiversity is allowed to be degraded, for the human communities in which the offset occurs, and for the nonhuman world we aspire to manage. And the “right” matters because it depends on the inclinations of those framing the laws, those implementing the laws, and those monitoring who does what where.

“Right” will be reflected in the variables described here—time, space, and type, in addition to who is calling the shots and is required or enabled to do what when. In a seminal article, James Salzman and J.B. Ruhl describe the legal machinations necessary to turn ecological entities (e.g., pollutants, wetlands) into fungible commodities.³ Borrowing from, and adding to, the variables they describe, this Article explores how different jurisdictions are making life into fungible commodities. I look at the *temporal* dimension of biodiversity offsetting: when must offset requirements be completed (e.g., before or after the original destruction is allowed), and for how long must the offset be maintained? I examine the *spatial* requirements: e.g., how far from the original destruction must or may the offset be? I look at the *type* of trades that are allowed: for example, must the “replacement” entity be the same as the entity that is destroyed or degraded? Finally, I examine who must do what to make sure the offset is sustained.

In analyzing how jurisdictions arrange these variables, I provide examples that other jurisdictions might or might not wish to adapt. Furthermore, how these variables are legally mandated helps us understand how a nation, a state, or a community understands their relationship with the natural world, and what that portends for the future of human/non-human interactions. All human polities must balance the needs (real or imagined) of the citizens that live there with the reality that those needs can often only be met by destroying or degrading some part of the surrounding natural matrix. How

² See David Takacs, *Are Koalas Fungible? Biodiversity Offsetting and the Law*, 26 N.Y.U. ENVTL. L.J. 161 (2018).

³ See James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 STAN. L. REV. 607 (2000).

polities strike that balance will be reflected by the specific choices they make, not only to allow offsetting in the first place, but also in the ways they stack the variables to ensure species and ecosystem viability in the short term and long term.

Examining the granular details of biodiversity offsetting, we get blueprints for what natural communities (and the human communities who depend upon them) will look like in the Anthropocene. Biodiversity offsetting, done right, could be part of a deliberate, planned system of ecological design in the coming, potentially apocalyptic era. Postmodern ecological design has to be rooted in ecological reality: even as we increasingly dominate it, nature continues to operate by its laws, not ours. If we do not adapt our laws to nature's laws, we are just rearranging koalas on the deck of a sinking ark. But the design must take into account human desires beyond the purely ecological.

This Article proceeds as follows. I first explain biodiversity offsetting and briefly rehearse the arguments for and against it. Concluding that the practice is here to stay, I then explain how different jurisdictions are crafting laws to implement the practice, focusing on the variables of type, time, space, and personnel. I offer a vision for how the ideal offsetting law should be structured, based upon a vision of deep equity, i.e. offsets should simultaneously and synergistically promote individual, community, and nonhuman health and potential. I also explain how a system of measuring, monitoring, reporting, and verification should be observed, and discuss how problems of environmental democracy—whose voices should be heard when making decisions about what biodiversity continues to exist where—will emerge. I conclude by explaining how well-structured, carefully implemented and monitored biodiversity offsetting could be part of our conservation toolkit for the Anthropocene era. But to implement biodiversity offsetting in a deeply equitable way will be expensive, difficult, and require a cadre of dedicated stakeholders committed to sustainable human and nonhuman communities.

II. WHAT IS BIODIVERSITY OFFSETTING?

As humans increasingly appropriate more of Earth's resources, we face a cataclysmic rate of species loss, portending grave

results for a sustainable human civilization.⁴ Environmental laws have proliferated 38-fold since 1972.⁵ Nearly every nation has a framework environmental law; eighty-eight nations have enshrined the right to a healthy environment, and another sixty-two guarantee some form of environmental protection in their constitutions.⁶ Despite the proliferation of laws, we are proceeding to destroy biodiversity at a terrifying rate. The latest report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (“IPBES”), the “most comprehensive assessment of its kind,” declares that a million species (one-eighth of the total number of species on Earth) are threatened with extinction.⁷ A new survey of plant species finds that more than twice as many plants have gone extinct as birds, mammals, and amphibians combined, which the authors believe is still a “gross underestimate” of the actual number of plant species that have faced, and do face, extinction.⁸ According to the International Union for Conservation of Nature (“IUCN”), more than 28,000 species are threatened with extinction, i.e. 27% of all the species they have assessed. This includes 40% of amphibian species, 25% of mammal species, and 14% of bird species facing grave extinction threats.⁹ The human population

⁴ *Global Biodiversity Continues to Decline, According to New Reports from IPBES*, INT’L SCI. COUNCIL (Mar. 23, 2018), <https://council.science/current/news/global-biodiversity-continues-to-decline-according-to-new-reports-from-ipbes> [<https://perma.cc/TJ4Z-VPGT>]; *The IUCN Red List of Threatened Species*, INT’L UNION FOR CONSERVATION OF NATURE, <https://www.iucnredlist.org> [<https://perma.cc/5YM3-7VLH>] (last visited Apr. 22, 2020) [hereinafter IUCN]; Jonathan Watts, *Stop Biodiversity Loss or We Could Face Our Own Extinction Warns UN*, GUARDIAN, (Nov. 6, 2018), <https://www.theguardian.com/environment/2018/nov/03/stop-biodiversity-loss-or-we-could-face-our-own-extinction-warns-un> [<https://perma.cc/2FN9-RTCY>].

⁵ *Dramatic Growth in Laws to Protect Environment, but Widespread Failure to Enforce, Finds Report*, ENVTL. LAW INST. (Jan. 2019), <https://www.eli.org/news/dramatic-growth-laws-protect-environment-widespread-failure-enforce-finds-report> [<https://perma.cc/K33E-U2YG>].

⁶ CARL BRUCH ET AL., UNITED NATIONS ENV’T PROGRAMME, ENVIRONMENTAL RULE OF LAW: FIRST GLOBAL REPORT 2 (2019).

⁷ *Nature’s Dangerous Decline ‘Unprecedented Species Extinction Rates Accelerating’*, IPBES (May 6, 2019), <https://www.ipbes.net/news/Media-Release-Global-Assessment> [<https://perma.cc/8AVV-VD3R>].

⁸ Damian Carrington, *‘Frightening’ Number of Plant Extinctions Found in Global Survey*, GUARDIAN, (Jun. 10 2019), <https://www.theguardian.com/environment/2019/jun/10/frightening-number-of-plant-extinctions-found-in-global-survey> [<https://perma.cc/N5XN-7DXS>].

⁹ IUCN, *supra* note 3.

is projected to grow to 9.7 billion by 2050 and likely to 11 billion by 2100,¹⁰ while the average person's buying power and consumption will grow by 150%.¹¹

Our laws to conserve are not keeping pace with our drive to destroy. We need new, innovative mechanisms to help stop the destruction of the nonhuman world. Biodiversity offsetting is one mechanism that finds support in laws that exist or are being formulated in over one hundred countries, and are mandatory in forty-two countries.¹² The most comprehensive database tallies 12,983 offset projects in thirty-seven countries with a total size of over 150,000 sq. km.¹³ In a biodiversity offset, law allows a developer to destroy individuals of a species or degrade a type of ecosystem in exchange for restoring land to benefit a particular species¹⁴ or ecosystem type,¹⁵ or preserving individuals of that species or acres of that ecosystem that would otherwise be lost.¹⁶ Developers pay to offset the externalities their development causes. They may affect the offset themselves, pay an in-lieu fee to a government agency or nonprofit (e.g., a land trust) to do the offset, or purchase an offset from another entity, sometimes a

¹⁰ I don't believe the Earth will support this number without rebelling. Damian Carrington, *World Population to Hit 11bn in 2100—With 70% Chance of Continuous Rise*, GUARDIAN (Sept. 18, 2014), <https://www.theguardian.com/environment/2014/sep/18/world-population-new-study-11bn-2100> [<https://perma.cc/SE9S-ZJLQ>]; *Growing at Slower Pace, World Population is Expected to Reach 9.7 Billion in 2050 and Could Peak at Nearly 11 Billion Around 2100*, UNITED NATIONS DEP'T OF ECON. & SOC. AFFAIRS (Jun. 17, 2019), <https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html> [<https://perma.cc/D9GZ-JD6U>].

¹¹ B. Miller et al., *'New Conservation' or Surrender to Development?*, 17 ANIMAL CONSERVATION 509, 510 (2014).

¹² Kerry ten Kate, Director of Forest Trends Biodiversity Offsets Initiative, Working Towards No Net Loss and a Net Gain of Biodiversity: Some Key Lessons on Law and Policy, ENV'T INST. OF AUSTL. AND N.Z. National Biodiversity Offsets Conference, Canberra, Aug. 27, 2019; Tami Putri, *World View—A Snapshot of National Biodiversity Offset Policies*, IUCN (Sept. 5, 2019), <https://portals.iucn.org/offsetpolicy/> [<https://perma.cc/CA3B-JNQA>] [hereinafter IUCN Snapshot].

¹³ IUCN Snapshot, *supra* note 12.

¹⁴ Usually—but not necessarily always—the same species or ecosystem. See discussion below.

¹⁵ For overviews of biodiversity offsetting, see generally Takacs, *supra* note 2; KERRY TEN KATE & JOHN PILGRIM, IUCN, BIODIVERSITY OFFSETS TECHNICAL STUDY PAPER (2014); WORLD BANK GROUP, BIODIVERSITY OFFSETS: A USER GUIDE (2016).

¹⁶ Martine Maron et al., *Faustian Bargains? Restoration Realities in the Context of Biodiversity Offset Policies*, 155 BIOLOGICAL CONSERVATION 141, 142 (2012).

business specializing in providing such offsets.¹⁷ The “restoration economy”—including wetlands mitigation and biodiversity offsetting—has been estimated as a \$4 billion per year business in the U.S.¹⁸

Biodiversity offsets are controversial. Foes portray the scheme as a “license to trash nature,”¹⁹ amounting to a giveaway to developers to avoid otherwise effective conservation laws. If individual organisms are non-fungible entities, and one believes that restoration cannot and should never substitute for an original, undisturbed, functioning ecosystem, biodiversity offsetting will always be a non-starter. Critics assert that offsetting employs phony metrics, and simply reify the capitalist system that now puts a price tag on life forms, “effectively pushing the natural world even further into the system that is eating it alive.”²⁰

Proponents assert that biodiversity offsets allow a jurisdiction to plan on a landscape level, deciding where conservation and development should occur. For the regulated entity such as a government bureau, subdivision developer, fracker, or resident wishing to build a home, offsets may reduce the time and costs of compliance, and offer flexibility in fulfilling requirements

¹⁷ See, e.g., KERRY TEN KATE & MICHAEL CROWE, IUCN, BIODIVERSITY OFFSETS: POLICY OPTIONS FOR GOVERNMENTS, INPUT PAPER FOR THE IUCN TECHNICAL STUDY GROUP ON BIODIVERSITY OFFSETS 42–44 (2014); G. DUKE & KERRY TEN KATE, FOREST TRENDS, EXPLORING LESSONS LEARNED FROM BIODIVERSITY OFFSETTING MARKETS IN OTHER COUNTRIES THAT COULD INFORM APPRAISAL OF OPTIONS FOR DELIVERING OFFSETS IN ENGLAND 14 (2014).

¹⁸ Ariel Wittenberg, *Trump’s Rule Threatens Booming \$4B ‘Restoration Economy’*, E&E NEWS (Jan. 3, 2019), <https://www.eenews.net/stories/1060110745/print> [<https://perma.cc/ZX2X-NKPW>].

¹⁹ Bruce A. McKenney & Joseph M. Kiesecker, *Policy Development for Biodiversity Offsets: A Review of Offset Frameworks*, 45 ENVTL. MGMT. 165, 173 (2010); James Kanter, *Companies with Poor Track Records on Environmental Damage Try for Change*, N.Y. TIMES (Oct. 13, 2008), <https://www.nytimes.com/2008/10/13/business/worldbusiness/13iht-rbogbio.4.16908253.html> [<https://perma.cc/5SES-XDYA>]. For characterization of Habitat Conservation Plans as “licenses to kill”, see generally J.B. Ruhl, *How to Kill Endangered Species, Legally: The Nuts and Bolts of Endangered Species Act ‘HCP’ Permits for Real Estate Development*, 5 ENVTL. L. 345 (1999).

²⁰ George Monbiot, *The Pricing of Everything*, GEORGE MONBIOT (July 24, 2014), <http://www.monbiot.com/2014/07/24/the-pricing-of-everything/> [<https://perma.cc/M343-3TWG>]. For a summary of opposition to biodiversity offsetting, see Takacs, *supra* note 2, at 182–95.

under laws protecting biodiversity.²¹ For environmentalists, offsets provide financing for conservation on private land,²² and can direct protection to areas where endangered species and ecosystems will most benefit. In some situations, a requirement to offset may allow some environmental benefits where otherwise none would occur.²³

In a previous article, I concluded that despite the controversy surrounding it, biodiversity offsetting is here to stay, and could be a valuable part of our twenty-first century conservation toolkit if done “right.”²⁴ Here, I explore how we might do biodiversity offsetting “right.” I start by portraying an ideal world where perfect conditions exist for perfect offsets. I then discuss how different jurisdictions in the U.S., Australia, South Africa, and the United Kingdom are, in fact, pursuing offsetting. I examine how these jurisdictions are regulating the different variables—timing of requirements, distance from original destruction, type of units that may be traded, responsibilities for implementing and monitoring the offset—that must be specified in law and implemented in practice to ensure that biodiversity offsetting results in outcomes that benefit sustainable human and nonhuman communities.

III. VISION

“Conservation is not rocket science; it is far more complex.”²⁵ For biodiversity offsets to be more than just a giveaway allowing developers to evade conservation laws, offsets must be done right. But what does that mean? How to implement offsetting in the law so that the offset benefits human and nonhuman communities?

Looking holistically at biodiversity conservation law, we contemplate and plan for human and nonhuman needs and

²¹ See Barton H. Thompson, Jr., *Markets for Nature*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 261, 262 (2000).

²² Joseph M. Kiesecker et al., *Development by Design: Blending Landscape-Level Planning with the Mitigation Hierarchy*, 8 FRONTIERS ECOLOGY & ENV'T 261, 265 (2009).

²³ For a summary on the benefits of biodiversity offsetting, see Takacs, *supra* note 2, at 195.

²⁴ Takacs, *supra* note 2, at 225.

