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Legal and Scientific Integrity in Advancing a "Land Degradation Neutral World"

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Executive Summary

It is no secret that the fight against desertification isn't going well. In the two decades since the United Nations Convention to Combat Desertification came into force, desertification has worsened considerably. Many within the desertification community and beyond are calling for a fresh approach to the problem: the establishment of a global goal to achieve a "land-degradation neutral world" (LDNW). However, the call for land degradation neutrality has not been universally celebrated, particularly given the questionable track record of past "no net loss" policies.

In this paper, the authors explore ways to advance global land degradation neutrality into a concept — and, eventually, a program — that has legal and scientific integrity, such that it delivers tangible gains. The paper draws on lessons learned from two ongoing, land-centered policy attempts similarly framed around goals of "neutrality": the "no net loss" wetlands policy embraced by the United States' Wetlands Mitigation Banking (WMB) program, as representative of a broad class of "biodiversity offset" programs emerging around the world; and Reduced Emissions from Deforestation and Forest Degradation (REDD), an international program aimed at preserving, enhancing, and restoring forests as carbon "sinks."

The paper finds that three key issues emerge for further consideration on the path to a "land-degradation neutral world": (1) how to define and measure the problem — "land degradation" — in scientifically and legally meaningful ways; (2) how to successfully pursue "neutrality" as an organizing principle; and (3) how to balance the local and the global, and the public and the private, in the administration of such a program. The paper concludes that neither WMB nor REDD's experience allows for enthusiastic endorsement of "neutrality"-framed land management programs, but suggests that these efforts may have laid the groundwork or the next generation of such programs to proceed with greater knowledge of how to design with integrity, for success. It asserts that LDNW's best hopes for success will lie in early, honest conversations that achieve reasonable clarity in program aims, coupled with metrics that accurately capture these aims and a willingness to allow pluralistic experimentation during early stages of implementation.

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I. INTRODUCTION

It is no secret that the fight against desertification isn't going well. In the two decades since the United Nations Convention to Combat Desertification (UNCCD) came into force,[1] desertification—defined as degradation in the quality of "arid, semi-arid, and dry subhumid" land areas[2]—has worsened considerably. Recent United Nations estimates suggest that 52% of drylands currently under agricultural cultivation are moderately or severely degraded, and 12 million hectares of productive land become barren each year due to desertification and drought.[3] And while drylands are the focus of the UNCCD, the challenge isn't limited to them: somewhere around twenty percent of land worldwide is moderately or severely degraded and most experts predict this percentage will increase in coming decades.[4]

In the face of these numbers and trends, many within the desertification community and beyond are calling for a fresh approach to the problem: the establishment of a global goal to achieve a "land-degradation neutral world."[5] This goal gained considerable traction after it was included in the outcome document of the 2012 United Nations Conference on Sustainable Development, better known as the "Rio+20" Conference.[6] The UNCCD Secretariat has since proposed that the world adopt the more concrete goal of "Zero Net

[1] United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, June 17, 1994, 33 I.L.M. 1328 [hereinafter UNCCD].

[2] *Id.* art. 1(a). These arid, semi-arid, and dry subhumid areas, which are often collectively referred to as drylands, "cover approximately 40% of the world's land area, and are most prevalent in Africa and Asia. *See* United Nations Environment Management Group, *Global Drylands: A UN System-Wide Response*, at 15 (2011).

[3] *See* UNCCD SECRETARIAT POLICY BRIEF, ZERO NET LAND DEGRADATION: A SUSTAINABLE DEVELOPMENT GOAL FOR RIO +20, 13 (May 2012) (hereinafter "ZNLD BRIEF"); UNCCD SECRETARIAT, DESERTIFICATION, THE INVISIBLE FRONTLINE 4 (2014). It is worth noting, however, that definitional and measurement differences in desertification abound—a problem discussed in more detail *infra* section II.a, and that some of the acres rendered barren each year due to drought may naturally return to a productive state.

[4] *See* ZNLD Brief, at 3; *see also* Technical Support Team of the UNCCD, *Issues Brief: Desertification, Land Degradation and Drought,* at 8 (2012) (citing Bai ZG et al., *Global assessment of land degradation and improvement, Identification by remote sensing*, Report 2008/01, ISRIC—World Soil Information); MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELLBEING, DESERTIFICATION SYNTHESIS 1 (2005).

[5] *See, e.g.*, ZNLD BRIEF; U.N. General Assembly, Res. 66/288: *The Future We Want: Outcome Document of the U.N. Conference on Sustainable Development*, Para. 206, 11 Sept. 2012 : *see also* Pamela Chasek et al., *Operationalizing Zero Net Land Degradation: The next stage in international efforts to combat desertification?*, 30 J. ARID ENVTS. 1, 1 (2014) (noting the need for urgent action to reverse land degradation).

[6] U.N. General Assembly, Res. 66/288: *The Future We Want: Outcome Document of the U.N. Conference on Sustainable Development*, Para. 206, 11 Sept. 2012 [hereinafter "Rio+20 Outcome Document"]. The "Rio+20" nickname stems from the fact that the 2012 conference occurred 20 years after the first Earth Summit, also in Rio de Janeiro, in 1992. *See UN Conference on Environment and Development (1992)*, U.N. (May 23, 1997), http://www.un.org/geninfo/bp/enviro.html (last visited May 28, 2014).

Land Degradation by 2030."[7] As the UNCCD has explained, this "neutralizing" of land degradation would come about through "a global shift in land stewardship such that degradation of new areas is avoided, and unavoidable degradation is offset by restoring an equal amount of already degraded land in the same time and in the same ecosystem."[8]

Few would argue with the goals of slowing land degradation and restoring degraded land where possible. And there is obvious rhetorical appeal to the "land-degradation neutral world" slogan, as it lends specificity to a problem that has proven challenging to measure and manage.[9] The frame of "neutrality" may also be gaining appeal due to the proliferation of domestic "no net loss" targets in biodiversity offsetting programs, as well as the push for "carbon neutrality" within the realm of climate change policy.[10] However, the call for land degradation neutrality has not been universally celebrated. One major reason for this resistance is that it remains unclear how this goal might be translated from an aspirational objective that sounds good in the abstract, into concrete actions with verifiable outcomes. In particular, it is not clear whether the concept can be imbued with legal and scientific integrity so that it becomes more than just a "platitude."[11] Indeed, in examining previous pushes for land neutrality, some scholars have posited that "no net loss" policies may be no more than "an effective political diversion," erecting "an illusion that crumbles under scrutiny from ecological and political science."[12]

This article looks at ways to avoid these risks and to advance global land degradation neutrality into a concept—and, eventually, a program—that has legal and scientific integrity, such that it delivers tangible gains. We do so by turning backwards to move forward, drawing on lessons learned from two ongoing, land-centered policy attempts similarly framed around goals of neutrality: the "no net loss" wetlands policy embraced by the United States' Wetlands Mitigation Banking (WMB) program, as representative of a broad class of "biodiversity offset" programs emerging around the world; and Reduced Emissions from Deforestation and Forest Degradation (REDD+), an international program aimed at preserving, enhancing, and restoring forests as carbon "sinks." These examples

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[7] *See* UNCCD, A STRONGER UNCCD FOR A LAND-DEGRADATION NEUTRAL WORLD, Issue Brief, at 7 (2013) [hereinafter "A STRONGER UNCCD"].

[8] Press Release, UNCCD, *Global conference steps up action to move to a land-degradation neutral world*, 15 November 2012; *see also* A STRONGER UNCCD, *supra* note 7, at 9.

[9] As the UNCCD Secretariat has explained, the vision of land-degradation neutrality "is strikingly clear and easy to communicate." A STRONGER UNCCD, *supra* note 7, at 7.

[10] *See infra* Parts 3-4 for more details on these programs.

[11] See Introductory Remarks, UNCCD Expert Working Group on A Land Degradation Neutral World, July 2013, *available at*

http://www.unccd.int/en/programmes/RioConventions/RioPlus20/Pages/LDNW-Expert-Meeting.aspx.