²⁵ Edward T. Game et al., *Conservation in a Wicked Complex World; Challenges and Solutions*, 7 CONSERVATION LETTERS 271 (2014).

externalities broadly and synergistically. The overarching guidance I offer for those designing and implementing the law of biodiversity is to think about what I call “deep equity” as a foundational principle.²⁶ Deeply equitable laws, policies, and values promote sustainable pathways that act in synergy to maximize the health and potential of all individuals, communities, and ecosystems. The equity is “deep” because it requires that we fundamentally re-imagine our community structures and responsibilities, because values become rooted within each individual, and because we root these values and responsibilities in our legal systems and policy choices. Our laws and policies would, in turn, support actions and values promoting even deeper equity.

An ideal biodiversity offset examines the interplay between human individual, human community, and nonhuman community health and potential. It starts by having us consider that the human population is growing in size and in buying power. Biodiversity conservation must accommodate those needs (meanwhile attempting to change what some of us think we “need”), while recognizing that the only way to do so is to sustain the ecological matrix that is the ultimate source of human flourishing.

An offset should not be a one-off, planned in isolation from other conservation interventions or societal desires. To accommodate human and nonhuman wants and needs, we must plan on a landscape level. We have to do conservation by intentional design. At least in the short term, nature will persist and thrive with a maximum of diverse species where we choose it to persist. Environmental laws provide guidance—sometimes sweeping rhetoric of value priorities, sometimes nuts and bolts of how law is operationalized—of what a nation or other jurisdiction’s priorities are and how they should be realized.²⁷ Those laws result in cartographic boundaries: where a

²⁶ David Takacs, *Forest Carbon Projects and International Law: A Deep Equity Legal Analysis*, 22 GEO. INT’L ENVTL. REV. 521 (2010).

²⁷ Discussion of how to balance conservation and development on a broad scale, and how and whether landscape level, simultaneous biodiversity conservation and poverty alleviation should be included is beyond the scope of this paper. For a review see Jeffrey Sayer, *Reconciling Conservation and Development: Are Landscapes the Answer?* 41 BIOTROPICA 649 (2009).

jurisdiction has slated for development, where for conservation, and where those two priorities collide. Offsetting should always be situated in a broader plan, to fulfill some conscious goals that a community has carefully delineated: this, for example, is a goal of the U.S. Endangered Species Act (“ESA”) compensatory mitigation rule.²⁸ It should not be ad hoc, unless an ad hoc decision is making the best of a bad situation where no overarching legal guidance is available, and the relevant human and nonhuman communities would be worse without the offset.

An offset should never undermine an existing law that seeks to conserve Earth’s species and ecosystems in perpetuity. But in some cases, we may need to increase our flexibility or broaden our vision for *how* a law is implemented. The priority should be “to provide a means whereby the ecosystems upon which endangered species and threatened species may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species”²⁹ To maximize the chances that a species will persist in perpetuity, small, isolated preserves that cause expenditures for not much conservation effect—and enrage property owners at the same time—are not the optimal way to go. We should figure out where lands can best support large, resilient populations, and prioritize those efforts, including through financial incentives for conservation.

Biodiversity offsets must account for climate change. What a species or ecosystem type needs today will change as the Earth becomes hotter, dryer, and more chaotic.³⁰ That means looking for locations to develop where protected species and ecosystems are no longer viable, and protecting those species where biologists predict they will be viable. It means prioritizing offset recipients in corridors that biologists assess will be necessary to

²⁸ John D. Pilgrim et al., *A Process for Assessing the Offsetability of Biodiversity Offsets*, 6 CONSERVATION LETTERS 1, 2 (2012). Joseph Mascaro, *Earth Makers*, BREAKTHROUGH INST. (Aug. 6, 2015), <https://thebreakthrough.org/journal/issue-5/earth-makers> [<https://perma.cc/53C8-23ZV>]. See also Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).

²⁹ Endangered Species Act, 16 U.S.C. § 1531 (1973).

³⁰ Brett R. Scheffers et al., *The Broad Footprint of Climate Change from Genes to Biomes to People*, 354 SCIENCE 719 (Nov. 11, 2016).

facilitate migration of species and their ecosystems. Overall, it means adopting resilience thinking: because nature comprises complex, dynamic systems, our responses to changes in those systems must be similarly dynamic, adapting as we examine how nature responds to our interventions.³¹

We use the tools and data conservation biology and ecology provide us to choose how and where to develop, and how and where to preserve. Biodiversity offsets will be ineffective without high quality data on what currently exists and what should, or could exist under variable ecological conditions. Before we can offset, we must preset an ecological baseline with clear legal rights and responsibilities for developers, managers, ecologists, and environmental watchdogs. Ecological studies and computer modeling can tell us where species might want to head in the future, where to protect migration corridors, and how to concentrate and synergize conservation resources. For example, this could be achieved in large contiguous areas rather than small isolated “living dead” parcels. They help us restore and rewild degraded lands with wisdom.

Biodiversity offsetting may be a mechanism for balancing disparate or competing values. However, balancing values first requires determining what we value. More or less space for housing or farms or strip malls? More or less space for wild nature? A preference for government to handle all conservation, or to let the free market dictate who can do conservation best, while recognizing that biodiversity offsetting wouldn't exist without government laws mandating preservation in the first place? Perhaps the best mechanism to ensure that biodiversity and people matter when doing offsetting is to situate the practice as part of sound landscape planning. For example, regional Habitat Conservation Plans under the ESA, or California's Natural Community Conservation Plans, attempt to manage human and nonhuman needs, drawing boundaries of where we will develop and where we will make space for nature. We would take expert and citizen input for where we are going to conserve

³¹ The literature on resilience and climate change is vast and beyond the scope of this essay. For an introduction, see J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—With Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373 (2011).

elements of the biological landscape. Offsetting becomes part of our toolkit for achieving that goal. That is to say, if offsets are not ad hoc one-offs but instead are part of comprehensive landscape planning, they become the means to a democratically determined end.³²

Of course, nature ultimately has a mind of its own. Species may stubbornly refuse to comply with what is contractually required of them. As of this writing, Australia's most prominent environmental conflict is over the proposed Adani coal mine in Queensland. In addition to the climate change impacts of burning the resulting coal, the mine can only be approved through a biodiversity offset for the critically endangered Black-Throated Finch. Conservation biologist Brandon Wintle, who led a panel of experts examining Adani's offset plan, was not impressed with the plan, stating that "there's no evidence to convince us that the species will suddenly get up and move from the habitat it currently occupies on the mine site and move to the offset site and live happily ever after."³³

Biodiversity offset providers must adjust accordingly. Ideally, offsetters would be required to meet performance standards and employ principles of adaptive management to adjust practices to meet those standards. Adaptive management would require offset providers to meet a certain set of outcomes about health of the ecosystem and the species of concern, with requirements to refine practices until those requirements are met. Payment would be allocated incrementally to ensure ongoing compliance.

³² Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).

³³ In a bit of creative public environmental activism, the black-throated finch also won the 2019 *Guardian* Australian "Bird of the Year Contest." See Ben Smee & Lisa Cox, *Adani Mine Could Snuff Out Black-Throated Finch's Last Chances of Survival*, *GUARDIAN* (Nov. 12, 2019), <https://www.theguardian.com/environment/2019/nov/12/adani-mine-could-snuff-out-black-throated-finchs-last-chances-of-survival> [<https://perma.cc/7SR5-F7SM>]; Naaman Zhou, *Black-Throated Finch Wins 2019 Bird of the Year With Tawny Frogmouth Second*, *GUARDIAN* (Nov. 14, 2019), <https://www.theguardian.com/environment/2019/nov/15/black-throated-finch-wins-2019-bird-of-the-year-as-tawny-frogmouth-comes-second> [<https://perma.cc/STG6-H73D>]; Ben Smee, *Queensland Ordered to Release Secret Report on Black-Throated Finch Conservation*, *GUARDIAN* (Dec. 6, 2019), <https://www.theguardian.com/business/2019/dec/07/queensland-ordered-to-release-secret-report-on-black-throated-finch-conservation> [<https://perma.cc/3D6G-GCLG>].

Offsets should not be a cheap way of bypassing expensive environmental law obligations.³⁴ By putting a price on biodiversity, we are reinforcing a form of capitalism that is destroying the planet. But there is already a price on biodiversity—in many cases treating it as having no value at all. While anathema to purists, biodiversity offsets nonetheless may harness capitalism for socio-ecologically beneficial ends. Biodiversity offsetting puts a price on biodiversity, and heeding the variables below assiduously helps get the best deal for biodiversity that we possibly can, and where otherwise it would have no value.

Below I discuss the variables that biodiversity offsetting laws (and those implementing them) must consider, with suggestions on how to think about best practices for these variables.

IV. OFFSETTING UNITS

A. Introduction

To approximate fungibility, offsets must be done right. But what does it mean to be done “right?” How can governments implement offsetting in the law so that the offset benefits both human and nonhuman communities sustainably and synergistically?

True fungibility is difficult enough to ensure in pollution trading when, say, a unit of a greenhouse gas emitted here hypothetically has the same environmental impact as a unit of greenhouse gas offset over there. But even if pollutants may be fungible, it is much tougher to figure out how (or even whether) to make biodiversity itself fungible.

In their influential article on the rise of environmental trading markets, Salzman and Ruhl discuss the potential

³⁴ In REDD+, or Reducing Emissions from Deforestation and forest Degradation, an entity facing a greenhouse gas emission reduction requirement (or simply volunteering to offset their emissions) will pay someone else to plant trees or avoid deforesting an area to offset the emissions. In papers I have written on REDD+, I make the point that to do REDD+ “right” might price the program out of existence. See David Takacs, *Environmental Democracy and Forest Carbon (REDD+)*, 44 ENVTL. L. 71, 113 (2014); David Takacs, *Forest Carbon (REDD+), Repairing International Trust, and Reciprocal Contractual Sovereignty*, 37 VT. L. REV. 653, 661 (2013).

(non)fungibilities of commodities across space, time, and type.³⁵ For a market to work, it “must assume fungibility—that the things exchanged are sufficiently similar in ways important to the goals of environmental protection.”³⁶

By examining the nuts and bolts of how biodiversity offsetting is conducted in the field (*in situ*), we can see how offsetting might benefit nonhuman and human communities. To do so, the law must specify how trades occur across *space*, *time*, and *type*.³⁷ In addition, law must allocate *who* requires, provides, approves, and monitors offsets. Below I look at how different jurisdictions have specified these requirements, as a reality check for how a novel form of biodiversity conservation might proceed. In an ideal world, a biodiversity offset would pay careful attention to the variables described here, with a goal of implementing deeply equitable biodiversity offsetting.

As of this writing, the U.S. government has taken, in Prof. Dave Owen’s words, a “conservative turn against compensatory mitigation.”³⁸ In the past, the U.S. Fish and Wildlife Service (“USFWS”) had a rule that advocated offsetting as a mitigation tool for both government actions, under ESA Section 7, and for habitat conservation plans for any citizen mitigating a take of a listed species, under Section 10.³⁹ Former Interior Secretary Ryan Zinke labeled compensatory mitigation as “un-American” and “extortion.”⁴⁰ Arguing that compensatory mitigation violates the Fifth Amendment of the U.S. Constitution because no sufficient nexus exists between damage and offset, the Department of Interior has suspended rules on biodiversity offsetting promulgated during the Obama Administration.⁴¹ The Bureau of Land Management (“BLM”) has issued an

³⁵ Salzman & Ruhl, *supra* note 3, at 622–30.

³⁶ *Id.* at 611.

³⁷ *Id.* at 625.

³⁸ Dave Owen, *The Conservative Turn Against Compensatory Mitigation*, 48 ENVTL. L. 265 (2018).

³⁹ Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).

⁴⁰ Jennifer Yachnin, *Zinke Vows to Restore ‘Breaches,’ Keeps NPS Despite Reorg*, E&E NEWS (June 27, 2017), <https://www.eenews.net/eenewspm/stories/1060056675> [<https://perma.cc/7GVL-PQDN>].

⁴¹ US Fish & Wildlife Service Mitigation Policy Withdrawal, 83 Fed. Reg. 36,472 (July 30, 2018).

Instruction Memorandum that “the BLM must not require compensatory mitigation from public land users.” While allowing for voluntary mitigation, “the BLM will not accept any monetary payment to mitigate the impacts of a proposed action.”⁴² I have nonetheless maintained the original proposed rule in my discussion here, in the expectation that the U.S. will one day return to official policies that promote environmental sustainability.

B. Time

All offset enabling laws must specify *time*: once officials greenlight development, how does the law compensate for an uncertain future for a biological entity when today’s destruction is certain? For biological and legal reasons, offsets should be in place before permitted habitat destruction begins. Monitoring should be ongoing to ensure that nature and its tenders are doing what they have contracted to do. Providers of offsets should set up a system to help ensure that the offset is as enduring as the environmental destruction which preceded it.

Failure to secure offsets before allowing destruction can lead to negative results for biodiversity and, ultimately, for humans. For example, in 2009, in the rapidly growing city of Melbourne, the Victoria State government promised to create a large, contiguous Westland Grassland Reserve; this was planned to connect protected areas and compensate for suburban development. Only about 1% of the area’s original grassland, which harbors numerous endangered species, remains. The government rezoned over 100,000 acres for development with the promise that the reserve would be created by 2020. As of this writing, only 9% of the land has been secured, and the reserve has not been managed to clear invasive weeds that threaten even the area that has been secured.⁴³ The last update

⁴² BUREAU OF LAND MGMT, INSTRUCTION MEMORANDUM NO. 2019-018, COMPENSATORY MITIGATION (2018).

⁴³ Ian Penna, *Victoria’s Western Grasslands Reserve Failure*, VPNA PARK WATCH (June 14, 2019), <https://vnpa.org.au/victorias-western-grassland-reserves-failure/> [https://perma.cc/476J-6TWY]; Adam Carey & Clay Lucas, *From grassland to wasteland: Victoria breaks promise to create grassland reserve*, AGE (May 12, 2019), <https://www.theage.com.au/politics/victoria/from-grassland-to-wasteland-victoria-breaks-promise-to-create-environmental-reserve-20190512-p51mjd.html> [https://perma.cc/SWA6-F2Y4].

from the State government, dated July 2017, still promised a combination of voluntary and compulsory land acquisition with no target date for completion forecast.⁴⁴

If offsets require restoration of degraded habitat, it is preferable to take a precautionary approach and require advanced offsets, where habitat has already been established and secured (with “accrued biodiversity values”⁴⁵) and the species or ecosystem of concern is already present and healthy.⁴⁶ That is to say, it would not be enough that work is contemplated, or has begun on the offset: it should be far enough along to be likely to guarantee long-term success. If it is protection of mature, existing habitat, the protection would be new or “additional,” i.e., the area would not have been preserved without the offset funding. The developers should “secure” (i.e., conclusively legally arrange) the offset before the trade is approved and destruction begins.