[12] Susan Walker et al., *Why bartering biodiversity fails*, CONSERVATION LETTERS 2:149-157, 154 (2009).

provide potential frameworks for progress, but also act as harbingers of some of the challenges that land degradation neutrality may encounter in moving from theory to practical implementation. Three key issues emerge for further consideration on the path to a "land-degradation neutral world" (LDNW): (1) how to define and measure the problem—"land degradation"—in scientifically and legally meaningful ways; (2) how to successfully pursue "neutrality" as an organizing principle; and (3) how to balance the local and the global, and the public and the private, in the administration of such a program. Each of these issues exists at the nexus of science and law, and they are interrelated in ways that we parse in our discussion.

Little academic attention has yet been paid to the concept of land degradation neutrality. The lack of scholarship to date is unsurprising given the goal's recent emergence. There is, however, urgency to understanding how land-degradation neutrality might proceed and the degree to which it should be embraced, as it is currently under consideration for inclusion as one of the United Nation's post-2015 "Sustainable Development Goals" (SDGs).[13] These goals have historically played an important role in helping shape the international community's development agenda and funding priorities,[14] such that embracing land degradation neutrality as an SDG might have major practical consequences. Furthermore, there is also an active debate regarding how to move forward within the UNCCD, and how the Convention might fit (or not fit) with the broader goal of LDNW.[15] Fleshing out the concept of LDNW may also produce insights relevant to both of

[13] *See* Sustainable Development Goals, United Nations Sustainable Development Knowledge Platform, http://sustainabledevelopment.un.org/index.php?menu=1300 (last visited April 11, 2014). One main outcome of the Rio+20 Conference was that member States agreed to a process to develop a set of Sustainable Development Goals (SDGs), which will build upon the Millennium Development Goals and converge with the post 2015 development agenda. A UN Working Group is tasked with developing a draft set of goals for presentation to the UN General Assembly in 2014. *See Sustainable Development Goals*, United Nations, http://sustainabledevelopment.un.org/index.php?menu=1300; Progress report of the Open Working Group of the General Assembly on Sustainable Development Goals, ¶¶ 54-55 (observing that "[h]alting and reversing land degradation will be critical to meeting future food needs," while also questioning "whether the objective is sufficiently ambitious, given the current extent of land degradation globally and the potential benefits from land restoration not only for food security but also for mitigating climate change"); *see also* Chasek et al., *supra* note 5, at 1.

[14] Pamela S. Chasek, *Follow the Money: Navigating the International Aid Maze for Dryland Development*, J. OF INTL. ORG. STUDIES, Vol. 4, Issue 1: 77, 88 (2013) (noting that the UNCCD has tried to "bandwagon" with the Millennium Development Goals to increase funding); *see also* Elina Andersson et al., *The Political Ecology of Land Degradation*, 36 ANNUAL REV. ENVTL. RESOURCES 295, 308 (2011) ("Changes in the dominant development discourse can be traced to the endorsement of the Millennium Declaration by the UN member states in 2000, which shifted the focus from fostering economic growth per se to encouraging 'pro-poor growth' and increasingly incorporating environmental concerns in the development process." (internal citations omitted)).

[15] *See* UNCCD, Decision 8/COP.11, Follow-up to the outcomes of the United Nations Conference on Sustainable Development (Rio+20) (September 2014) (creating an intergovernmental working group to "(1) establish a science-based definition of land degradation neutrality in arid, semi-arid and dry sub-humid areas; (2) develop options relating to arid, semi-arid and dry sub-humid areas that Parties might consider should they

these discussions, as well as to the ongoing debate about how combating land degradation might play a role in future international climate mitigation regimes.[16]

We are cautiously optimistic about the promise that the LDNW framework holds for reorienting thinking and action around the problem of land degradation, provided that the implementation process is executed thoughtfully. Most importantly, the accountability created by an LDNW framework could help generate better outcomes and increased funding for actions to prevent and reverse land degradation. It also could be used as the impetus for altering national legal baselines to require restoration as a condition of private development within the country. More broadly, it may empower pluralistic experimentation on land degradation management and measurement models. Ultimately, however, this article raises more questions than answers—an appropriate move at this early stage of LDNW development. In particular, we argue that WMB and REDD+ flag important concerns about the relationship between program goals and the definitions and measurements derived therefrom; about the challenges of using "neutrality" as an organizing framework; and about the appropriate scale of the program and the appropriate actors to involve in order to attract funding while preserving the integrity of the program's original goals. For LDNW, the key takeaway is that early, thoughtful, inclusive design discussions will be of paramount importance in heading off some of these issues and creating a program that delivers real results to people struggling to cope in marginalized lands.

This article proceeds in five parts. Part II provides scientific background on land degradation and explores the genesis and current status of the LDNW goal. Part III describes the structure of, and key challenges faced by, the WMB and REDD+ programs. With this background, Part IV moves on to examine the lessons that LDNW can learn from these past attempts at designing a land management program framed in terms of "neutrality." Part V concludes the discussion.

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strive to achieve land degradation neutrality; and (3) advise the Convention on the implications for its current and future strategy, programmes and the resource requirements"); *see also* Chasek et al., *supra* note 5, at 1.

[16] While the current Kyoto Protocol to the United Nations Framework Convention on Climate Change restricts participation of land use mitigation credits to the forestry sector, and even severely circumscribes their use within this sector, *see infra* note 181, many commentators have suggested that land use mitigation activities might play a larger role in future regimes. *See, e.g.*, Gillian A. Cerbu, Brent M. Swallow & Dara Y. Thompson, *Locating REDD: A global survey and analysis of REDD readiness and demonstration activities*, 14 ENVTL. L. & POL'Y 168, 169 (2011) (noting that REDD+ is spurring movement towards including "net negative changes in carbon stocks across all lands and land uses" within future international compliance mechanisms); Ingrid J. Visseren-Hamakers et al., *Trade-offs, co-benefits and safeguards: current debates on the breadth of REDD+*, 4 CURRENT OPINION IN ENVTL. SUSTAINABILITY 1, 4 (2012) (noting complex tensions over whether to broaden REDD+ beyond forests to include agriculture).

II. GENESIS AND STATUS OF LDNW GOAL

a. Understanding Land Degradation

i. Defining the Term

In striving for land-degradation neutrality, it is first necessary to confront the complex question of what land degradation *is.* In its brief presented to Rio+20 calling for LDNW, the UNCCD Secretariat defined land degradation as the "reduction or loss of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as: (i) soil erosion caused by wind and/or water; (ii) deterioration of the physical, chemical and biological or economic properties of soil; and (iii) long-term loss of natural vegetation."[17] This tracks the definition of desertification used within the UNCCD.[18] The complexity of this definition illustrates the challenges involved in defining a concept as broad as "land degradation."[19]

At a biological level, land degradation manifests as "*persistent* reduction in biological productivity."[20] Depending on the land in question, reduced biological productivity might produce different consequences: in cropland, it might reduce soil fertility and yield per acre over time; in rangeland, it may reduce the land's carrying capacity for cattle; in forests, it could reduce the provision of ecosystem services like water filtration and retention.[21] Each

[17] ZNLD BRIEF, *supra* note 3, at 6.

[18] In fact, this definition is taken essentially verbatim from the UNCCD, which defines "desertification" in this same manner but limits it to "arid, semi-arid and dry sub-humid areas." UNCCD, *supra* note 1Art. 1(a),(g).

[19] It is worth noting that although the quoted definition is the most legally entrenched and is widely accepted, it is not used universally. *See* Michael M. Verstraete, Robert J. Scholes & Mark Stafford Smith, *Climate and Desertification: Looking at an Old Problem through New Lenses*, FRONTIERS IN ECOLOGY & THE ENVIRONMENT, Vol. 7, No. 8 (Oct. 2009), at 421 (explaining that the UNCCD's definition is widely accepted). Alternative definitions track this one, but often in simpler terms. *See, e.g.*, Technical Support Team of the UNCCD, *Issues Brief: Desertification, Land Degradation and Drought*, *supra* note 4, at 1 (defining land degradation as "any diminishment of biodiversity and ecosystem functioning that negatively impacts the provisioning of ecosystem services and ultimately impedes poverty eradication and sustainable development"); *see also* Andersson et al., *supra* note 14, at 308 ("Land degradation is long-term loss of ecosystem function and service, caused by disturbances from which the system cannot recover unaided.").

[20] ZNLD BRIEF, *supra* note 3, at 11 (emphasis in original).

[21] *See* Elizabeth Corell, THE NEGOTIATED DESERT: EXPERT KNOWLEDGE IN THE NEGOTIATIONS OF THE CONVENTION TO COMBAT DESERTIFICATION 46 (Linköping Univ. Dept. of Water & Envtl. Studies Dissertation, 1999). Of course, ecosystem service provision occurs across these land types. *See* J.B. Ruhl, *Agriculture and Ecosystem Services: Strategies for State and Local Governments*, 17 N.Y.U. Envtl. L.J. 424, 426 -427 (2008) (observing that "[i]n recent years . . . ecologists and economists focusing on agriculture have forged a more complete vision of the capacity of agricultural lands. They see farms as housing the natural capital capable of providing a stream of diverse good and services, including ecosystem services such as increased biodiversity, carbon sequestration, pollination,

of these biological consequences also carries economic consequences, though some are more readily commoditized than others (e.g., changes in yield per acre can easily be measured in dollar terms, whereas declining ecosystem services often cannot be).[22] The breadth of the UNCCD's definition of land degradation thus captures the many diverse manifestations of the problem, but it also creates potential tension. Are we worried about the ecological function or economic productivity of land? The likely answer is both. But how are we to strike a balance between the two? One can imagine that solutions and interventions might look quite different depending on how one treats the value of non-commoditized ecosystem services as compared to more readily measurable services like agricultural output.[23] We will return to this tension in Part 4 below, where we explore in more detail the challenges of defining and measuring land degradation neutrality.

The emphasis on the word "*persistent*" in the definition above highlights another challenge in defining land degradation. The Millennium Ecosystem Assessment suggests that degradation occurs when land does not return to its expected level of productivity after a stress is removed.[24] For example, if land suffers from drought for several years and consequently loses productivity, but recovers after rains return, the phenomenon is *not* one of land degradation.[25] But it is not always easy to determine when exactly a stress like drought has been "removed," so as to define the line between a drought-induced state of deterioration and the type of persistent loss in productivity that constitutes actual "land degradation."[26] One prominent example of this challenge was seen in the vigorous debate about whether the African Sahel, which suffered catastrophic dry conditions throughout the second half of the twentieth century, was simply enduring a prolonged drought, or whether localized land management practices were contributing to the persistence of overly dry

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groundwater recharge, and improvement of water quality."); Chasek et al., *supra* note 5, at 1 (explaining the persistent reduction of biodiversity as a defining feature of land degradation).

[22] *Cf. generally* J.B. Ruhl & James Salzman, *The Law and Policy Beginnings of Ecosystem Services*, 22 J. LAND USE & ENVTL. L. 157 (2007).

[23] *Cf.* Rattan Lal et al., *Zero Net Land Degradation: A New Sustainable Development Goal for Rio+20*, Report prepared for the Secretariat of the UNCCD, at 4 (May 2012) (describing land degradation as concerning both land productivity and provision of other ecosystem services, without probing the tension between the two).

[24] Millennium Ecosystem Assessment, *supra* note 4, at 4.

[25] *See* Alan Grainger et al., *Desertification and Climate Change: The Case for Greater Convergence*, MITIGATION AND ADAPTATION STRATEGIES FOR GLOBAL CHANGE 5: 361-377, at 363 (2000) (explaining that the identification of long-term land degradation trends is "made difficult by short-term fluctuations").

[26] *See id.*; *see also* Seely, M. et al., *Advances in desertification and climate change research: Are they accessible for application to enhance adaptive capacity?*, 64 GLOBAL & PLANETARY CHANGE 236, 237.

conditions.[27] Many blamed the conditions on unsustainable farming and grazing practices.[28] More recent research has shown that it was in fact the oceans that contributed to most of the Sahel's long-term climate variability—i.e. the decades of drought—and to the resultant desert-like conditions, as opposed to on-the-ground mismanagement.[29] Such experiences suggest that it is not necessarily accurate to classify even longer-term changes in land productivity as "degradation." Knowing where to draw this line is perplexing but important, as solutions that focus on responding to socio-economic causes of land degradation are only likely to be effective when such localized actions contribute meaningfully to an area's decline in biological productivity.

ii. Extent of the Problem

This challenge of identifying "persistent" degradation is compounded by the technological and practical challenge of measuring all the land of the planet to determine its relative health. Land degradation is typically measured by assessing land cover data captured via satellite, but land cover is criticized as a weak proxy for degradation.[30] Accuracy can be improved by pairing satellite imaging with local measurements and observations, but at greater expense of time and money.[31] And even if accuracy can be

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[27] *See* Alessandra Giannini, Michela Biasutti & Michel M. Verstraete, *A climate model-based review of drought in the Sahel: Desertification, the re-greening and climate change*, 64 GLOBAL & PLANETARY CHANGE 119, 119 (2008).

[28] *See* Andersson et al., *supra* note 14, at 299.

[29] *See* Giannini, Biasutti & Verstraete, *supra* note 27, at 120; S.M. Herrmann & C.F. Hutchinson, *The changing contexts of the desertification debate*, 63 J. OF ARID ENVIRONMENTS 538, 542 (2005). More specifically, recent modeling suggests that sea surface temperatures are a major contributor to rainfall levels in the Sahel, and that the area's "progression from the wetter-than-average 1950's and 1960's to the drier-than-average 1970's and 1980's . . . is related to a generalized pattern of warming of the global tropical oceans, especially of the Indian Ocean, combined with enhanced warming of the southern compared to the northern tropical Atlantic Ocean." *Id.* at 120-21. Still, the literature supports some contribution, if minor, of local land-use changes to forcing the drought, either directly through changes in the local surface energy and water fluxes, *see* S.M. Hagos et al, *Assessment of uncertainties in the response of the African monsoon precipitation to land use change simulated by a regional model*, CLIMATE DYNAMICS (2014), doi:10.1007/s00382-014-2092-x, or via changes in the uplift of dust, *see* P. Ginoux et al., *Global-scale attribution of anthropogenic and natural dust sources and their emission rates based on MODIS Deep Blue aerosol products*, 50(3) REVIEWS OF GEOPHYSICS (2012) RG3005, doi:10.1029/2012RG000388; M. Yoshioka et al., *Impact of Desert Dust Radiative Forcing on Sahel Precipitation: Relative Importance of Dust Compared to Sea Surface Temperature Variations, Vegetation Changes, and Greenhouse Gas Warming*, 20(8) J. OF CLIMATE 1445–67 (2007), doi:10.1175/JCLI4056.1.

[30] Ephraim Nkonya et al., *Global extent of land degradation and its human dimension*, in PRINCIPLES OF SUSTAINABLE SOIL MANAGEMENT IN AGROECOSYSTEMS 205 (eds. Rattan Lal & B.A. Stewart, Boca Raton, FL, US: CRC Press 2013).

[31] Z.G. Bai et al., *Proxy global assessment of land degradation*, 24 SOIL USE & MGMT. 223, 224 (2008) (noting that satellite-assessed normalized difference vegetation index (NDVI) is only a proxy that cannot "tell us anything

achieved in measurements at a certain time, as the above discussion suggests, the "greatest challenge in mapping land degradation" may be "determining what the 'non-degraded' vegetation production or reference condition for any parcel of land or pixel should be."[32] As a result of these challenges, considerable debate persists about just how great the problem of land degradation is.[33] There is general agreement that the problem is severe and will only get more pressing as population growth and changing consumption patterns continue to put pressure on existing lands and fuel expansion into marginal lands in order to meet future food, energy, water, and material needs.[34] But when it comes to measuring the current extent of the problem, estimates of the percentage of land degraded worldwide range from as little as 15 percent to as much as 65 percent.[35] The fact that estimates vary so widely is undoubtedly problematic for establishing an LDNW goal that relies on measuring the problem and tracking its improvement—a problem we return to in Part 4.

iii. Causes

Further complexity exists in considering the causes of land degradation. There has long been a debate over the relative strength of anthropogenic versus natural causes of degradation, but all seem to agree that land degradation is caused by a combination of climatic variability—including extreme weather events and slower climatic changes that cause the preponderance of droughts or floods[36]—and human actions.[37] Within this latter

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about the kind of degradation or improvement," which requires "subsequent assessment of the actual field situation").