Advanced offsets are modeled in California’s biodiversity banks, where private offsetting companies buy land and either preserve it or restore it before securing permission from the USFWS to sell a certain number of credits to developers who need them.⁴⁷ Note the risky business speculation here: biobankers must purchase and restore with no guarantee that the species will remain formally listed, or the USFWS will approve their bank for credits.⁴⁸

Some offset schemes do not require that the fungible commodity be in place before destruction is permitted. If approval for a project is given before offsets are secured, then there may be little incentive for the developer to fulfill their

⁴⁴ *Conservation Program*, GOVT. OF VICT. DEPT. OF ENV’T, LAND, WATER, AND PLANNING, <https://www.msa.vic.gov.au/conservation-actions/western-grassland-reserve> [https://perma.cc/5KKW-9XZY].

⁴⁵ Sarah Bekessy et al., *The Biodiversity Bank Cannot be a Lending Bank*, 3 CONSERVATION LETTERS 151 (2010).

⁴⁶ David Robinson, *Biodiversity Banking in NSW: A Critique*, 14 AUSTRALASIAN J. NAT. RES. LAW & POL’Y 115, 131 (2011).

⁴⁷ Cf. WILDLANDS, <https://www.wildlandsinc.com/map-search/> [https://perma.cc/NJU7-BE9J] (last visited Apr. 18, 2020); *California Banks*, WESTERVELT ECOLOGICAL SERVS., <https://www.wesmitigation.com/available-credits/california-banks/> [https://perma.cc/373Z-YQXQ] (last visited Apr. 18, 2020).

⁴⁸ Interview with Wayne White, President of Nat’l Mitigation Banking Ass’n and Dir. Of Bus. Dev. of Wildlands, Inc., in Sacramento, Cal. (Oct. 14, 2014); Interview with Steve Morgan, CEO, Sacramento River Ranch, in W. Sacramento, Cal. (Sept. 18, 2014).

offset obligations,⁴⁹ or it may prove impossible to find a suitable fungible offset.⁵⁰ The U.S. rule prefers, but does not require, advanced mitigation.⁵¹ Victoria has updated its regime so that proof of an offset availability must be in hand before the permitted destruction can occur,⁵² although a footnote in the government guide notes, “[y]ou do not need to secure the offset until after your application to remove native vegetation is approved. You only need to include a statement that shows you *intend* to secure the offset *if* your application is approved.”⁵³ While the Australian Commonwealth and Queensland policy prefers advanced offsets “where practical,” and those securing advanced offsets may have reduced requirements,⁵⁴ McDonald et al. chronicle a number of instances where Australian Commonwealth ministers permitted a development with no guarantee that suitable offsets would be found.⁵⁵ Queensland’s

⁴⁹ For an example of the dangers of approvals for major projects given before the offset is secured, see Michael Slezak, *Maules Creek offsets still not secured, five years after land clearing approved*, GUARDIAN (Mar. 1, 2018), <https://www.theguardian.com/environment/2018/mar/02/maules-creek-land-clearing-continues-despite-lack-of-require-offsets> [https://perma.cc/5VLF-ECXY].

⁵⁰ AUSTRALIA SENATE REPORT ENVIRONMENT AND COMMUNICATIONS REFERENCES COMMITTEE, ENVIRONMENTAL OFFSETS 52 (June 2014) [hereinafter AUSTRALIA SENATE REPORT].

⁵¹ United States, Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (2016).

⁵² GOV’T OF VICT. DEP’T OF ENV’T, LAND, WATER, & PLANNING, *I need to secure an offset*, <https://www.environment.vic.gov.au/native-vegetation/native-vegetation/offsets-for-the-removal-of-native-vegetation/i-need-to-secure-an-offset> [https://perma.cc/GND2-RF8B] (last visited Apr. 18, 2020).

⁵³ GOV’T OF VICT. DEP’T OF ENV’T, LAND, WATER, AND PLANNING, HOW TO MEET YOUR OFFSET REQUIREMENT 1 (2018), https://www.environment.vic.gov.au/__data/assets/pdf_file/0027/329454/Info-sheet-How-to-meet-your-offset-requirement.pdf [https://perma.cc/MZ6H-G333].

⁵⁴ AUSTRALIAN GOV’T DEP’T OF SUSTAINABILITY, ENV’T, WATER, POPULATION AND CMTYS., ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 ENVIRONMENTAL OFFSETS POLICY OFFSETS POLICY 11 (Oct. 2012) [hereinafter EPBC OFFSETS POLICY], http://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf [https://perma.cc/V52X-SF29]; QUEENSL. GOV’T, QUEENSLAND ENVTL. OFFSETS POLICY 57 (Version 1.6, June 2018) [hereinafter QUEENSLAND ENVTL. OFFSETS POLICY 1.6], <https://environment.des.qld.gov.au/assets/documents/pollution/management/offsets/offsets-policyv1-6.pdf> [https://perma.cc/2AW2-ULJG].

⁵⁵ Jan McDonald et al., *Promoting Resilience to Climate Change in Australian Conservation Law: The Case of Biodiversity Offsets*, 39(4) U. N.S.W. L.J. 1612, 1639 (2016).

policy seeks to minimize time lag, but offsets need not be secured in advance.⁵⁶ None of these arrangements inspire confidence that the jurisdictions are prioritizing biodiversity over development.

A New South Wales policy for major projects stipulates that proponents “generally” have to secure offsets before development occurs, but may be able to commence with “the proponent providing security to ensure the offset requirement is fulfilled. This ensures both the security of offset arrangements and some flexibility for proponents.”⁵⁷ But “securing offsets” is not the same as having offsets in place in advance—it just means a plan is in place for the offset. Australian critics point out that government regulators approve offsets under the Environmental Protection and Biodiversity Conservation Act (“EPBC”) contingent on a subsequent development of an offset plan, with little transparency of what transpires next. The damage will always be evident; the offset may not be.⁵⁸

In Australia, I did see several potential and actual offset sites in progress that had grazing cattle where none were allowed under the terms of the offset, spindly dying trees in koala offset restoration sites, and ecologically unhealthy land providing the offset valve for economically valuable development. In Queensland, revised offsets policy applied specifically to iconic koalas: developers must plant three new eucalyptus trees at an offset site for every one they destroy (down from the previous requirement of five trees).⁵⁹ But koalas are picky. These trees may take twenty years or more before a koala will find them suitable to inhabit, and that is a long wait between meals.⁶⁰ In

⁵⁶ QUEENSLAND ENVTL. OFFSETS POLICY 1.6, *supra* note 54, at 8.

⁵⁷ N.S.W. GOV'T, NSW BIODIVERSITY OFFSETS POLICY FOR MAJOR PROJECTS (2014), <http://www.environment.nsw.gov.au/resources/biodiversity/140672biopolicy.pdf> [<https://perma.cc/WC5P-FKF2>]. For options (trust funds, insurance pools) considered in the U.K., see DEP'T FOR ENV'T & RURAL AFFAIRS, BIODIVERSITY OFFSETTING IN ENGLAND GREEN PAPER 25 (Sept. 2013), https://consult.defra.gov.uk/biodiversity/biodiversity_offsetting/supporting_documents/20130903Biodiversity%20offsetting%20green%20paper.pdf [<https://perma.cc/WY9M-RQE3>].

⁵⁸ McDonald, *supra* note 55, at 1641.

⁵⁹ QUEENSL. DEP'T. OF ENV'T & HERITAGE PROT., KOALA CONSERVATION UNIT, GUIDELINE: OFFSET FOR NET GAIN OF KOALA HABITAT IN SOUTH EAST QUEENSLAND POLICY 2 (2012); QUEENSLAND ENVTL. OFFSETS POLICY 1.6, *supra* note 54, at 13.

⁶⁰ In an expedition to observe koalas, Doug Kerlin of the Australia Koala Foundation showed me where koalas could and could not be found. And it was going to be a long

an expedition around the sprawling suburbs of Brisbane, Doug Kerlin of the Australia Koala Foundation showed me the kinds of trees where koalas could and could not be found. The government clearly allows development in violation of its own koala offset policy.⁶¹ And, it was going to be a long time before some of the young trees planted to satisfy the offset requirements could ever serve koalas' exacting needs. Yet, offset parameters must account for competing values: would Brisbane's developers have to wait twenty or more years to build until successful restoration of new, mature habitat occurred, with evidence that koalas had chosen to visit? To allow the jurisdiction to build needed housing and preserve koalas, would it not be better to require them to buy some of the rare, remaining undeveloped koala habitat at high prices?

In South Africa, national guidelines do not specify that offsets be secured in advance, although the Western Cape guidelines state that "[o]ffsets in the most appropriate form must be secured before development commences."⁶² Experts and government officials informed me that the requirement remains at the discretion of the official and that approvals are routinely granted for projects where the offset has not been secured. For example, the Department of Environmental Affairs allowed development of a coal mine on the borders of Mapungubwe National Park, which also was a UNESCO World Heritage Site. An offset agreement was derived years after the approval of the coal mine, with no specifics on how the money would be spent.⁶³

Other temporal variables to consider are whether or not credit may be given for "prior gains" that would reward an offset

time before some of the spindly trees planted for offset requirements would ever serve their fussy needs. See QUEENSL. DEPT. OF ENV'T & HERITAGE PROT., *supra* note 59.

⁶¹ Peter McCutcheon, *Koala Habitat Cleared for Housing Development Against Environment Department's Offset Policy*, ABC NEWS (Aug. 13, 2019), <https://www.abc.net.au/news/2019-08-13/koala-habitat-cleared-against-department-of-environment-rules/11392454> [<https://perma.cc/WAC3-RMR9>].

⁶² SUSIE BROWNIE ET AL., PROVINCIAL GOV'T OF THE WESTERN CAPE: DEP'T OF ENVTL. AFFAIRS & DEV. PLANNING, PROVINCIAL GUIDELINES ON BIODIVERSITY OFFSETTING 11 (2d. ed. March 2007) https://www.westerncape.gov.za/text/2007/3/pgwcoffsetsguide linedraft_5march_07.pdf [<https://perma.cc/B568-R2TA>].

⁶³ MELISSA FOURIE, THE SHAME OF VELE COLLIERY: HOW REGULATORY CAPITULATION, NEGLECT, AND CONTEMPT SHAPED THE BATTLE OF MAPUNGUBWE; CENTER FOR APPLIED LEGAL STUDIES, THE MAPUNGUBWE STORY 76 (2014).

provider for retrospective biodiversity enhancements taken before offsets were approved, as in Victoria.⁶⁴ If the offset requires restoration, the law should stipulate to what time period one must restore.⁶⁵ That time period might not be in the past: it might be the best guess of what the species will need in the future as ecological conditions evolve with climate change.

Finally, law must stipulate for how long the offsets must be secured. Obvious destruction may be temporary—think exploration for presence of fossil fuels or minerals—although the ecological impacts may last long after. But more often, damage is permanent, at least until a particular development is abandoned and nature takes over and/or human civilization ends (and nature takes over again).⁶⁶ Unlike wetland loss, which (hypothetically, at least) can be mitigated without intensive ongoing management, to sustain many species in changing ecological regimes, biodiversity preserves must be managed into the distant future to maintain the focused goal the offset was meant to achieve.⁶⁷ External monitoring should be continuous and measured against performance standards, with guaranteed financial arrangements for continued maintenance and monitoring. Thus, an ideal offset would be established in perpetuity (at least as long as we are around), as well. Either the offset is on land that will now be designated as permanently preserved, or arrangements have been made to give the land to a land trust or trusted government agency after an agreed period of time the offset provider has managed for the desired biological outcomes.⁶⁸

⁶⁴ VICT. STATE GOV'T DEPT. OF ENV'T, LAND, WATER, & PLANNING, GUIDELINES FOR THE REMOVAL, DESTRUCTION, OR LOPPING OF NATIVE VEGETATION, §§ 9.4.1 (Dec. 2017) [hereinafter GUIDELINES FOR NATIVE VEGETATION]; ENV'T DEFS. OFFICE (VICTORIA), REFORMING NATIVE VEGETATION OFFSET RULES IN VICTORIA (May 2013).

⁶⁵ For a fascinating example from Chobe National Park in Botswana, where current attempts to restore an elephant-damaged ecosystem would require continuous replication of previous disturbances, see J.T. du Toit, *Considerations of Scale in Biodiversity Conservation*, 13 ANIMAL CONSERVATION 228, 232–33 (2010).

⁶⁶ Tom Allen, *Chernobyl: The Wildlife Haven Created When People Left*, GUARDIAN (May 28, 2019), <https://www.theguardian.com/travel/2019/may/28/chernobyl-wildlife-haven-tour-belarus-created-nuclear-disaster-zone> [<https://perma.cc/U8W8-PFN8>].

⁶⁷ Michael J. Bean & Lynn E. Dwyer, *Mitigation Banking as an Endangered Species Conservation Tool*, 30 ENVTL. L. REP. 10537, 10540 (1999).

⁶⁸ This was the arrangement at sites I visited in California.

Not all offset laws require maintenance in perpetuity. The U.S. rule says that offsets must be “durable,” which means that they must be “sustained for the duration of the associated impacts”⁶⁹ This is also the rule in Queensland.⁷⁰ I take that to mean that if the impacts are permanent, so, too, must be the offsets. While Australian national law notes that “[a]s a general guide, the best legal mechanisms for protecting land are intended to be permanent,” when there are “difficulties,” “[s]uch situations will be considered by the department on a case-by-case basis.”⁷¹ New South Wales has a Biodiversity Stewardship Agreement that requires in perpetuity agreements registered on land title, with a 20-year reporting duty, after which any management obligations may be renewed.⁷² Similarly in Victoria, while “[o]ffset sites must provide permanent compensation for the loss of biodiversity value from the removal of native vegetation,” a required offset plan “includes 10 years of management commitments” and “ongoing management actions to maintain the vegetation at the improved condition, following the initial 10 year period.”⁷³ Many offsets in Australia either are of temporary duration, such as ten to twenty years, or allegedly permanent but with no dedicated funds to ensure sustainability.⁷⁴

Where destruction may be permanent, compensation at the offset site should ideally be permanent, as well. What are the financial arrangements allowing management to continue over time? Does a third party hold an easement to ensure continued offset compliance? Ensuring an offset in perpetuity requires some kind of binding contract with an offset manager and an endowment or security bond to ensure management funds.⁷⁵

⁶⁹ Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316 (Dec. 27, 2016).