[32] K.J. Wessels et al., *Mapping land degradation by comparison of vegetation production to spatially derived estimates of potential production*, 72 J. OF ARID ENVIRONMENTS 1940, 1941 (2008).

[33] Pandi Zdruli et al., *What We Know About the Saga of Land Degradation and How to Deal With It?*, at 5, in LAND DEGRADATION & DESERTIFICATION: ASSESSMENT, MITIGATION & REMEDIATION (P. Zdruli, ed., Springer Science 2010).

[34] ZNLD Brief, *supra* note 3, at 9 (noting that by 2030, the demand for food is predicted to rise 50%, for energy 45%, and for water 30%, requiring 175 million to 220 million hectares of additional cropland); MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 4, at 1 ("The pressure is increasing on dryland ecosystems for providing services such as food, forage, fuel, building materials, and water for humans and livestock, for irrigation, and for sanitation."). *But see* Andersson et al., *supra* note 14, at 299 (discussing several studies that challenge "the neo-Malthusian proposition of population density as a main driver of land degradation"); Bai et al., supra note 31, at 232 ("Comparison of rural population density with land degradation shows no simple pattern.").

[35] Technical Support Team of the UNCCD, *Issues Brief: Desertification, Land Degradation and Drought*, *supra* note 4, at 8. One assessment that further breaks down these estimates by ecosystem type finds that 20 percent of cultivated areas, 30 percent of natural forests, and 25 percent of grasslands are already degraded or in the process of being degraded. *See* Bai, ZG et al., *Global assessment of land degradation and improvement, Identification by remote sensing*, Report 2008/01, ISRIC—World Soil Information. Estimates focusing specifically on drylands generally place the percentage already degraded between 10 and 20 percent. Millennium Ecosystem Assessment, *supra* note 4, at 1.

[36] *See, e.g.*, Alexis Saba et al., *Getting Ahead of the Curve: Supporting Adaptation to Long-term Climate Change and Short-term Climate Variability Alike*, 1:2013 CARBON & CLIMATE L. REV. 3, 4 (explaining that climate variability

category, researchers place socio-economic factors, land use patterns, over-exploitation of land by pastoral and agricultural uses, removal of vegetation, and poor water management, among other contributing factors (including major forces like urbanization, industrialization, and globalization).[38] As researchers have gained a more sophisticated understanding of land degradation, they have developed more nuanced, layered explanations of causality: there are ecological components, direct land management components, and social, political, and economic factors that influence and inform land management decisions in important ways.[39] This complexity means that agriculture or pastoralism can "play either a positive or negative role, depending on how it is managed."[40] Causes are also highly localized and vary both within and among ecosystem types and among communities.[41] Moreover, often the difference between cause and prevention may only be a matter of degree; for example, controlled fires may help manage land degradation, whereas frequent and intensive fires may be a cause.[42]

Then there is the confounding factor of climate change. Land degradation certainly contributes to climate change, as degraded land has less ability to sequester carbon.[43] Land use changes and land degradation make up a significant portion—by some estimates as much as 20 percent—of worldwide greenhouse gas emissions, with forest clearing and forest degradation creating most of these emissions and drylands contributing about four percent.[44] The converse is also true: although the pathways and linkages are not perfectly

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typically references "internal climate variability" that occurs as a result of natural internal processes within climate, as opposed to climate change, which accounts for "anthropogenic climate change in the industrial era and in the future). The issue of how climate change factors into the causes of land degradation is discussed *infra*.

[37] *See* S. Herrmann & C. Hutchinson, *The Changing Contexts of the Desertification Debate*, 63 J. OF ARID ENVTS. 538, 539 (2005) (noting that there has been a long debate over the anthropogenic versus natural causes of desertification); Verstraete, Scholes & Smith, *supra* note 19, at 421 (noting disagreement over "root causes, characteristics, and consequences"); *see also* Zdruli et al., *supra* note 33, at 7; Lal et al., *supra* note 23, at 9; Elina Andersson et al., *The Political Ecology of Land Degradation*, 36 ANNUAL REV. ENVTL. RESOURCES 295, 296 (2011) ("The political-ecology approach emphasizes that land degradation results from the interaction between the physical environment and society.").

[38] ZNLD BRIEF, *supra* note 3, at 8; M. Seely et al., *supra* note 26, at 237.

[39] *See, e.g.,* Andersson et al, *supra* note 14, at 297-98, 301.

[40] Millennium Ecosystem Assessment, *supra* note 35, at 9; *see also* Andersson et al., *supra* note 14, at 302.

[41] Andersson et al., *supra* note 14, at 302.

[42] Millennium Ecosystem Assessment, *supra* note 4, at 10.

[43] Grainger et al., *supra* note 25, at 363; UNEP, UNCCD, and UNDD, CLIMATE CHANGE IN THE AFRICAN DRYLANDS: OPTIONS AND OPPORTUNITIES FOR ADAPTATION AND MITIGATION, at 38 (2009) [hereinafter "CLIMATE CHANGE IN AFRICAN DRYLANDS"].

[44] CLIMATE CHANGE IN AFRICAN DRYLANDS, *supra* note 43, at 38. *But see* Grainger et al., *supra* note 25 (noting that estimates of carbon emissions from drylands' degradation are inaccurate and need more work). Estimates for

understood, climate change is also a force that contributes to land degradation. Climate change is predicted to bring about (and in fact, is already causing) changing rainfall patterns and more extreme weather events,[45] contributing to drought, flooding, erosion, and runoff; as well as increased temperatures, which cause additional soil moisture loss.[46] Anthropogenic climate change is also responsible for some of the large-scale changes in atmospheric circulation that influence the amount of rain received in many regions, including sub-Saharan Africa[47] and southeast South America,[48] although it is difficult to confidently quantify climate change's role in this complex system.[49] Future climate effects vary widely by region and are not yet well understood.[50] But it is increasingly apparent that climate change and land degradation are likely to create a detrimental positive feedback

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land degradation's contribution to overall greenhouse gas emissions vary by methodology and source. Most recently, the IPCC estimated that agriculture, forestry, and other land-use contributed a combined 24% of 2010 emissions. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), FIFTH ASSESSMENT REPORT, MITIGATION, TECHNICAL SUMMARY, at 12 (2014).

[45] IPCC, MANAGING THE RISKS OF EXTREME EVENTS AND DISASTERS TO ADVANCE CLIMATE CHANGE ADAPTATION. A SPECIAL REPORT OF WORKING GROUPS I AND II (Cambridge Univ. Press 2012).

[46] CLIMATE CHANGE IN AFRICAN DRYLANDS, *supra* note 43, at 18; Lal et al., *supra* note 30 (ZNLD), at 13; Verstraete, Sholes & Smith, *supra* note 19, at 421; SAHARA AND SAHEL OBSERVATORY, CLIMATE CHANGE ADAPTATION AND & THE FIGHT AGAINST DESERTIFICATION 9-10 (2007) (explaining that climate change reduces rainfall and increases variability, thereby increasing the risks of desertification); David S. Battisti & Rosamond L. Naylor, *Historical Warnings of Future Flood Insecurity with Unprecedented Seasonal Heat*, 323 SCIENCE 240, 240-42 (Jan. 2009) (predicting that growing season temperatures by end of this century in tropics and subtropics will exceed the most extreme measurements from the 20th century, causing crops to suffer); Smith *et al*., Agriculture, Forestry and Other Land Use (AFOLU), Working Group III – Mitigation of Climate Change of the IPCC, 45 (2014) (discussing the increase of dieback in the Amazon region due to increased drought in the region).

[47] M. Biasutti & A. Giannini, *Robust Sahel drying in response to late 20th century forcings*, 33(11) GEOPHYSICAL RESEARCH LETTERS (2006), doi:10.1029/2006GL026067.

[48] P.L. Gonzalez et al., *Stratospheric ozone depletion: a key driver of recent precipitation trends in South Eastern South America*, 42(7-8) CLIMATE DYNAMICS 1775–1792 (2013), doi:10.1007/s00382-013-1777-x.

[49] Herrmann & Hutchinson, *supra* note 37, at 541-42; R. Zhang et al., *Have Aerosols Caused the Observed Atlantic Multidecadal Variability?*, JOURNAL OF THE ATMOSPHERIC SCIENCES, 130104154622004 (2013), doi:10.1175/JAS-D-12-0331.1; N.L. Bindoff et al., *Detection and Attribution of Climate Change: from Global to Regional*, in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge Univ. Press, eds. T.F. Stocker et al. 2013); W. Cramer et al., *Detection and Attribution of Observed Impacts*, in *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge Univ. Press 2014).

[50] For example, outlier climate models buck the majority view on whether rainfall will increase or decrease across the Sahel, *see* Giannini, Biasutti & Verstraete, *supra* note 27, at 125; Michela Biasutti, *Forced Sahel rainfall trends in the CMIP5 archive*, JOURNAL OF GEOPHYSICAL RESEARCH 118(4), 1613–1623 (2013), doi:10.1002/jgrd.50206, and some scientists even question the consensus model projections for the Horn of Africa. *See* W. Yang et al., *The East African Long Rains in Observations and Models*, J. CLIMATE (2014), 140403142037009, doi:10.1175/JCLI-D-13-00447.1..

loop, as climate change contributes to land degradation, which releases further carbon, which in turn contributes to further land degradation.[51]

iv. Prevention and Cure

While the extent of land degradation remains debated and its causes confounding and complex, there does seem to be more scientific convergence on methods to prevent land degradation and restore degraded land. In general, most researchers point to "sustainable land management" (SLM) as the predominant strategy for both preventing and reversing degradation.[52] SLM is a "knowledge-based combination of technologies, policies and practices that integrate land, water, biodiversity, and environmental concerns . . . to meet rising food and fibre demands while sustaining ecosystem services and livelihoods."[53] Practically speaking, this might include improving the supply of soil water, enhancing soil quality, decreasing water losses to runoff and evaporation, protecting vegetative cover, integrating pastoral and cropping uses of land, and water harvesting and recycling.[54] Local and traditional practices often have much to offer in determining appropriate natural resource management strategies.[55] These more ecological interventions, however, are often thought not to be enough to independently sustain improvements in land quality—many suggest that they must be accompanied by major socio-economic changes, including improving government effectiveness, rural services, and land tenure and rights; addressing gender disparities; and improving access to markets and credits.[56] Finally, payments for ecosystem services are often mentioned as a potential tool to encourage adoption of specific SLM practices.[57]

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[51] *See* Herrmann & Hutchinson, *supra* note 37, at 542 ("Not only can global warming contribute to desertification, but desertification can also contribute to global warming by playing a role in altering sources and sinks of greenhouse gases.").

[52] *See* Lal et al., *supra* note 23, at 17; Nyonka et al., *supra* note 19, at 221; Millennium Ecosystem Assessment, *supra* note 4, at 14-15.

[53] Lal et al, *supra* note 23, at 17. *see also* Chasek et al., *supra* note 5, at 1

[54] Lal et al, *supra* note 23, at 17; Millennium Ecosystem Assessment, *supra* note 4, at 14-15.

[55] Technical Support Team of the UNCCD, *supra* note 4, at 5.

[56] Lal et al., *supra* note 23, at 18; Nyonka et al., *supra* note 19, at 221; *see also* Andersson et al., *supra* note 14, at 303 ("[A] narrow focus on technical solutions runs the risk of leading to policy failure.").

[57] *See, e.g..,* Lal et al., *supra* note 23, at 19 (imagining that payments might be made by "individuals, communities, local government, national governments or even international institutions"); Andersson et al., *supra* note 14, at 306, 307 (noting the rise of the concept, but also scholars' concerns that payments for ecosystem services "may further increase the marginalization of indigenous people through an overly narrow focus on a few monetarized aspects of the ecosystem).

There appears to be greater consensus about the ability of these strategies to *prevent* land degradation than to *restore* already degraded land.[58] Overall, successful stories of restoration appear limited, causing the Millennium Ecosystem Assessment to conclude that restoration "may be difficult even with major policy and technological interventions."[59] And, especially if greenhouse gas emissions continue to balloon, climate change may become an increasingly disruptive force that thwarts many efforts to prevent and restore degraded land. As such, addressing greenhouse gas emissions will be an important component of achieving land degradation neutrality (in addition to LDNW serving as an important component of addressing greenhouse gas emissions). Similarly, coordinating LDNW and adaptation strategies will be essential to ensure that lands are protected or restored for conditions expected in the future, rather than observed in the past.

b. From the Desertification Convention to "LDNW"

The LDNW push has come largely from the desertification policy community.[60] Historically, desertification has been treated as a discrete problem and governed by a series of international conventions aimed specifically at halting and reversing its spread. As explained below, however, the recent call for expanding the global focus from

[58] *Compare* Lal et al., *supra* note 23, at 15 (asserting that we know how to manage land sustainably to prevent degradation, and soil can be rehabilitated and productivity restored) *with* Pamela Chasek et al., *Zero Net Land Degradation: Outcome of "Operationalizing the Zero Net Land Degradation Target" Session at the Sede Boqer Fourth Int'l Conf. on Drylands, Deserts, and Desertification*, at 4-5 (8 Jan. 2013) (endorsing sustainable land management as a tool for using land without degrading it, while noting that the world has less experience with restoration tools). On payments for ecosystem services more generally, *see*

e.g., KATOOMBA GROUP, PAYMENTS FOR ECOSYSTEM SERVICES, GETTING STARTED: A PRIMER (May 2008), *available at*

http://www.unep.org/pdf/PaymentsForEcosystemServices_en.pdf; Keith H. Hirokawa & Elizabeth J. Porter, *Aligning Regulation with the Informational Need: Ecosystem Services and the Next Generation of Environmental Law*, 46 AKRON L. REV. 963 (2013); J.B. RUHL, STEVEN E. KRAFT & CHRISTOPHER L. LANT, THE LAW AND POLICY OF ECOSYSTEM SERVICES (Island Press 2007); J.B. Ruhl & James Salzman, *The Law and Policy Beginnings of Ecosystem Services*, 22 J. LAND USE & ENVTL. L. 157 (2007).

[59] Millennium Ecosystem Assessment, *supra* note 4, at 16; *see also* R.K.A. Morris et al., *The creation of compensatory habitat—Can it secure sustainable development?*, J. FOR NATURE CONSERVATION 14:106 (2006) (asserting that habitat creation is much more easily accomplished in wetlands and inter-tidal environments than it is in terrestrial ecosystems); Martine Maron et al., *Faustian bargains? Restoration realities in the context of biodiversity offset policies*, 155 BIOLOGICAL CONSERVATION 141, 144 (2012) (finding that restoration projects do not have a high success rate, and that restoration is particularly challenging where "external degrading influences" exist, such as urbanization and agricultural intensification).

[60] *See* Chasek et al., *supra* note 58, at 3.

desertification to land degradation stems from an almost universal agreement that desertification governance has been a failure to date.[61]

The primary international agreement concerning desertification is the 1994 UNCCD. This convention replaced a looser, non-binding "Plan of Action to Combat Desertification" agreed upon at the 1977 United Nations Conference on Desertification.[62] The UNCCD was ratified by 195 countries.[63] Under the UNCCD, affected countries[64] are encouraged to submit "National Action Programmes" (NAPs), which report on the extent of the problem within the country and outline the national policy and institutional initiatives planned to combat desertification.[65] These NAPs can then be used to solicit funding from developed country sources, although the funding picture is complicated by the fact that the UNCCD does not have its own financing tool. Instead, the UNCCD includes a "Global Mechanism" related to funding, but its mandate extends only to increasing the effectiveness and efficiency of existing financial mechanisms.[66] For this reason, although developed countries pledged in the Convention to "actively support" and "provide substantial financial resources" to affected developing countries,[67] financing of the actions proposed in NAPs "depends mainly on the good intentions of bilateral cooperation projects."[68] The little

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[61] Alan Grainger, *The Role of Science in Implementing International Environmental Agreements: The Case of Desertification*, 20 LAND DEGRAD. & DEVELOP. 410, 411 (2009); *see also* UNCCD Decision 3/COP.8: The 10-year strategic plan and framework to enhance the implementation of the Convention, at 8 (2007) (hereinafter "Strategic Plan"); Jeff Tollefson & Natasha Gilbert, *Earth Summit: Rio report card*, NATURE, VOL. 486, 6 JUNE 2012, at 23 (giving the UNCCD an overall grade of an "F").