⁷⁰ QUEENSLAND ENVTL. OFFSETS POLICY 1.6, *supra* note 54, at 7.

⁷¹ EPBC OFFSETS POLICY, *supra* note 54, at 20, 22.

⁷² *Frequently Asked Questions (FAQs)*, N.S.W. GOV'T BIODIVERSITY CONSERVATION TRUST, <https://www.bct.nsw.gov.au/faqs> [<https://perma.cc/J75V-8UFN>].

⁷³ GUIDELINES FOR NATIVE VEGETATION, *supra* note 64, at §§ 9.2, 9.3.

⁷⁴ Various interviews stressed this. BECCA MADSEN ET AL., ECOSYSTEMS MARKETPLACE, STATE OF BIODIVERSITY MARKETS REPORT: OFFSET AND COMPENSATION PROGRAMS WORLDWIDE 47 (2010).

⁷⁵ South Australia requires “Rehabilitation Security Bonds that cover the risk to the government should proponents become insolvent or the rehabilitation is insufficient.”

But which manager? The original developer, the offset provider, the government or a land trust? Is there some plan to maintain the biodiversity offset after the lifespan of the human owner and manager? So, for example, the River Ranch Mitigation Bank in California's Sacramento Valley has an endowment for management in perpetuity held by a local land trust.⁷⁶ If, as is often the legal requirement, the offset bank must guarantee a conservation easement to be held by a third party, conservation gains will more likely endure.⁷⁷

No single "right" answer exists for when or how much of the offset has to be designed or completed once we allow development and destruction to commence. It's *all* a matter of values weighing. We may not want to wait until offsets are secured or mature before allowing development because that would put a huge brake on, say, affordable housing—or simply large profits for an influential developer. It depends on what matters to a community or its leaders. Is it building or mining at all costs? Then of course you develop first, check that the offset is competent later. But if your laws, or your societal values, say that biodiversity greatly matters, then of course you make sure the offset is legitimate, is functioning, is achieving specified goals, and is secured in perpetuity before you allow the destruction that the offset facilitates. It's all about who cares about what when, and what they're willing to pay to fulfill those values. The law of biodiversity offsetting, and the policies that implement it, will reflect how we weigh the values of development and conservation. In biodiversity offsetting, *time* is always of the essence.

See BUSINESS AND BIODIVERSITY OFFSETS PROGRAMME, BIODIVERSITY OFFSET DESIGN HANDBOOK: APPENDICES 25 (2009).

⁷⁶ *River Ranch Wetland Mitigation Bank*, WILDLANDS, <https://www.wildlandsinc.com/banks/river-ranch-wetland-mitigation/> [<https://perma.cc/BL5E-8BZL>] (last visited Apr 24, 2020). This is on the same property as banks for the Valley Elderberry Longhorn Beetle and Swainson's Hawk, with the entire land protected in perpetuity.

⁷⁷ *Conservation & Mitigation Banking*, CAL. DEPT OF FISH & WILDLIFE, <https://www.wildlife.ca.gov/Conservation/Planning/Banking> [<https://perma.cc/NP5P-7L2E>] (last visited Apr. 24, 2020).

C. Space

Biodiversity law requires thinking about how we prioritize survival of a species or unique ecosystem and how we weigh that against the essentially local nature of ecosystem services and various delights biodiversity brings people in their backyards. Species and ecosystems, and the ecological, cultural, and aesthetic services they perform, serve multiple local functions. The Sheffield, U.K. residents who take their morning walks or twitch for birds in ancient Smithy Woods may not care if larger areas of greater ecological significance are secured 100 kilometers away to compensate for the highway slated to go there.⁷⁸ But in Brisbane, Australia, rehabilitating koala habitat adjacent to existing protected areas while allowing development in areas where koalas no longer have long-term prospects for survival, because development is already occurring there and koala migration routes are cut off, may assist long-term survival of the species.⁷⁹ And the tradeoff may not bother human residents who require housing or associated services, are recent immigrants to the area, and/or have no attachment to local nature, and/or already have accepted that development is more important than preserving vestiges of nature.

Ideal offsets would be spatially planned on a landscape level to fulfill interlocking human and nonhuman needs. The USFWS expresses a “preference for consolidated mitigation sites” planned as part of “a landscape-level strategy” thus avoiding “a piecemeal approach to conservation efforts that often results in small, non-sustainable parcels of habitat scattered throughout the landscape.” The USFWS notes the economies of scale that are often cost-effective, improve monitoring oversight, and can

⁷⁸ See Ben Spencer, *Developers Want to Bulldoze 12th-Century Forest to Make Way For a Motorway Petrol Station Under New Planning Loophole*, DAILY MAIL ONLINE (March 26, 2014), <https://www.dailymail.co.uk/news/article-2590198/Developers-want-bulldoze-12th-century-forest-make-way-motorway-petrol-station-attempt-use-possible-new-planning-loophole.html> [<https://perma.cc/48H6-9AP8>]. See also Monbiot, *supra* note 20 (“It seems to me unlikely that anyone would have proposed trashing this ancient woodland to build a service station in the middle of it, were it not for the possibility of biodiversity offsets.”); Interview with Liz Ballard, CEO Sheffield and Rotherham Wildlife Trust, in Sheffield, U.K. (Nov. 26, 2014).

⁷⁹ This was the reality I saw in several site visits in Queensland, Australia between 2014–2019.

streamline compliance efforts.⁸⁰ Regional habitat conservation plans under the ESA, or California's unique Natural Community Conservation Plans ("NCCPs") provide a model of collaboratively determined mapping exercises where communities decide where development will go and where nature will be prioritized.⁸¹ Queensland prefers "Strategic Offset Investment Corridors" that provide "landscape-scale benefit" thus making offsets "more cost effective and easier to find."⁸² Such spatial planning can also cut through red tape as priority sites for development and offsets are spatially predetermined.

As environmental law scholar Douglas Kysar notes, "[l]aw contains its own geography,"⁸³ and, unfortunately, political maps seldom match ecological maps. The law must specify how far from the original site of destruction an offset may or must be. According to the USFWS, the permissible "service area" of an offset is "the geographic area within which credits may be applied to offset debits associated with development activities. Service areas are mapped geographies with unique ecological and sometimes political significance. In general, larger service areas provide greater flexibility to exchange credits and debits. Landscape, economic, and regulatory realities inform and constrain decisions on service areas."⁸⁴ In other words, not just ecological considerations inform decisions on where offsets may happen. California Fish & Wildlife agents have identified that determining the correct "service area" is one of the most difficult decisions they face when managing offsets.⁸⁵ Political or

⁸⁰ Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,340.

⁸¹ CAL. DEPT OF FISH & WILDLIFE, *supra* note 77. For a particularly fine example of planning for endangered species needs in a region threatened with development from the San Francisco Bay Area's sprawl, see EAST CONTRA COSTA COUNTY HABITAT CONSERVATION PLAN ASS'N, THE FINAL EAST CONTRA COSTA COUNTY HABITAT CONSERVATION PLAN/NATURAL COMMUNITY CONSERVATION PLAN (2006).

⁸² QUEENSLAND ENVTL. OFFSETS POLICY Version 1.8, at § 2.4.4.

⁸³ DOUGLAS A. KYSAR, REGULATING FROM NOWHERE: ENVIRONMENTAL LAW AND THE SEARCH FOR OBJECTIVITY 123 (2011).

⁸⁴ U.S. FISH & WILDLIFE SERV., GREATER SAGE-GROUSE RANGE-WIDE MITIGATION FRAMEWORK 11 (2014), https://www.fws.gov/greatersagegrouse/documents/Landowners/USFWS_GRSG%20RangeWide_Mitigation_Framework20140903.pdf [<https://perma.cc/6KLH-HMEH>].

⁸⁵ David Bunn et al., *Reforms Could Boost Conservation Banking by Landowners*, 67 CAL. AGRIC. 86, 92 (2013).

bureaucratic considerations may prove more important than ecological considerations.⁸⁶ And so, for example, Queensland's koala policy requires that, except in special circumstances, offsets "be within the same [local government area]."⁸⁷

Offsets restricted to areas close to the development might better mimic ecological conditions of the damaged site and better maintain services enjoyed by people in the affected area.⁸⁸ In Victoria, "[t]he offset must be located within the same Catchment Management Authority boundary or municipal district as the native vegetation to be removed. This maintains a link between the location of the offset and the site of the native vegetation to be removed."⁸⁹ On the other hand, the more spatially restrictive we are, the less likely the market will be able to find a suitable equivalent biological entity: the market may be too thin to function efficiently. In New South Wales, offsets must be for the same legally listed threatened species, "not constrained by locality," making the market thicker, i.e. more likely to be able to arrange a suitable offset for the protected biological entity.⁹⁰ In Queensland, sites I visited were proposed to offset development hundreds of kilometers from where the offset is found. This could make ecological sense, as well: we may wish to concentrate our offsets at some distance, if that is where a larger bank with greater ecological viability or a suitable habitat corridor is located.⁹¹ Take koalas, for example: if a residual population of koalas is doomed because they are surrounded by housing that blocks their ability to migrate to new habitat, officials may prefer to steer offsets towards ecologically robust ecosystems where suitable forage and migration routes and genetically diverse populations may thrive. But that doesn't necessarily fulfill the wishes of local residents who wish to enjoy natural surroundings, including the koalas that presently live in those surroundings.

Not all habitats are equal. Even before climate change threatened existing habitats, species needed defined, protected

⁸⁶ *Id.* at 89.

⁸⁷ QUEENSLAND ENVTL. OFFSETS POLICY 1.6, *supra* note 54, at 13.

⁸⁸ DEP'T FOR ENV'T. & RURAL AFFAIRS, *supra* note 57, at 16.

⁸⁹ GUIDELINES FOR NATIVE VEGETATION, *supra* note 64, at 16.

⁹⁰ N.S.W. GOV'T., *supra* note 57, at 22.

⁹¹ DEP'T FOR ENV'T & RURAL AFFAIRS, *supra* note 60, at 16.

corridors to migrate as ecological conditions changed.⁹² Offsets could be directed to protecting or augmenting these corridors.⁹³ In 2012, Australia produced a National Wildlife Corridors Plan, with one mention that such a plan will “support the implementation of a range of other conservation activities, such as sustainable agriculture and land management, biodiversity offsets and conservation covenants.”⁹⁴ The overarching Australian Commonwealth guidance discusses “co-benefits” including “increasing landscape connectivity” but does not seem to prioritize these kinds of offsets.⁹⁵ In South Africa’s KwaZulu Natal Province, offsets should “[m]ake the maximum contribution to securing, protecting and/or linking biodiversity priority areas, and consolidating ecological corridors in the landscape . . . [and] [m]inimize fragmentation of habitat, consolidate or buffer existing protected or priority conservation areas and/or create corridors between these areas.”⁹⁶ In KwaZulu Natal, development that impedes critical ecological corridors might require greater offset compensation, and offsets should be preferably situated where they can maximize corridor connectivity; connectivity should also be taken into account in the Western Cape’s rules.⁹⁷

⁹² See Kerrigan Bork & Andrew L. Rypel, *Improving Infrastructure for Wildlife*, 34 NAT. RESOURCES & ENV’T, CHI., no 4, 2020 at 38; Bonnie Malloy, *Symbolic Gestures or Our Saving Grace: The Relevance of Compensatory Mitigation for Florida’s Wetlands in the Climate Change Era*, 27 J. LAND USE & ENVTL. L. 103, 138 (2011); REBECCA KORMOS ET AL., BIODIVERSITY OFFSETTING IN THE UNITED STATES: LESSONS LEARNED ON MAXIMIZING THEIR ECOLOGICAL CONTRIBUTION 9 (2015), https://cms.fauna-flora.org/wp-content/uploads/2017/12/FFI_2015_Biodiversity-offsets-USA.pdf [<https://perma.cc/EW8M-WPHF>]; Miguel B. Araújo et al., *Would Climate Change Drive Species Out of Reserves? An Assessment of Existing Reserve-Selection Methods*, 10 GLOBAL CHANGE BIOLOGY 1618, 1623 (2004). See generally Justin Gillis, *Spared Winter Freeze, Florida’s Mangroves are Marching North*, N.Y. TIMES (Dec. 30, 2013), <https://www.nytimes.com/2013/12/31/science/without-winter-freezes-mangroves-are-marching-north-scientists-say.html> [<https://perma.cc/3W27-RVDM>].

⁹³ See J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 50 (2008).

⁹⁴ AUSTRALIAN GOV’T DEP’T. OF SUSTAINABILITY, ENV’T., WATER, POPULATION, & COMMUNITIES, NATIONAL WILDLIFE CORRIDORS PLAN: A FRAMEWORK FOR LANDSCAPE-SCALE CONSERVATION 35 (2012).

⁹⁵ EPBC OFFSETS POLICY, *supra* note 54, at 12.

⁹⁶ EZEMVELO KZN WILDLIFE, CONCISE GUIDELINE: BIODIVERSITY OFFSETS IN KWAZULU NATAL 31 (2013), http://www.kznwildlife.com/Documents/ekznw_finaldraft_offsets_concisefinal_130213.pdf [<https://perma.cc/X6XR-6X8U>].

⁹⁷ *Id.* at 15, 31; BROWNLIE ET AL., *supra* note 62, at 74.

Cassinia Environmental, a Victoria-based environmental services business that provides biodiversity offsets, seeks to connect all of Australia's National Parks by helping private land owners find finance for conservation. He calls his vision "Biolinking Australia," seeking to prioritize conservation that facilitates the movement and migration of native species between newly connected lands"⁹⁸ Paul Dettmann, founder of Cassinia, calls himself "a quilt maker. I'm always looking for the bits and pieces that can be sewn together to better support the landscape."⁹⁹ Sites that he is working on, and which I have visited, seemed in robust ecological condition, but are threatened with development. His projects fulfill the goals of his company, i.e., using offsets to link together strategic corridors for biodiversity.¹⁰⁰ That is to say, he is paying attention to suitable space for where offsets ought to go, including prioritizing migration corridors. Note, still, that this is a vision for an offsetting business, not a requirement of an offsetting law.