[62] *See Report of the United Nations Conference on Desertification*, U.N. Doc. A/CONF.74/36 (1977); Corell, *supra* note 21, at 19.

[63] The UNCCD now has 194 ratifications, as Canada withdrew as of March 28, 2014 (largely for domestic, symbolic political reasons). *See Update on Ratification of the UNCCD,* Secretariat to the UNCCD,

http://www.unccd.int/Lists/SiteDocumentLibrary/convention/ratification-eng.pdf (last visited April 15, 2014); Mike Blanchfield, *Canada first country to pull out of UN drought convention*, TORONTO GLOBE & MAIL March 27, 2013 (quoting a spokesman of Canada's International Cooperation Minister explaining the withdrawal on the grounds that "membership in this convention was costly for Canadians and showed few results, if any for the environment," while noting that Canada provided $283,000 to support the convention from 2010 to 2012).

[64] "'Affected countries,' means countries whose lands include, in whole or in part, 'affected areas,'", which are separately defined as "arid, semi-arid and/or dry sub-humid areas affected or threatened by desertification.'" UNCCD, *supra* note 1, Art. 1, (h)-(i).

[65] *See id.* Art. 9.1, 10; Grainger, *supra* note 61, at 419-20. Developing countries are particularly encouraged to submit NAPs, although other "affected countries" can submit a NAP if they so desire. *See* Art. 9.1; *see also* Chasek et al., *supra* note 5, at 1 (discussing the role of the UNCCD and NAPs).

[66] *See* UNCCD, *supra* note 1, Art. 21.

[67] *Id.* Art. 6(a)-(b).

[68] YOUBA SOKONA, CLIMATE CHANGE ADAPTATION & THE FIGHT AGAINST DESERTIFICATION, REPORT OF THE SAHARA AND SAHEL OBSERVATORY, at 20-21 (2007); Grainger, *supra* note 61, at 419 (observing that NAPs reflect limited institutional capacity and receive considerably less funding that country-level biodiversity or climate change reports).

multilateral international financing available is channeled through the Global Environmental Facility's land degradation project.[69] Between 2003 and 2012, the GEF approved 96 projects under its "land degradation focal point," providing $346 million in funding supplemented by $1.85 billion in co-financing (including bilateral aid).[70] This spending amounted to about four percent of GEF funding between the years 1991 and 2011—certainly a disappointing result for those who believe that healthy land is key to advancing a large variety of development and environmental goals.[71]

The UNCCD is a "sister convention" to the United Nations Framework Convention on Climate Change (UNFCCC) and United Nations Convention on Biodiversity (UNCBD), as they all emerged out of the 1992 Rio Earth Summit.[72] However, the UNCCD may more accurately be analogized to a forgotten stepsister, given the comparatively paltry amounts of international attention and funding it has received. During the same period that land degradation received four percent of GEF funds, climate change received 31% and biodiversity 37%.[73] Several challenges are frequently identified as major contributors to the UNCCD's lack of success: lack of clarity around the concept and measurement of "desertification,"[74] lack of high quality scientific input and an ineffective science-policy

[69] *See* Chasek, *supra* note 14, at 86-87. During negotiations, developing countries pushed for a separate Desertification Fund within the Convention, but were unsuccessful. The financing issue was "an almost insurmountable obstacle in the final stages of the negotiations in 1994." Bo Kjellén, *The Role of the Desertification Convention in the Early 21st Century*, ENVTL. POL'Y & L. 40/2: 146, 152 (2010). The GEF now serves as the financial mechanism for the UNCCD, but has not proved the "panacea" to the financing problem that many developing countries hoped it would be. *Chasek,* supra note 14, at 84.

[70] Chasek, *supra* note 14, at 84-85.

[71] *Id.* Chasek notes, however, that some additional funding reached land degradation projects under "multi-focal" grants, although this funding is harder to trace.

[72] *See* Andersson et al., *supra* note 14, at 305 (noting that the three conventions are therefore often collectively referred to as the "Rio Conventions.").

[73] *See, e.g.* Chasek, *supra* note 14, at 85 (noting that climate change received 31% of GEF funds from 1991-2011, biodiversity 37%, and land 4%).

[74] There has been no evolution in the official definition used by the UNCCD since adoption of the Convention—recent documents still define desertification as "land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities." *See, e.g.*, ZNLD BRIEF, *supra* note 3, at 8. This definition was, apparently, the product of a hard-fought compromise during early negotiations. *See* Bo Kjellén, *The Role of the Desertification Convention in the Early 21st Century*, ENVTL. POL'Y & L. 40/2: 146 (2010) (noting that one of Agenda 21's achievements was to agree on the "very difficult question" of how to define desertification). But in practice, desertification means different things to different countries and different scientific communities. Steffen Bauer & Lindsay C. Stringer, *The Role of Science in the Global Governance of Desertification*, J. OF ENVT. & DEVELOPMENT 18: 248, 257 (July 2009); Grainger, *supra* note 61, at 419.

interface,[75] and lack of funding.[76] The end result is that desertification has continued to worsen despite the nominally "urgent concern of the international community."[77]

The widespread frustration around the lack of progress on desertification is one of the driving forces behind the new turn away from a narrow focus on desertification, to a broader focus on land degradation.[78] Desertification has long been defined as "a subset of land degradation under dry climates," [79] making the leap a direct and logical one. And even under the reframing, as UNCCD Secretariat publications are careful to point out, desertification remains a key concern as a result of its scale: drylands are home to 38% of the world's population—over 2 billion people—and cover 41 percent of the earth's land surface.[80]

Nevertheless, the refocusing represents a marked change of strategy. For a long time, the UNCCD was held up by developing countries as "our convention"—a hard-fought international agreement focused specifically on a predominantly developing world problem (and one that is particularly pernicious in Africa)—in contrast to the developed-country concerns of climate change and biodiversity.[81] Thus, a definitional broadening, to the more global issue of "land degradation," is not supported by all within the desertification policy community.[82] Those in favor of such universalizing defend their position on the grounds that it will attract more international attention, more funding, and more concrete action.[83]

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[75] Grainger, *supra* note 61; Luc Gnacadja and Lindsay S. Stringer, *Towards a Global Authority on Desertification and Land Degradation*, ENVTL. POL'Y & L. 42/2: 87 (2012).

[76] *See* Chasek et al., *supra* note 5, at 1. *See also* Strategic Plan, *supra* note 61 (acknowledging some of the CCD's chief flaws: "insufficient financing compared to its two Rio sister conventions, a weak scientific basis, insufficient advocacy and awareness among various constituencies, institutional weaknesses and difficulties in reaching consensus among Parties.").

[77] *See* UNCCD, *supra* note 1, Preamble. Of course, the UNFCCC and UNCBD are not generally thought of as success stories, either, but they have attracted relatively greater financing and attention.

[78] *See* Chasek et al., *supra* note 58, at 3 (noting that it is relatively recently that desertification became framed as a "subset" of land degradation).

[79] ZNLD BRIEF, *supra* note 3, at 8.

[80] *See* United Nations Envt. Program, *Dryland Systems,* in ECOSYSTEMS AND HUMAN WELL-BEING: CURRENT STATE AND TRENDS, at 625 (2005), *available at* http://www.unep.org/maweb/documents/document.291.aspx.pdf; *see also* Lal et al., *supra* note 23, at 9.

[81] Some critics have suggested that part of the UNCCD's implementation trouble stems from the fact that "developed countries have been reluctant to acknowledge desertification as a global commons problem," and that this reluctance drives their refusal to commit to substantive legal and financial obligations. Bauer & Stringer, *supra* note 74, at 251.