Of course, cost may be determinative when making spatial determinations on where development will happen and offsets will go: one would not need a degree in economics to figure out that offsets will be more likely to roll down the economic hill to places where the land is cheapest.¹⁰¹ As scholars and activists in the U.S. environmental justice movement have pointed out, low-income communities and communities of color (often one and the same) are disproportionately burdened with environmental pollution. They are also suffering from disproportionate lack of access to environmental amenities. Just as conventional pollution trading creates "hot spots" of areas where pollution is allowed to be concentrated (and thus local residents suffer), so environmental injustice may occur through the creation of biodiversity "green deserts," or spaces where biodiversity and the services it affords are denied to local,

⁹⁸ Class presentation by Paul Dettman, CEO of Cassinia Environmental, at the University of Melbourne (Sept. 20, 2019).

⁹⁹ *Kara Kara*, GREENFLEET, https://www.greenfleet.com.au/Our-forests/Planting-Sites/KaraKara?_ga=2.15588981.279850914.1586705076-1423749991.1586705076 [https://perma.cc/F7CS-SYPK] (last visited Apr. 18, 2020).

¹⁰⁰ See *supra* note 98.

¹⁰¹ See Salzman & Ruhl, *supra* note 3, at 666.

particularly urban, residents.¹⁰² In places like California, where affordable housing is in desperately short supply, citizens may have no choice but to accept housing in biodiversity-poor areas where development has been facilitated by offsetting. Law thus should scrutinize biodiversity offsetting carefully to ensure that hypothetical ecological “trade ups” are not simply prioritizing cheap land and leaving less economically privileged citizens without nature.¹⁰³

As biodiversity offsetting spreads, the practice may be used to compensate for degradation where the impacts are felt far from the source. For example, in Australia, turbidity in the Great Barrier Reef comes from mining activity far inland.¹⁰⁴ Air or water pollution may impact biodiversity far from the source of pollution: currently, no offsets that I know account for distant impacts to biodiversity. Perhaps most importantly, climate change may be the most destructive force on biodiversity. Will a greenhouse gas polluter have to compensate for biodiversity destruction, and if so, where would be an appropriate site of the offset?

At the end of the day, a flaw in any offset is that ecosystem services are largely local phenomena. The further the trading distance, the more people whose nearby biodiversity will be degraded will suffer—both ecologically and aesthetically.¹⁰⁵ Different spatial parameters could mean transfers not just between different ecosystems, but also between different political jurisdictions, different regions with different environmental values, and transfers from public to private, or vice versa, ownership. Hypothetically, offsetting could occur even outside of national borders, particularly where it made

¹⁰² Karl Mathiesen, *Is Biodiversity Offsetting a ‘License to Trash Nature’?* GUARDIAN (Nov. 12, 2013), <https://www.theguardian.com/environment/2013/nov/12/biodiversity-offsetting-license-trash-nature> [<https://perma.cc/JP2J-HNFY>] (quoting a Friends of the Earth offsetting report).

¹⁰³ McKenney & Kiesecker, *supra* note 19, at 173.

¹⁰⁴ Justine Bell et al., *Legal Frameworks for Unique Ecosystems—How Can the EPBC Act Offsets Policy Address the Impact of Development on Seagrass?* 31 ENVTL. PLAN. & L. J. 34, 45 (2014).

¹⁰⁵ J.W. Bull et al., *Categories of Flexibility in Biodiversity Offsetting, and Their Implications for Conservation*, 192 BIOLOGICAL CONSERVATION 522, 530 (2015).

ecological sense, e.g., to protect a migratory bird's threatened breeding habitat overseas.¹⁰⁶

Humans thrive in proximity to green spaces filled with biodiversity, not just in reserves somewhere over there. Ecological and economic realities, however, may prioritize biodiversity way over yonder. And the future is coming: offsetters should prioritize migration corridors. Political borders that do not map onto ecological needs may serve elected officials and bureaucrats better than nonhuman species. As with the variable of time, delineating spatial parameters will be a balancing act of who values what and *where* they value it.

D. Type/Currency

If we care about mitigating the perils of climate change, and biodiversity offsetting is one of our legal mechanisms, a ton of carbon dioxide here is pretty much a ton of carbon dioxide there.¹⁰⁷ If we are just interested in maintaining some basic ecosystem services, an acre of wetlands restored or preserved a few miles away may be functionally equivalent to an acre of current, functioning wetlands where the mall is headed. But is an Aye Aye in a tree right in front of us, where the oil palm plantation is planned, the same as a hypothetical Aye Aye in the future, out of harm's way of where the oil palms are slated to be planted?

To make life fungible, we need to specify the *type* of thing we are exchanging (koalas, Valley Elderberry Longhorn Beetles, Succulent Karoo), the amount of that thing we are exchanging (individuals, breeding pairs, acres), the quality of what we are exchanging (condition of habitat, risk of development threat at offset site), and an algorithm that combines these variables to connote what makes a "fair" exchange.¹⁰⁸ As noted above, while destruction is likely permanent, the offset's success is always uncertain, so the "type" of offset named should compensate for nature's (and human managers') vicissitudes.

¹⁰⁶ DEP'T FOR ENVTL. & RURAL AFFAIRS, *supra* note 57, at 16.

¹⁰⁷ But if we are concerned about sustainable development or preserving biodiversity, the details of the projects that exchange gas for gas will matter.

¹⁰⁸ See, e.g., Kate & Crowe, *supra* note 17, at 28.

What is the fungible unit that allows us to trade life? Tradable units for biodiversity could be sheer numbers of individuals or breeding pairs; acres of habitat; ecosystem types; ecosystem function or services; habitat connectivity and climate change resilience; evolutionary potential; genetic diversity; or some combination of these elements. It may simply depend on human communities' aesthetic or recreational preference because, according to a Scoping Study for offsetting in the U.K., "many people favour, often aesthetically, some types of biodiversity over others, irrespective of the wider goods and services that they offer."¹⁰⁹ Queensland's units have included "State significant biodiversity values," which may be endangered ecosystems, "essential habitat," wetlands, watercourses, "connectivity," and/or legally protected animals and plants.¹¹⁰

Thus, biodiversity offsetting law must name what biological entity we seek to conserve through the offset, and in what quantities. If attempting to offset damage to a biological entity in exchange for conserving "the same" biological entity, we are conserving "like for like." First, of course, one must answer the existential question of what is "like" the thing being destroyed? If it is a particular individual, then biodiversity offsetting is useless unless you are transporting the actual individual to a suitable habitat. If it is an "equivalent" breeding pair,¹¹¹ we would have to know what would have happened to the original pair, or what would happen to the hypothetical new pair—which, of course, we cannot know.

How to put into practice fungible biological trades is tricky. In the U.S., in places where offsetting is permitted as a flexibility mechanism under the Endangered Species Act, the unit of fungibility is clear: it is some other unit, or proxy, of the exact listed species being destroyed. But how to operationalize the

¹⁰⁹ JO TREWEEK ET AL., SCOPING STUDY FOR THE DESIGN AND USE OF BIODIVERSITY OFFSETS IN AN ENGLISH CONTEXT 38 (2009).

¹¹⁰ QUEENSL. DEP'T OF ENV'T & HERITAGE PROT., QUEENSLAND BIODIVERSITY OFFSET POLICY (VERSION 1.1) 35–36 (Jan. 2014). Queensland has now streamlined their offsetting policy into an overarching Environmental Offsets document, which incorporates biodiversity and its values. See QUEENSL. DEP'T OF ENV'T & HERITAGE PROT., QUEENSLAND ENVIRONMENTAL OFFSET POLICY (VERSION 1.8) (2020).

¹¹¹ U.S. FISH & WILDLIFE SERV., GUIDANCE FOR THE ESTABLISHMENT, USE, AND OPERATION OF CONSERVATION BANKS 5 (2003).

offset? Ideally, we would maximize evolutionary potential, i.e., a requirement that the offset results in the species being more likely to persist than under the status quo had the development and associated offset not occurred. This is the notion underlying calls for “net gain” in biodiversity offsetting. Unfortunately, our knowledge of evolutionary potential is often rudimentary, and the chaos of climate change magnifies the baseline vagaries of intraspecies and interspecies dynamics.¹¹² So we do not, and cannot, know that offsetting habitat for a given endangered species here with hypothetical habitat for three times that amount over there will result in more or fewer of the species fifty years from now.

Some U.S. ESA credit systems do measure the amount offset in a “pair-for-pair” system, meaning that for each breeding pair lost, the developer must maintain one other breeding pair.¹¹³ But how would one “maintain” for eternity an ephemeral entity like a “breeding pair?” “Credit values”—the currency quantifying what constitutes a unit of offsetting—will be determined on a case-by-case basis according to the situation.¹¹⁴ The currency may be in acreage, breeding pairs, family groups, or some other stochastic variable.¹¹⁵ Will each species have its own currency? Or does each individual offset have its own sui generis currency? Do the guiding laws or standards provide a framework for calculating currency transactions?

In most cases, we are not necessarily trading individuals for individuals—we are trading habitat for habitat. How “like” the habitat destroyed does the new habitat have to be? In protecting listed endangered species, the USFWS allows a different habitat from the one destroyed if the species might use the offset habitat at a particular stage of its life cycle.¹¹⁶ If the habitat does not yet exist, or if it is in early stages, how can one guarantee it will

¹¹² See, e.g., Livia Albeck-Ripka & Brad Plummer, *5 Plants and Animals Utterly Confused by Climate Change*, N.Y. TIMES (Apr. 4, 2018), <https://www.nytimes.com/2018/04/04/climate/animals-seasons-mismatch.html>. [<https://perma.cc/Y6YQ-YTFR>].

¹¹³ U.S. FISH & WILDLIFE SERV., *supra* note 111, at 5.

¹¹⁴ *Id.* at 9.

¹¹⁵ *Id.*

¹¹⁶ Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,338–39 (Dec. 27, 2016).

be anything “like” the original?¹¹⁷ Offset law also has to specify whether preserving lands threatened by imminent development with permanent security is a permissible offset. Problems with “additionality” have plagued REDD+ (Reducing Emissions from Deforestation and forest Degradation) schemes, where entities may offset their carbon emissions by protecting forests that allegedly would have been felled without the financial investments from the offset: in REDD+ or biodiversity offsetting, how would we ever know the land would have been degraded without the offset security?¹¹⁸ And if a protected species or habitat in the offset site is in a precarious position, does this simply point to shortcomings in the overarching law that would allow a species in precarious position to be pushed further towards the brink?¹¹⁹

For the market to function at all, there must be a commodified “stock” in which to trade. The more specific the law requires the “likeness” to be, the thinner the market, and the more difficult it will be to find a suitable fungible unit.¹²⁰ In some cases, what is to be destroyed may be relatively common and evolutionarily sustainable, and offsets could be used for “unlike” species or ecosystems of higher conservation value (and not simply because an area is cheaper or more convenient to expend on conservation).¹²¹ Such “trading up” would have to be informed by clearly delineated law/policy describing conservation priorities, and by the best available scientific data.¹²² In New South Wales, for example, trading out of kind is allowed if “like for like” options are not available.¹²³ Furthermore, offsets “must be targeted to the biodiversity values being lost or to higher conservation priorities,”¹²⁴ but the worry remains that certain

¹¹⁷ For an extended discussion on “equivalence,” see Kate & Crowe, *supra* note 17, at 75–77.

¹¹⁸ Takacs, *supra* note 26, at 522, 572, n.78.

¹¹⁹ McDonald et al., *supra* note 55, at 1631; see Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,330 (discussing additionality concerns).

¹²⁰ Kate & Crowe, *supra* note 17, at 26–27.

¹²¹ Kiesecker et al., *supra* note 22, at 263.

¹²² J.W. Bull et al., *supra* note 105, at 522, 523.

¹²³ OFFICE OF ENV'T & HERITAGE FOR THE N.S.W. GOV'T, NSW BIODIVERSITY OFFSETS POLICY FOR MAJOR PROJECTS 10 (2014).

¹²⁴ *Id.*

kinds of species or ecosystems may lose out if they are not conveniently or cheaply available.¹²⁵ On the other hand, choosing to restore currently highly degraded habitats—even modifying the original complement of species to create new habitat of a rarer type—could give the greatest “functional lift,” i.e., the greatest net gain or potential to turn biological relative-deserts into thriving biodiversity reserves.¹²⁶

Best practices might discourage supplementary measures when destruction at one site is guaranteed.¹²⁷ This may include research or education expenses in lieu of actual offsets. On the other hand, we know very little about some of the species we are driving to endangerment. In Western Australia, Scott Whiting has been managing a \$62.5 million (AU) flatback turtle offset fund that Chevron has set up in exchange for offshore gas exploration. At the start of the offset period, however, biologists knew virtually nothing about the needs of the turtle. Thus, money for research was crucial before deciding where and how to offset because you need to know what the Turtle needs before you try to fulfill its needs.¹²⁸ Some offsets I’ve visited in Queensland and Victoria allow improved management for a particular conservation outcome. For example, fences keep livestock or invasive species out; fire suppression or controlled burns allow a particular habitat to thrive. Here, as in so much of offsetting, the details matter about whether or not this genuinely improves outcomes for human and nonhuman communities. In Australia’s national EPBC Act, at least 90% of the offset requirements must be met through direct offsets. However, the regulators will consider less if “it can be

¹²⁵ Bull, *supra* note 105, at 530. Victoria encourages this “trading up.” The U.K. is considering it. DEP’T FOR ENV’T & RURAL AFFAIRS, *supra* note 57, at 26; Kate & Crowe, *supra* note 17, at 26; McKenney & Kiesecker, *supra* note 19, at 173.

¹²⁶ HUGH LAVERY, THE USE OF ECOLOGICAL DESIGN TO ACHIEVE SUSTAINABLE DEVELOPMENT IN QUEENSLAND, AUSTRALIA 142 (2012).

¹²⁷ NATURE CONSERVATION COUNCIL OF N.S.W., PARADISE LOST—THE WEAKENING AND WIDENING OF NSW BIODIVERSITY OFFSETTING SCHEMES, 2005–2016 (2016) [hereinafter PARADISE LOST].

¹²⁸ Scott Whiting, Presentation at the 2019 National Biodiversity Conference, Canberra (Aug. 27, 2019). See also *North West Shelf Flatback Turtle Conservation Program*, GOV’T OF W. AUSTL. DEP’T OF BIODIVERSITY, CONSERVATION & ATTRACTIONS, <https://flatbacks.dbca.wa.gov.au> [<https://perma.cc/VCP9-2CYP>] (last visited May 10, 2020).

demonstrated that a greater benefit to the protected matter is likely to be achieved through increasing the proportion of other compensatory measures in an offsets package” or “scientific uncertainty is so high that it isn’t possible to determine a direct offset that is likely to benefit the protected matter. For example, this can be the case in some poorly understood ecosystems in the Commonwealth marine environment.¹²⁹

The Business and Biodiversity Offsets Programme (“BBOP”), an international association of corporations, NGOs, government bureaus, and financial institutions,¹³⁰ is the leading advocate for best practices and standards. In a short time, their standards have evolved into offset dogma. Their core principles are: (a) the “mitigation hierarchy,” which states that offsetting is a last resort after damage has been minimized and restoration has occurred on site; (b) a standard of no net loss (and preferably net gain) for biodiversity; and (c) a requirement of “like-for-like or better,” where offsets should replace the exact kind of biological entity that is being destroyed, or replace it with an entity that is even more imperiled and thus a higher priority for conservation; and (d) “red flags,” or extremely endangered species or ecosystems that should never be degraded (and thus never be offset).¹³¹

The International Finance Corporation, the private sector group of the World Bank, has adopted the mitigation hierarchy for projects it funds, affecting billions of dollars of development projects.¹³² It requires that projects “reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats.”¹³³ Even

¹²⁹ EPBC OFFSETS POLICY, *supra* note 54, at 10.

¹³⁰ *Business and Biodiversity Offsets Programme*, FOREST TRENDS ASS’N, <https://www.forest-trends.org/bbop/> [<https://perma.cc/JMD6-F79M>] (last visited Apr. 21, 2020).

¹³¹ BUSINESS AND BIODIVERSITY OFFSETS PROGRAMME, BIODIVERSITY OFFSET DESIGN HANDBOOK: APPENDICES 6, 9, 30 (2009). See also *Biodiversity Market: Overview*, ECOSYSTEM MARKETPLACE, <http://www.ecosystemmarketplace.com/marketwatch/biodiversity/> [<https://perma.cc/JMD6-F79M>] (last visited Apr. 21, 2020).

¹³² *Products and Services: Investment*, INT’L FIN. CORP., http://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/solutions/products+and+services/investment-proserv [<https://perma.cc/5N4A-FZSG>] (last visited Apr. 21, 2020); INT’L FIN. CORP., PERFORMANCE STANDARD 6: BIODIVERSITY CONSERVATION AND SUSTAINABLE MANAGEMENT OF LIVING NATURAL RESOURCES 2 (2012).

¹³³ *Id.* at 10.

President Obama endorsed the mitigation hierarchy in his Memorandum calling for a U.S. unified policy on compensatory mitigation.¹³⁴

All overarching biodiversity offset law should specify when a level of harm is sufficient enough to trigger the mitigation hierarchy—and thus the possibility of offsets—in the first place. If the threshold is too low, a jurisdiction can suffer biodiversity death from a thousand cuts. For example, in Queensland between mid-2014 and mid-2018, 150,000 hectares had been cleared, but only 4% required offsets under the existing offsetting framework.¹³⁵

Heeding the mitigation hierarchy means developers should first avoid biodiversity impacts, minimize impacts onsite that can't be avoided, and restore impacts inflicted. Offsets should only be prescribed for biodiversity impacts that cannot be avoided, minimized, or restored.¹³⁶ Note, though that *any* impact can be avoided if we prioritize the biological entity over the development! Destruction is never inevitable. This hierarchy mimics prior compensatory mitigation efforts, such as what the U.S. Army Corps of Engineers and other entities have used to manage wetlands under § 404 of the Clean Water Act.¹³⁷ The U.K.'s proposed national offset policy would adhere to the mitigation hierarchy,¹³⁸ as does New South Wales.¹³⁹

Adhering to the mitigation hierarchy may mean that sometimes just the threat of an expensive offset will cause developers to avoid the impact in the first place—a victory for biodiversity that might not have occurred but for the existence

¹³⁴ See Memorandum on Mitigation Impacts on Natural Resources from Development and Encouraging Related Private Investment (Nov. 3, 2015), <https://obamawhitehouse.archives.gov/the-press-office/2015/11/03/mitigating-impacts-natural-resources-development-and-encouraging-related> [<https://perma.cc/N64J-HFJG>] (last visited Apr. 21, 2020).

¹³⁵ Carol Rayner, Team Leader of the Offsets Policy and Implementation Unit, Department of Environment and Science, Govt. of Queensland, Presentation at the 2019 National Biodiversity Offsets Conference, Canberra, Austl. (Aug. 27, 2019). Ms. Rayner added that some of this clearing might have fallen under the national Commonwealth's biodiversity offsets scheme, but because of lack of coordination, she had no way of knowing how much.

¹³⁶ Kate & Crowe, *supra* note 17, at 7.

¹³⁷ See Salzman & Ruhl, *supra* note 3, at 651.

¹³⁸ See DEP'T. FOR ENV'T & RURAL AFFAIRS, *supra* note 57, at 4.

¹³⁹ See N.S.W. GOV'T, *supra* note 57, at 8.

of the offset requirement. On the other hand, developers may simply choose to compensate rather than avoiding or minimizing the original damage. The availability of offsets may facilitate development and allow a developer to avoid a harm they might otherwise have to mitigate onsite.¹⁴⁰ In some cases, this could be acceptable if it results in a net gain for the biological entity and contributes towards socially beneficial development.

BBOP recommends that all offsetting settle for at least “no net loss” or, preferably, “net gain.”¹⁴¹ Many legal systems have adopted one or the other as a core principle. The U.S. does not differentiate.¹⁴² Regardless of the standard, one first has to choose the unit of fungibility. Then, one has to determine what counts as securing that unit to achieve no net loss or net gain. It is not as simple as acres for acres of gain or loss. For example, in Victoria, management improvement of an existing site for a conservation value, or security gains (e.g., a permanent easement on a site that could have been developed) count as offset “gains,” making it more difficult to compare what is lost to what might be gained.¹⁴³

South Africa’s approach is that neither no net loss nor net gain is realistic in the context of a poor, rapidly developing nation. Furthermore, many of the nation’s fragile ecosystems do not respond well to restoration once they have been degraded. Instead, in draft guidelines for the Western Cape and in proposed national guidelines, officials talk of “adding to the conservation estate” or a “managed drawdown” to sustain some representative sample of hundreds of immaculately mapped ecosystem types.¹⁴⁴

¹⁴⁰ See Jessica Owley, *The Increasing Privatization of Environmental Permitting*, 46 AKRON L. REV. 1091, 1094 (2013). For NSW, see David Robinson, *Biodiversity Banking in NSW: A Critique*, 14 AUSTRALASIAN J. NAT. RES. L. & POL’Y 115, 132, 136-37 (2011); McDonald et al., *supra* note 55, at 1630.

¹⁴¹ See BBOP, A CALL TO ACTION (2018).

¹⁴² See Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,325 (Dec. 27, 2016).

¹⁴³ See Kate & Crowe, *supra* note 17, at 31.

¹⁴⁴ See Susan Brownlie & Mark Botha, *Biodiversity Offsets: Adding to the Conservation Estate, or “No Net Loss”?*, 27 IMPACT ASSESSMENT & PROJECT APPRAISAL 227, 228 (2012). Interview with Jeffrey Manuel, Dir. of Biodiversity Info. and Plan., S. African Nat’l Biodiversity Inst. in Cape Town, S. Afr. (Feb. 25, 2015); See also Jeffrey Manuel, BBOP Community Of Practice, Overview Of The South African Framework For Biodiversity Offsets 3 (2013); Jeffrey Manuel, Development And Implementation Of Biodiversity

In the mitigation hierarchy, biodiversity offsets are usually posed as a “last resort,” to be employed only to compensate for onsite damages that cannot be avoided.¹⁴⁵ It is ironic that supporters of biodiversity offsetting sing its many praises, but always leaven their praise with the stipulation that it should only come as a last resort. If an area has been zoned for development or the population of concern is biologically isolated, an evolutionary dead end with no hope of corridor connectivity, why not prioritize offsetting as an ecologically prudent *first* resort? All of this, of course, is subject to the proviso that we need clear guidelines embedded in law based upon careful planning for human and nonhuman needs so that offsets facilitate development that need not take place in exchange for losses to the listed species or ecosystem. If the practice affords beneficial outcomes, why not thicken the market and employ flexible offsetting more widely in our conservation arsenal?

At the other end of the spectrum, some conditions must be set to note when offsets must never be used, because the loss would be too great. That is to say, in any conservation law, some species or ecosystems are sacrosanct because they are “red flags”—i.e. keystone species that are critical to the structure of the entire ecosystem, or perhaps simply too fragile to be restored elsewhere.¹⁴⁶ These might include critically endangered species; last remnants of endangered habitats; resources that have no viable existing or restorable offsets; no available areas that would add value above existing intact resources; existing national parks or similar areas; or world heritage sites, Ramsar wetlands, or other areas that a nation has pledged to domestic and international audiences would remain permanently off limits.¹⁴⁷

For example, in South Africa’s Western Cape and KwaZulu Natal Provinces, destruction to nationally classified “critically endangered” ecosystems cannot be offset.¹⁴⁸ Furthermore,

Offsets Policy In South Africa: Input Prepared For Session 5 Of The Conference “To No Net Loss And Beyond” 5 (2014).

¹⁴⁵ AUSTRALIA SENATE REPORT, *supra* note 50, at 97; N.S.W. GOV’T, *supra* note 57, at 8.

¹⁴⁶ AMREI VON HASE, BBOP, RESOURCE PAPER: LIMITS TO WHAT CAN BE OFFSET 5 (2012).

¹⁴⁷ See AUSTRALIA SENATE REPORT *supra* note 53, at 32–36; VON HASE, *supra* note 146, at 8–9.

¹⁴⁸ See VON HASE, *supra* note 146, at 9.

places where local people depend upon existing ecosystem services, stakeholder opposition is high, land tenure is unclear, and/or financial or governance arrangements for permanent protection are absent should not be offset.¹⁴⁹ BBOP's advice is that deciding what cannot be offset "requires consideration of a wide range of ecological, legal, socio-economic and financial factors, and should be guided by the advice of suitably qualified specialists and local expertise."¹⁵⁰ In other words, this question is no easier or thornier than any other question as to when and how to allow offsets. It is all about the quality of data, the level of planning, and the elaboration of values. But guidance must be clear in law if we are to avoid giving to developers biological resources that a community cherishes or a species requires because it is easier or cheaper to offset than to not develop or develop with greater environmental consciousness on site.

Of course, if one is looking for "no net loss" or for "net gain," the calculations will depend on how to predict the baseline at the original site without a crystal ball to tell one what would have happened at that site were the development not to occur. Do we compare to what exists on the site currently? To what would exist if the site would be left to regenerate on its own? To what it would look like if it continued to degrade? If one overestimates the rate of decline, you require a smaller offset, and thus guarantee further loss of the target species or habitat.¹⁵¹

When no net loss or net gain is required, given the certainty of destruction and the uncertainty of replacement, the law should require some weighted ratio to increase the odds that the offset will, in fact, result in no loss or in a gain.

Ratios can vary dramatically. In the U.S., there is no set ratio, and every deal is negotiated separately.¹⁵² The tradeoffs may be that if the ratios are too high, businesses may rebel at the cost, and perhaps in more conservative, environmentally unfriendly governments, one might have to take what one can get. While "mitigation ratios have not always truly reflected the value of

¹⁴⁹ See *id.* at 14–15.

¹⁵⁰ See *id.* at 3.

¹⁵¹ See FLEUR J.F. MASEYK ET AL., NAT'L ENVTL. SCI. PROGRAMME, GUIDANCE FOR DERIVING "RISK OF LOSS" ESTIMATES WHEN EVALUATING BIODIVERSITY OFFSETS UNDER THE EPBC ACT 2 (2017).

¹⁵² See Interview with Carl Wilcox, Cal. Dep't of Fish & Wildlife (June 27, 2019).

the land lost and gained for the species,” ratios or destruction to offset are still often 1:1 despite uncertainties of restoration of success of the offset and shape and type of the location and climate change uncertainties.¹⁵³ In Queensland, to the consternation of those who require offsets, the current maximum ratio of 4:1 is being reconsidered to allow higher ratios for imperiled species or uncertain results.¹⁵⁴ In South Africa’s Western Cape, offset ratios vary from 10:1 for “vulnerable” ecosystems to 30:1 for “critically endangered” ones.¹⁵⁵ KwaZulu Natal gives different basic offset ratios (with multipliers varying from 3:1 to 30:1 depending on whether the area is Near Threatened, Vulnerable, Endangered, or Critically endangered) for eighty-five different kinds of ecosystem, with potential increases depending on the quality of sites to be damaged and preserved, the quality of the biodiversity the ecosystems contain, and the level of risk at the offset site.¹⁵⁶ In South Australia, depending on a variety of calculations, the offset ratio area can be thirty to fifty times the extent of the original damage.¹⁵⁷

In a well-studied example of the threatened Green and Golden Bell Frog (*Litoria aurea*), which had to make way for Sydney’s Olympic Park, offsetters required a nineteen-fold increase in pond size and nine-fold increase in pond edge. The total population size of the frog increased 1.2 to 3.5 times.¹⁵⁸ In that situation, the developers were wealthy enough to afford a major, expensive offset and implement a robust monitoring program. Sometimes the ratio required for a particularly vulnerable species or ecosystem will make a project no longer economically viable, but the point of a well-calibrated biodiversity offsets system is that we cannot afford certain levels of ecological losses.

To make life fungible requires figuring out what gets traded for what, how much of it gets traded, and at what cost to the

¹⁵³ See REBECCA KORMOS ET AL., BIODIVERSITY OFFSETTING IN THE UNITED STATES: LESSONS LEARNED ON MAXIMIZING THEIR ECOLOGICAL CONTRIBUTION 6 (2015).

¹⁵⁴ See Interview with Alan Key and Hugh Lavery, in Brisbane, Austl. (July 26, 2019).

¹⁵⁵ BROWNIE ET AL., *supra* note 62, at 49.

¹⁵⁶ CONCISE GUIDELINE: KWAZULU NATAL BIODIVERSITY OFFSETS 21–29 (2013).

¹⁵⁷ Adam Schutz, Dep’t of Env’t (S. Austl.), Biodiversity Offsetting in South Australia, Presentation at National Biodiversity Offsets Conference (Aug. 27, 2019, Canberra, Austl.); email from Adam Schutz (Aug. 30, 2019).

¹⁵⁸ Pickett et al., *Achieving No Net Loss in Habitat of a Threatened Frog Required High Offset Ratio and Intensive Monitoring* 157 BIOLOGICAL CONSERVATION 156, 159 (2013).

developer; it is a contentious conundrum. Later, I will discuss these attempts to shoehorn biodiversity's disparate, inherent and instrumental values into a quantifiable score, where parties attempt to make predictable, transparent, and formulaic what is really unpredictable, opaque, and incapable of fitting into neat equations.