[82] *See* Earth Negotiations Bulletin, UNCCD COP 11 Highlights, Friday, 20 September 2013, Vol. 4, No. 248; UNCCD COP 11 Highlights, Thursday, 26 September 2013, Vol. 4, No. 252, at 2.

[83] *See, e.g.*, A STRONGER UNCCD, *supra* note 7, at 12, 14 (arguing that land is the "vital natural capital resource" that unites many of the world's goals around food, energy, and water, and that a target-setting approach will catalyze funding).

In part, this perception stems from an understanding that climate change is likely to be a dominant funding priority in the coming decades.[84] LDNW, as opposed to a focus on desertification, encompasses lands that are more carbon-rich than deserts.[85] This breadth of land types potentially makes a more compelling case for why the world should devote more of its limited resources to land degradation prevention.[86] But at the same time, many experts caution against fully integrating desertification into the climate change regime, suggesting that it would be risky to reduce land degradation to *solely* a matter of carbon sequestration, given that land degradation is more widely tied to the livelihoods of billions of people and a range of environmental concerns.[87]

Whether or not broadening the world's focus from desertification to land degradation will revitalize attention and funding in the manner hoped for will depend largely on how the framing and implementation of this broader agenda proceeds. To be successful, we argue, careful work needs to be done to craft LDNW into an organizing framework with scientific and legal accountability. The following subsection explores the work done on LDNW to date, after which we will examine what LDNW might learn from analogous land governance regimes.

c. The LDNW Framework, to Date

Policy-makers and advocates have already taken a few steps towards creating an LDNW framework. Parties to the UNCCD devoted particular attention to new avenues for progress on desertification in advance of Rio+20 in 2012. Many saw Rio+20 "as an opportunity to catalyze recognition of desertification, land degradation and drought issues on the international sustainable development agenda, raising hopes that the UNCCD could

[84] *See, e.g.*, Grainger, *supra* note 61, at 419.

[85] Desertification is estimated to make up about four percent of annual global carbon emissions, due to drylands' expansive global coverage, *see* MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 4, at 18, although their carbon sequestration potential is less than forests. *See* Food & Agric. Org. of the UN, *Soil Carbon Sequestration for Improved Land Management*, at 5 (2001) ("[D]rylands represent about 40 percent of the world's land, [such that] even if the carbon content . . . of drylands [is] low, they can make an important contribution to global carbon sequestration . . . .").

[86] *See, e.g.*, Grainger, *supra* note 61, at 425 (suggesting that perhaps proponents of halting desertification could make more progress outside of the desertification regime, treating the issue instead as a special case of degradation of terrestrial carbon stocks).

[87] *See discussion accompanying* notes 254-257, *infra* (I cannot cross-reference these in track changes, though, so the note numbers are likely to change).

help the global community recognize that land policy must be incorporated when addressing multiple environmental crises."[88]

In accord with this strategy, the UNCCD Secretariat approached Rio +20 with the request that delegates adopt a goal of Zero Net Land Degradation ("ZNLD") by 2030.[89] A policy brief prepared by the UNCCD Secretariat in May 2012 in advance of Rio +20 outlines its vision in this regard.[90] Noting that population dynamics and increasing demand for energy, food, and water are expected to dramatically increase pressures on the land, the brief makes the case that land preservation is one of the most critical steps we can take to alleviate poverty, prevent conflict, and address climate change.[91] It paints LDNW as an achievable, effective organizing framework, which would aspire to either avoid degradation or offset degradation by land restoration.[92] And because the world will also require increasing amounts of food in the future, LDNW further requires "intensifying the yields from currently used lands without degrading these lands, and/or without expanding the agriculture frontier to lands that are not subject to agriculture and pastoralism."[93]

Although the Rio+20 conference received considerable criticism from the environmental and sustainable development communities for its lack of meaningful outcomes,[94] notable progress was made on LDNW. The Rio+20 "Outcome Document" includes an acknowledgement of "the need for urgent action to reverse land degradation" and a pledge to "strive to achieve a land-degradation neutral world in the context of sustainable development."[95] Of course, the "Outcome Document" is far from a treaty with

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[88] Earth Negotiations Bulletin, *Summary of the Tenth Meeting of the Conference of the Parties to the U.N. Convention to Combat Desertification: 10-21 Oct. 2011*, at 17, *available at* http://www.iisd.ca/download/pdf/enb04241e.pdf.

[89] The UNCCD Secretariat recommended several complementary steps as well in its brief to Rio+20, including agreement on a new legal instrument (perhaps a "ZNLD Protocol" under the CCD); establishment of an "Intergovernmental Panel/Platform on Land and Soil" as a scientific and technical authority; and a comprehensive assessment of the "Economics of Land Degradation." *See* ZNLD Brief, *supra* note 3.

[90] *Id.*

[91] *Id.* at 9.

[92] *Id.* at 12; *see also* Lal et al., *supra* note 23, at 14.

[93] Lal et al., *supra* note 23, at 15.

[94] *See, e.g.* James Van Alstine et al, *The UN Conference on Sustainable Development (Rio+20): A sign of the times or 'ecology as spectacle'?*, 22 ENVTL. POLITICS 333, 334 (2013) (noting that the outcome document is weak on commitments or agreed actions); Ann Powers, *The Rio+20 Process: Forward Movement for the Environment?*, 1 TRANSNAT'L ENVTL. L. 403, 404-05 (2012) (explaining that RIO+20 is not generally regarded as successful, as it lacked the broad goals and vision of the earlier Rio conference).

[95] United Nations Rio +20 Conference on Sustainable Development, Outcome of the Conference, A/CONF.216/L.1, at 39 (June 19, 2012). Summaries of the negotiations suggest, however, that delegates in splinter group discussions were not successful in having the "zero net rate" terminology included, and that there was also disagreement over referencing action by the international community. Earth Negotiations

binding effect; rather, one scholar describes it as a "statement of hopes, aspirations, admonitions, and promises."[96] Nevertheless, it remains "the kind of soft law document that can provide a basis for legal arguments on many fronts,"[97] making the Outcome Document's embrace of LDNW an important starting point for building a viable LDNW framework and program.

There is now a sense in the desertification community that it is time to capitalize upon the momentum generated by the Rio+20 goal of LDNW, particularly in advance of the elaboration of the UN's 2015 Sustainable Development Goals.[98] Since adoption of the LDNW goal at Rio+20, a few expert events have focused on the topic. During "Global Soil Week," which took place in Berlin in November 2012, one day was devoted to exploring the concept of LDNW.[99] In June 2013, the UNCCD convened a meeting of experts in Korea to discuss moving forward on LDNW.[100] Experts at these meetings have called for several next steps. The most common call is for movement from the general goal of LDNW to more specific targets, perhaps including the "Zero Net Land Degradation by 2030" target espoused by the UNCCD Secretariat. Some also suggest pilot projects in order to determine how to apply the LDNW goal in particular areas and how to measure and monitor success.[101] Finally, there is strong—but not universal—support for including LDNW as one of the 2015 U.N. Sustainable Development Goals. [102]

However, the most recent UNCCD Conference of the Parties (COP11), which took place in Namibia in September 2013, highlighted the conceptual work that remains to be done on LDNW. Most delegates agreed that clarification was needed to understand the role of the UNCCD in promoting LDNW and in moving from broad theory to implementation. The United States went so far as to propose deleting any reference in

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Bulletin, *Summary of the United Nations Conference on Sustainable Development: 13-22 June 2012*, at 15, *available at* http://www.iisd.ca/download/pdf/enb2751e.pdf.

[96] Powers, *supra* note 94, at 408.

[97] *Id.* at 410.

[98] *See supra* note 13 for an explanation of Sustainable Development Goals.

[99] *See* Chasek et al., *supra* note 58.

[100] *See* Chair's Summary, Consultative Meeting on a Sustainable Development Goal (SDG) on LDNW and on the associated target for ZNLD, 27-27 June 2013-Seoul, Korea.

[101] *See* Presentation of Dr. Pamela Chasek, UNCCD LDNW Meeting June 2013 (presentations from this expert working group are available on the UNCCD's website at http://www.unccd.int/en/programmes/RioConventions/RioPlus20/Pages/LDNW-Expert-Meeting.aspx).