E. Who Does What?

In biodiversity offsetting, as the players manipulate the chess pieces of life, offset law must specify *who* may or must play which roles in establishing and maintaining complicated transactions. Depending on how the roles are delineated, offsets may just be a cheap way for a developer to circumvent biodiversity protection laws, or may be a prudent means of maintaining sustainable development in robust ecological systems.

The law has to define who requires, and pays for, an offset. The law must also define whether the offset must be provided by the developer itself, by the government (through an in-lieu fee program paid by the developer), or by a private bank.¹⁵⁹ The latter may be an entity that does offsetting as its primary business,¹⁶⁰ or a non-profit, like a land trust, that may use offsetting funds to further its own mission.¹⁶¹ The law would have to specify what responsibilities each of these entities have, including whether they bear the liability for the success of the offset, and how penalties would accrue should the offset fail.¹⁶²

There is no recipe for which of these specifications is most likely to lead to a successful, sustainable offset. In lieu payments fed into a trust fund may be absorbed or disappear

¹⁵⁹ See, e.g., U. S. DEP'T OF THE INTERIOR, OFF. OF POL'Y ANALYSIS, CONSERVATION BANKING OVERVIEW AND SUGGESTED AREAS FOR FUTURE ANALYSIS 2-3 (2013), <https://www.fws.gov/endangered/landowners/pdf/Conservation%20Banking%20Overview%20DOI-Sept2013.pdf> [<https://perma.cc/4B7E-LKQ6>].

¹⁶⁰ See, e.g., WILDLANDS <https://www.wildlandsinc.com> [<https://perma.cc/QZY6-SR95>]; EARTHTRADE, earthtrade.com.au [<https://perma.cc/GWT3-AFAZ>]; CASSINIA ENVIRONMENTAL, <https://cassinia.com> [<https://perma.cc/A6ER-R5FL>].

¹⁶¹ See, e.g., QUEENSL. TRUST FOR NATURE, <https://qtfn.org.au> [<https://perma.cc/YAG9-KHJ7>].

¹⁶² See, e.g., U. S. DEP'T OF THE INTERIOR, OFF. OF POL'Y ANALYSIS *supra* note 159, at 4.

into a general budget to pay for more pressing matters.¹⁶³ Between July 1, 2014 and June 30, 2018, Queensland incorporated offsets into 156 development approvals, collecting in-lieu payments totalling 9.6 million Australian dollars in the process. State government officers in Queensland admitted that in lieu payments have been accruing without being spent; as of early 2019, the government's own figures reported that only 1.5 million "ha[d] been contracted, committed, or spent delivering offset project."¹⁶⁴

In Queensland, of 246 projects with 132 required impacts totaling 11,697 hectares, only nine advanced offsets had been registered, totaling under 1,000 hectares.¹⁶⁵

Biodiversity offsetting laws have to explain who monitors the success of the offset, and with what rigor and frequency. Offset providers may or may not do what they've pledged to do; more importantly, nature may or may not cooperate to deliver the outcome pledged by offset providers. An offsets policy is only as strong as the underlying law on which it is based and the regulatory regime implementing that law. Even though market approaches are often promoted as an alternative to traditional command and control, a firm regulatory hand must guide them, if they are to successfully implement sustainable development. That is to say, biodiversity offsetting may need more, not less, government oversight, to protect both human and nonhuman communities, to make sure the metrics balance out, and to safeguard that the system does not, as its critics fear, become a gift to developers to circumvent existing environmental laws. A survey of biodiversity offset providers in California confirmed that from their point of view, clear standards rooted in law and enforced with consistency were crucial for the biodiversity market to function.¹⁶⁶

¹⁶³ See Martine Maron et al., *Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting*, 66 *BIOSCIENCE* 489, 495 (2016).

¹⁶⁴ QUEENSL. GOV'T, A REVIEW OF QUEENSLAND'S ENVIRONMENTAL OFFSETS FRAMEWORK: A DISCUSSION PAPER 10 (Feb. 2019) https://www.qld.gov.au/__data/assets/pdf_file/0018/94131/qld-enviro-offsets-framework-discuss-paper.pdf [<https://perma.cc/9ZUK-BA4F>].

¹⁶⁵ Rayner, *supra* note 135. Ms. Rayner said that some of this clearing might have fallen under the national Commonwealth's biodiversity offsets scheme, but added that because of lack of coordination, she had no way of knowing how much.

¹⁶⁶ See David Bunn et al., *supra* note 85.

No offset scheme that I know of has a market regulator that keeps track of who is doing what and where; this is regarded by at least one experienced environmental consultant as “the biggest failure of the current market.”¹⁶⁷ Discussions and talks at the 2019 Australia New Zealand National Biodiversity Offsets Conference confirmed that no national or state offset scheme in these countries had a coordinator who was minding and regulating all the complicated offset transactions. A non-partisan regulator could help keep track of the many moving parts of many biodiversity offset schemes, and avoid total regulatory fiascos, such as the Victorian government’s failure to live up to its promises to create reserves to compensate for runaway development.¹⁶⁸ It may be (unfortunately) that ongoing offsets require no external verification. Were subsequent periodic verification required, the law must specify whether government officials, or, as in some REDD+ and carbon offsetting models, private companies will be accredited to verify. The latter option carries its own problems; if a company is too stringent in applying the standards, they may quickly find themselves without work.¹⁶⁹ The ideal offset regime would require an adaptive management program based on constant feedback, with verification, about whether the targeted species or habitat is living up to the terms of the contract; but even adaptive management is more difficult than often claimed, given the complexity of ecological systems.¹⁷⁰ The offset agreement would implement a system of measuring, monitoring, reporting, and verification (“MMRV”), i.e., the offset provider/liability holder regularly doing the first three and another entity (ideally a competent government official) doing the latter to make sure

¹⁶⁷ Christopher Ewing, CO2 Australia, Australia’s Biodiversity Offset Market—Panacea or Pipe Dream? Presentation at National Biodiversity Offsets Conference (Aug. 27, 2019, Canberra, Austl.).

¹⁶⁸ For one call for such a regulator to cope with expanding development and failure to create promised offset reserves, see VICTORIAN NAT’L PARKS ASS’N, VICTORIAN STATE GOVERNMENT REVIEW OF THE NATIVE VEGETATION CLEARING REGULATIONS—CONSULTATION PAPER 13 (May 2016) (“KEY GAP 4—Victoria still needs an Independent Regulator”).

¹⁶⁹ See David Takacs, *Carbon Into Gold: Forest Carbon Offsets, Climate Change Adaptation, and International Law*, 15 HASTINGS W.-N.W. J. ENVTL. L. & POL’Y., 39, 75 (2009).

¹⁷⁰ See Edward T. Game et al., *supra* note 25, at 272–73.

the offset provider is living up to its commitments.¹⁷¹ The MMRV system should continue for the life of the project to make sure that nature and its handlers are performing as expected.¹⁷² Unfortunately, government officials from the Australian states of Queensland, Victoria, and New South Wales have told me that they simply lack the capacity to effectively monitor offset progress once the offset has been improved.

A carefully regulated, market-based system presents multiple benefits. For-profit offset providers I visited and interviewed in California, Queensland, and Victoria, seemed to be offering excellent services. As several offset providers emphasized, their livelihoods depended upon the business, they had special expertise in restoration or land acquisition, they were passionate about their work, and government bureaus, skeptical about market-based conservation, could jeopardize their businesses; because of all this, they believed they were more likely to provide and maintain top quality offset.¹⁷³ The U.S. rule favors conservation banks, and discourages permittee-responsible offsets both because the latter tend to be ecologically-isolated one-offs, and because it is more difficult to track their permanence.¹⁷⁴

We cannot do offsetting without scientific input on what species exist where, and what they need. But, obviously, scientists are not the only voices that should be heeded.¹⁷⁵ One complaint about offsets is they are sometimes a black box conducted between individual parties without a chance for affected communities to weigh in. In a report critical of the use of biodiversity offsetting, the Nature Conservation Council of

¹⁷¹ For a comprehensive evaluation of how this works for REDD+, see generally David Takacs, *Forest Carbon (REDD+), Repairing International Trust, and Reciprocal Contractual Sovereignty*, 37 VT. L. Rev. 653 (2013).

¹⁷² Cf. Maron et al., *supra* note 163, at 495.

¹⁷³ Field trip and interviews with Alan Key, CEO of Earthtrade, Rockhampton Australia (July 13–14, 2019); Class presentation, Paul Dettmann, CEO of Cassinia Environmental, University of Melbourne (Sept. 20, 2019). I have also visited Paul Dettmann's field sites in Victoria with him January 26, 2015; Interview with Steve Morgan, CEO, Sacramento River Ranch, in W. Sacramento, Cal. (Sept. 18, 2014).

¹⁷⁴ See Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,317–19 (Dec. 27, 2016).

¹⁷⁵ For a discussion on whose voices to heed in biodiversity interventions, see David Takacs, *Whose Voices Count in Biodiversity Conservation? Ecological Democracy in Biodiversity Offsetting*, 22 J. ENVTL. POL'Y & PLANNING 43 (2019).

NSW calls for a public register, which would allow citizens and officials to monitor and enforce offsets.¹⁷⁶ In an offset, some communities will lose aesthetic and recreational opportunities while others may gain. For example, Maron et al. pithily ask: “No net loss for whom?”¹⁷⁷ To fulfill environmental democracy rights, we recognize that all biodiversity conservation measures, including offsetting, must simultaneously heed not just the voices of scientists, but also those citizens most affected at the site to be destroyed.¹⁷⁸ We also must recognize that we must not listen solely to the loudest, but pay special attention to the voices of the most marginalized, heeding the multitude of ways that local biodiversity contributes to human flourishing, and impoverishes neighboring human communities when biodiversity has been banished to a distant locale.¹⁷⁹ And, of course, we must listen to the nonhuman, on whose behalves these laws ultimately exist, while recognizing that in attending to their needs, we secure our own futures.

The law should thus explain who may comment on or intervene in a proposed offset. Whose voices would be heard, and how and when an offset would be scuttled due to opposition at the site of destruction or restoration will often be fraught.¹⁸⁰ When the formulas are calculated solely to replace or mitigate loss of a species or ecosystem type, the aesthetic, recreational, health, and educational needs of the citizens where the destruction is to happen do not become part of the calculus.

In an ideal environmental democracy, there would be a public register that would allow for communities at sites of destruction and offset to weigh in, and that would allow concerned public members to play a role in monitoring the state of the offset. So,

¹⁷⁶ PARADISE LOST, *supra* note 127, at 11.

¹⁷⁷ Martine Maron et al., *supra* note 163, at 493.

¹⁷⁸ See generally Takacs, *supra* note 175. See also Victoria F. Griffiths et al., *No Net Loss For People and Biodiversity*, 0 CONSERVATION BIOLOGY 1 (2018).

¹⁷⁹ See generally Sandra Díaz et al., *Assessing Nature’s Contributions to People*, 359 SCIENCE 270 (2018).

¹⁸⁰ Takacs, *supra* note 175; David Takacs, *Environmental Democracy and Forest Carbon (REDD+)*, 44 ENVTL. L. 71, 113 (2014).

for example, Western Australia,¹⁸¹ Victoria,¹⁸² and New South Wales¹⁸³ all have registers designed to help facilitate trades between those needing and those offering offsets. But they are not designed to help concerned members of the public intervene or comment upon proposed offsets. The U.S. rule “encourage[s] collaboration . . . of affected communities and stakeholders,” but does not require it.¹⁸⁴ Because deals are worked out between developers and offset providers, it’s even more difficult for a concerned community member to participate.

V. METRICS

The ideal biodiversity offset will never be fully realized because the variables I describe here are just too complicated to balance: human and nonhuman winners and losers are inevitable even when we aim for win-win-win outcomes.

All of the variables above must be poured into a metric to determine how large the offset must be and how much it is going to cost the developer. It can get . . . complicated. The formulas must calculate area quantity, habitat quality, ecological significance, and risk of success or failure. Government managers in California identified determining an appropriate amount of “credits” to award biobankers as a major challenge.¹⁸⁵ This is not surprising. Conservation biologists disagree on proper indices to measure the probabilities of extinction. We lack excellent data on the populations and habits of most of the species with which we share the planet. We do not even know how many species currently share the planet with us,¹⁸⁶ and

¹⁸¹ *Govt. of Western Australia Offsets Register*, GOV’T OF W. AUSTL., <https://www.offsetsregister.wa.gov.au/public/searchregister/> (last accessed Apr 19, 2020) [<https://perma.cc/6WJ6-ADET>].

¹⁸² *Search the Native Vegetation Credit Register*, VICT. ST. GOV’T, https://nvr.delwp.vic.gov.au/?_ga=2.251678921.1533573958.1567040033-603412831.1567040033; (last visited Apr. 19, 2020) [<https://perma.cc/RN59-6KF2>].

¹⁸³ *Biodiversity Offset Scheme Public Registers*, N.S.W. GOV’T, <https://www.environment.nsw.gov.au/biodiversity/offsets-scheme-public-registers.htm> (last visited Apr 19, 2020) [<https://perma.cc/2SQD-X78Z>].

¹⁸⁴ Endangered and Threatened Wildlife and Plants; Endangered Species Act Compensatory Mitigation Policy, 81 Fed. Reg. 95,316, 95,340 (Dec. 27, 2016).

¹⁸⁵ Bunn et al., *supra* note 85, at 92.

¹⁸⁶ See generally DAVID TAKACS, *THE IDEA OF BIODIVERSITY: PHILOSOPHIES OF PARADISE* (1996); INT’L UNION FOR THE CONSERVATION OF NATURE, *SPECIES EXTINCTION* —The

debates rage about current extinction trends and probabilities, including how to calibrate and use various indices of species extinction probability.¹⁸⁷ Even definitive studies on extinctions admit that rates may be “gross underestimate[s].”¹⁸⁸ We cannot predict how the vicissitudes of a changing environment, or of human interventions in the natural world, will affect a given population, particularly on a planet where the unpredictability of climate change multiplies our already uncertain predictions. And we can never predict what a species or ecosystem is going to do or how it is going to react to environmental variables. With climate change throwing chaos into the mix, we have even greater problems predicting what those variables will be.¹⁸⁹

Nonetheless, to make biodiversity offsetting work, we need to account for the variables I describe above to allow predictability and procedural and economic fairness in the exchanges. Let’s use Victoria, Australia as an example and visualize why, among other attributes, biodiversity offsetting is a boon for ecological consulting businesses. When clearing vegetation, the developer must consider offset type, amount, special attributes of the area, and habitat quality.¹⁹⁰ There are two different kinds of offsets: first, species offsets, which are measured in Species Habitat Units, for when the development will impact a rare or threatened species, and second, General Offsets, which are measured in General Habitat Units, for general vegetation clearing, and having to be in the same of ten Catchment

FACTS. The IUCN estimates that only 15% (about 1.9 million) of extant species have been described, and of those, only 3% have been assessed for extinction probability.

¹⁸⁷ Eric Biber, *Which Science? Whose Science? How Scientific Disciplines Can Shape Environmental Law*, 79 U. CHI. L. REV. 471, 504 (2012); Michael McCarthy et al., *Linking Indices for Biodiversity Monitoring to Extinction Risk Theory*, 28 CONSERVATION BIOLOGY 1575, 1581–82 (2014).

¹⁸⁸ Damian Carrington, *‘Frightening’ Number of Plant Extinctions Found in Global Survey*, GUARDIAN (June 10, 2019), <https://www.theguardian.com/environment/2019/jun/10/frightening-number-of-plant-extinctions-found-in-global-survey> [<https://perma.cc/5Y6F-M3UN>].

¹⁸⁹ Oliver Milman, *Everglades Under Threat as Florida’s Mangroves Face Death by Rising Sea Level*, GUARDIAN (May 2, 2018), <https://www.theguardian.com/us-news/2018/may/02/mangroves-everglades-florida-rising-sea-level> [<https://perma.cc/892K-PXN4>].

¹⁹⁰ GUIDELINES FOR NATIVE VEGETATION, *supra* note 64, at 14.

Management Authorities as the destruction.¹⁹¹ There is an automatic multiplier of one and a half times for general habitat offsets and two times for species habitat offsets.¹⁹² For rare species, there will be an additional multiplier depending on where the land clearing occurs on the State's Habitat importance Map.¹⁹³

They then must generate a Habitat Hectares Score, i.e., the area of native vegetation multiplied by the ecological condition of the native vegetation.¹⁹⁴ Each type of habitat will fit within a Victoria Ecological Vegetation class, to be assessed by "an accredited native vegetation assessor," and will have a specific conservation status, for example, endangered, vulnerable, least concern.¹⁹⁵ Because "large trees are often the oldest part of an ecological system and are difficult to replace in the short term,"¹⁹⁶ the developer then has to include the number of large trees; offsets must contain at least the same number of large trees as the area being cleared.¹⁹⁷

Both offset seeker and provider calculate a Strategic Biodiversity Value Score, i.e., how the onsite biodiversity contributes, in relative terms, to Victoria's overall complement.¹⁹⁸ The offset seeker will enter these data into Victoria's Native Vegetation Credit Register and can then see how many units they will need, and what broker might be able to provide the offset.¹⁹⁹ The negotiation on price will occur between offset seeker and offset provider.

Skeptics thus criticize the formulas used to calculate offsets designed to guarantee "no net loss" or "net gain"; George Monbiot, for example, compares them to "marmalade. They are

¹⁹¹ VICT. ST. GOV'T DEPT OF ENV'T, LAND WATER & PLANNING, NATIVE VEGETATION CREDIT REGISTER: PRICING NATIVE VEGETATION CREDITS 1 (2018) [hereinafter NATIVE VEGETATION CREDIT REGISTER]; GUIDELINES FOR NATIVE VEGETATION, *supra* note 64, at 15.

¹⁹² GUIDELINES FOR NATIVE VEGETATION, *supra* note 64, at 17.

¹⁹³ *Id.* at 15.

¹⁹⁴ *Id.* at 7, 9, 13.

¹⁹⁵ *Id.* at 8.

¹⁹⁶ *Id.*

¹⁹⁷ NATIVE VEGETATION CREDIT REGISTER, *supra* note 191, at 2.

¹⁹⁸ GUIDELINES FOR NATIVE VEGETATION, *supra* note 64, at 10.

¹⁹⁹ *Search the Native Vegetation Credit Register*, *supra* note 182.

finely shredded, boiled to a pulp, heavily sweetened, and still indigestible. In other words, they are total gibberish.”²⁰⁰

I would not go *that* far. We *do* need some data to manage biodiversity, no matter what mechanism we choose to use. And to *not* pursue biodiversity offsetting suggests we have the data to justify keeping things as they are. In other words, if we are to make our best efforts to derive and implement sensible biodiversity conservation laws, we have to employ data on elements such as minimum viable population sizes in minimum viable areas that will sustain a given species, about where species and ecosystems currently exist, and about where they might go as climate change intensifies. These data are essential to help us figure out at what ratios we should set our offsets, when we should send up red flags to prevent offsets, and when offsetting might actually be prudent for species survival. That is to say, taking a precautionary approach and avoiding offsets because of the risk to the species involved is no help whatsoever. If advocates of offsetting are correct, then we cannot justify leaving species and conservation law in their current states, and precaution may require more aggressive means, which may include offsetting. So, perhaps, where species conservation science is uncertain (and isn't it always?), err on the side of overprotecting species and ecosystems: But in a given situation, does that mean avoiding offsetting, or abetting it?

Those implementing biodiversity offsetting employ fancy numbers and rarefied formulas to quantify what are essentially value choices. In my book, The Idea of Biodiversity, I examine what “biodiversity” means to the conservation biologists who invented the term and advocated on its behalf while all the while providing meaningful data on its diminution. What happens when biologists, who draw their expertise and authority from objectivity, become advocates? Science carries the imprimatur of objectivity;²⁰¹ and when we throw abstruse numbers and formulas into the mix, we provide a further layer of legitimacy to biodiversity offsetting. Once we acknowledge the values that go into making a decision, we can use science wisely for what Sandra Harding calls “strong objectivity” or greater self-

²⁰⁰ Monbiot, *supra* note 20.

²⁰¹ TAKACS, *supra* note 186.

awareness about the shortcomings of data in naming and achieving desired ends.²⁰² But in the biodiversity offsetting arena, strong objectivity goes beyond the primacy of data. It collects diverse perspectives bearing diverse expertise to make the best possible choices about the landscape.

As David Robinson notes, “What is really measured by biobanking is not all biodiversity values, just the quantitative ones. Ecosystems have aesthetic, educational, intrinsic, spiritual, and ethical functions which are not measured by following the *Biobanking Assessment Methodology*.”²⁰³ Data and numbers can inform the choices, and once we have made the choices, data and numbers can help us implement those choices. Science is indispensable, but the empirical knowledge it imparts cannot tell us what we want our communities and landscapes to look like. The “is” of science does not dictate the “ought” of law and policy, until it’s been refracted through the lens of value choices, one of which would be to decide whether we like offsetting in the first place.²⁰⁴

Further value choices are implemented in situ. How expensive do we want to make offsetting? How much do we want developers to pay? In its 2012 “Offset for Net Gain of Koala Habitat,” the Queensland Government required that for every non-juvenile koala tree a developer destroys, they must plant five somewhere else.²⁰⁵ In its 2018 revised offset policy, regulators had reduced that requirement to three new trees for every non-juvenile tree destroyed.²⁰⁶ This change was not due to new information about koalas and their ecological needs. That means Queensland law places more emphasis on koalas and makes development more costly than if they used a 1:1 ratio, but less costly than it used to be. Between 2012 and 2018, it’s not as if koalas’ ecological needs changed or threats to their continued existence diminished. The current requirements are

²⁰² Sandra Harding, *After the Neutrality Ideal: Science, Politics, and “Strong Objectivity”*, 59 SOC. RESEARCH 567, 569–75 (1992). For a discussion in the context of the concept and how scientific disciplines shape epistemology, see Biber, *supra* note 187, at 549–50.

²⁰³ Robinson, *supra* note 46, at 129.

²⁰⁴ David Takacs et al., *From Is to Should: Helping Students Translate Conservation Biology Into Conservation Policy*, 20 CONSERVATION BIOLOGY 1342 (2006).

²⁰⁵ QUEENSL. DEP’T OF ENV’T AND HERITAGE PROT., *supra* note 59, at 2.

²⁰⁶ EPBC OFFSETS POLICY, *supra* note 54, at 13.

still more costly than if law required that ten trees be planted for each one destroyed, or simply banned development where koalas hang out. Science cannot precisely predict which ratio would give an equivalent mature tree for the one taken, or whether or not koalas will choose to make their homes in the newly planted trees; the policies are too new to assess long term success of koala populations under different offset regimes. The current numerical requirements are educated guesses that reflect the relative weight constituents give to koalas versus shopping centers and housing developments.

When biodiversity is a prized commodity, biodiversity managers try to approximate conditions that will help assure that a species or habitat type will continue to thrive, and complicated formulas help parties believe they are likely to achieve this. But bureaucrats have to pay attention to the needs of developers, who may hold considerable political clout in a locale, and whose economic generation may be prized by local citizens. The U.K. is developing a national metric to be used to offset biodiversity destruction for new housing.

The increased demand for housing offers us an exciting opportunity. Applying a biodiversity net gain approach to national issues like house building could help deliver the 25 Year Environment Plan's ambition to be the first generation to leave our natural environment in a better state than we found it"²⁰⁷

To achieve "net gain," they've developed a metric that "uses a simple calculation that takes into account . . . size, ecological condition, location and proximity to nearby 'connecting' features."²⁰⁸ The metric "uses habitat, the places in which species live, as a proxy to describe biodiversity. These habitats are converted into measurable 'biodiversity units,' These biodiversity units are the 'currency' of the metric."²⁰⁹ For both area to be destroyed and area to be conserved or restored, the metric multiples size of habitat times a distinctiveness score

²⁰⁷ MATTHEW J. HEYDON ET AL., THE BIODIVERSITY METRIC 2.0: AUDITING AND ACCOUNTING FOR BIODIVERSITY USER GUIDE BETA VERSION 1 (2019).

²⁰⁸ *Id.* at 6.

²⁰⁹ QUEENSL. DEPT OF ENV'T AND HERITAGE PROT., *supra* note 59, at 2 ; Heydon, *supra* note 207, at 12.

times condition of the habitat times strategic location times connectivity value to get some whole number unit; as long as the offset's units are higher than the area to be destroyed, the offset should be approved.²¹⁰

How can biodiversity managers in the U.K. use a “simple” metric and hope to capture the complexities of an ecosystem or the vicissitudes of species survival when faced with stochasticity? On the other hand, were they to use more complicated metrics, the process of building houses becomes more cumbersome and expensive, and may thin the market, making it more difficult to find suitable offsets.

Every variable I discuss above combines some element of biological reality (what does this species *really* need to survive in perpetuity?) with value choices a community makes on the value of biodiversity compared to all of that community's other values. We multiply the uncertainty of our knowledge of species and ecosystems by the uncertainty of predicting the future, by the uncertainty that the chaos of climate change throws into the picture. We mask these uncertainties with careful figures and abstruse formulas. We fetishize our metrics, and pretend that the numbers have all the answers and we are just going to follow the numbers, and that through science you can use prestidigitation to make nonfungible koalas and beetles and Queensland brigalow fungible. We cannot do it without science, but we should not think science has all the answers for situations that start with fundamental questions. What kind of society do we wish to have? What role do we want nature to play? With whom do we wish to share the planet, and why? What kind of stewards do we wish to be for future generations? Do we want the Sacramento subdivision, or do we want Valley Elderberry Longhorn Beetles, or do we somehow want to split the difference and have both? Do we want that our grandchildren share Queensland with koalas, have easy access to fynbos from Cape Town, hear the meadowlarks of Essex, U.K.? The normative answers—when we should use offsets, and where we should situate them, and what metric should we use—blend empirical

²¹⁰ QUEENSL. DEPT OF ENV'T AND HERITAGE PROT., *supra* note 59, at 2 ; Heydon, *supra* note 207, at 13–15.

data with value choices that reflect a community's priorities and loves.

The variables I have discussed here are all necessary for a functional conservation management system. How far from the damage do we offset? How much of the offset has to be guaranteed before we allow certain destruction? What are we trading for what, and how much of it? Who, if anyone, is ultimately responsible for the success or failure of the offset? But the precise figures we plug into those variables reflect a community's visions and values for what they want their corner of the planet to look and feel like.

VI. CONCLUSION

For the immediate future, a world of eight, or ten, or twelve billion people are unlikely to be able to afford or tolerate laws that preserve large chunks of nature for nature's sake. At the same time, it is hubris to assume that nature can simply exist where and when and how we want it, subservient to our whims, or that we can exist without large swathes of functioning ecosystems comprised of a healthy collection of species.

Biodiversity offsets are here to stay, at least as a short-term solution that attempts to balance human and nonhuman communities' needs. A deeply equitable, idealized biological offset would be socially and ecologically sustainable and result in a greater chance of perpetuation of species and afford ecological and social benefits to human communities, as well. It would not be just a cheap and easy workaround for developers, but a costly and careful set of steps to take us into the Anthropocene with a healthy complement of nonhuman fellow travelers. But no single, given offset can be deeply equitable, maximizing health and potential for *all* affected human and nonhuman communities. Every offset is a tradeoff where some humans and nonhumans will lose, even if we do follow the mitigation hierarchy and employ offsets that make our best efforts to help the species or habitat in the long run. There will always be tradeoffs. Through allocating the variables here in any given law, biodiversity offsets show how communities weigh the relative importance of biodiversity and development.

And thus “best practices” are those which benefit both humans and biodiversity and give the greatest chance for long-term evolution and species survival—ours and theirs. Biodiversity offsetting, like any other conservation intervention, also requires thinking about how we prioritize survival of a species or unique ecosystem and how we weigh that against the essentially local nature of ecosystem services and various delights biodiversity brings people in their backyards. We should aim for resilience—ours, theirs—in changing ecological conditions, determined by tools from science. But when we offset and rob local populations of maximum biodiversity, we risk a vicious circle of lack of exposure to biodiversity and the danger that the further biodiversity gets from development (i.e. the more we offset), the less people appreciate biodiversity and the less we value it.

If implemented by those who care deeply about the health of human and nonhuman communities, if monitored continuously, and if situated astutely, biodiversity offsetting could and should be part of our revolutionary conservation toolkit in the Anthropocene. We do know that static conservation does not work in a non-static world of chaotic ecosystems becoming more chaotic with climate change and multiple ecological disruptions. If we name the normative goal—deep equity in symbiotic, sustainable human and nonhuman communities—we can explore multiple means of arriving there, and the multiple pilot project experiments in biodiversity offsetting now launching around the globe are one set of experiments worth monitoring.