[102] The UNCCD Secretariat believes that an LDNW SDG "would provide a coherent framework for action to safeguard healthy and productive land and soil." A STRONGER UNCCD, *supra* note 7, at 6. However, some experts questioned whether a "stand-alone target on land [is] germane," suggesting that "land and soil issues could be adequately addressed within the likely SDGs on poverty, water, energy and food security." UNCCD, Outcomes of the consultative meeting of experts on a land degradation neutral world, 22 July 2013, at 5.

UNCCD outcome documents to the concepts of LDNW and ZNLD due to "lack of clarity and scientific agreement."[103] Others proposed proceeding with caution in expanding the UNCCD's mandate beyond drylands.[104] One delegate called the UNCDD decision on how to follow up the Rio+20 LDNW outcome the "elephant in the room" at the COP.[105] Ultimately, the COP decided to "launch an intersessional process to examine how to define the Convention's goals on combating [desertification and drylands degradation] in relation to the Rio+20 outcome calling for effort to achieve a Land Degradation Neutral World (LDNW)."[106] This confusion and disagreement over the concept of LDNW at COP11 was in accordance with the conclusion reached by experts at the July 2013 working group that "more clarity was needed . . . in defining LDNW and the role of the UNCCD."[107] The remainder of this article suggests issues and lessons to consider in clarifying the vision for LDNW.

III. PAST EXAMPLES: WETLANDS MITIGATION BANKING AND REDD+

LDNW is not an entirely novel experiment proceeding within a void. Instead, it represents the latest—and perhaps most ambitious—example of conceptualizing environmental goals in terms of "neutrality." The following section explores two existing land-focused programs that have utilized "neutrality" frameworks to orient their design and administration. Before proceeding to an overview of the two programs we have selected for comparison—the United States' Wetlands Mitigation Banking (WMB) and the international scheme for Reduced Emissions from Deforestation and Forest Degradation (REDD+)—it bears explaining why we chose these particular examples. WMB—a U.S. program that aims to achieve "no net loss" in wetlands—presents a mature example of a biodiversity offsetting program. This program bears close resemblance to LDNW in its focus on measuring and netting land functionality. In contrast, REDD+ attempts to tackle what might be termed a "subset" of land degradation, focusing specifically on neutralizing global carbon emissions through improving forest carbon sinks. REDD+ stands as a particularly valuable example of the implementation challenges that a measurement-based, neutrality-framed, land-oriented program faces in the developing world.

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[103] Earth Negotiations Bulletin, UNCCD COP 11 Highlights, Friday, 20 September 2013, Vol. 4, No. 248.

[104] *See id.* (Brazil, China).

[105] Earth Negotiations Bulletin, UNCCD COP 11 Highlights, Thursday, 26 September 2013, Vol. 4, No. 252, at 2.

[106] Earth Negotiations Bulletin, UNCCD COP 11 Highlights, Monday, 30 September 2013, Vol. 4, No. 254, at 2; ICCD/COP(11)/L.19.

[107] *See* Chair's Summary, Consultative Meeting on a Sustainable Development Goal (SDG) on LDNW and on the associated target for ZNLD, 27-27 June 2013-Seoul, Korea, at 3.

Much has been written about each of these examples. Below, we focus on a broad overview of conceptual and practical challenges raised by these programs' experiences designing and implementing a goal of "neutrality."

a. Wetlands Mitigation Banking: The First Biodiversity Offset Experiment

Wetlands Mitigation Banking (WMB) represents an early experiment with a class of emerging "biodiversity offset" programs. These programs, which are "proliferating" across the world,[108] aim to strike a balance between development and biodiversity protection by requiring that losses in ecosystems caused by development be offset by a concomitant restoration of habitat elsewhere.[109] Such programs are typically tied to government "no net loss" policies, which seek to stabilize rates of habitat loss.[110] The United States, Australia, Brazil, Colombia, South Africa, the Netherlands, Sweden, and the United Kingdom, among others, now operate their own versions of biodiversity offsetting.[111]

The United States' WMB Program is the most mature of these offset frameworks and the first formalized program to embody the concept of biodiversity offsetting, thus lending itself most easily to retrospective analysis.[112] As it happens, the program also epitomizes many of the challenges that programs around the world have faced.[113]

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[108] Bruce A. McKenney & Joseph M. Kiesecker, *Policy Development for Biodiversity Offsets: A Review of Offset Frameworks*, ENVIRONMENTAL MANAGEMENT 45:165-176 (2010), at 165; Walker et al., *supra* note 12, at 149.

[109] *See, e.g.*, Maron et al., *supra* note 59, at 141 (defining biodiversity offsetting as "compensating for the losses of biodiversity components at an impact site by generating (or attempting to generate) ecologically equivalent gains, or 'credits,' elsewhere (i.e. an offset site)").

[110] *Id.* at 142 (noting that these programs are increasingly tied to "no net loss" policies).

[111] Bruce A. McKenney & Joseph M. Kiesecker, *Policy Development for Biodiversity Offsets: A Review of Offset Frameworks*, ENVIRONMENTAL MANAGEMENT 45:165-176, at 165 (2010). Brazil's program follows a somewhat different framework than most others, in that it utilizes payments from developers to the government instead of requiring private efforts at offsets. This payment model represents an interesting alternative that might prove promising, but it is still in its early stages of development. *Id.* at 166. A 2012 review found a total of 39 active biodiversity offsetting programs and 25 more under development. *See* Maron et al., *supra* note 59, at 141.

[112] McKenney & Kiesecker, *supra* note 111, at 166; Shelley Burgin, *BioBanking: an environmental scientist's view of the role of biodiversity banking offsets in conservation*, BIODIVERSITY CONSERVATION 17:807-816, 807 (2008).

[113] *See, e.g.*, McKenney & Kiesecker, *supra* note 111, at 168-74 (identifying common issues in six biodiversity offsetting programs, and suggesting that there is considerable consensus among the programs); Philip Gibbons & David B. Lindenmayer, *Offsets for land clearing: No net loss or the tail wagging the dog?*, ECOLOGICAL MGMT. & RESTORATION VOL. 8, NO. 1 (April 2007) (noting that poor compliance track records in offsetting programs extend beyond Wetlands Mitigation Banking).

WMB was created not through specific legislation or regulation, but rather sprang up more organically as way to fulfill certain requirements in the U.S. Clean Water Act.[114] That Act discourages development of wetlands by prohibiting such development in the absence of a permit.[115] To receive a permit, an applicant must show that (1) no reasonable alternatives exist to development of wetlands; (2) the proposed development design minimizes the harm done to wetlands; and (3) mitigation efforts will be undertaken to restore other wetlands to compensate for unavoidable wetlands losses.[116] As originally implemented, these parameters were interpreted to require "on-site" and "in-kind" compensatory mitigation, meaning that any offsetting required by a certain project had to occur on the same property, with the same kind of wetlands.[117] The Army Corps of Engineers ("the Corps"), which administers the Clean Water Act's permitting process,[118] also interpreted the relevant regulations to create a mitigation "hierarchy" that first favored restoration,[119] then enhancement,[120] and preservation only as a last resort option.[121]

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[114] WMB was first utilized as an experiment on the local level. Early successes, theoretical advantages, and perhaps also the desire to "defuse the growing political pressure for substantial change" to the system resulted in in the Corps and Environmental Protection Agency embracing the strategy in 1995 *Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks*, 60 FED. REG. 58,605 (Nov. 18, 1995). *See* James Salzman & J.B. Ruhl, *"No Net Loss": Instrument Choice in Wetlands Protection*, in MOVING TO MARKETS IN ENVIRONMENTAL REGULATION 2 (Jody Freedman & Charles D. Kolstad, eds., Oxford 2006). After many more years of experience, WMB was officially codified as a preferred mitigation strategy in 2008 regulations. *See* 33 C.F.R. § 332.1 et seq. (2013).

[115] *See* 33 U.S.C. §§ 1311, 1344 (2012) (making discharge of pollutants into water illegal except under specific sections, including receipt of a dredge and fill permit); *see also* Salzman & Ruhl, *supra* note 114, at 3; Philip Womble & Martin Doyle, *The Geography of Trading Ecosystem Services: A Case Study of Wetland and Stream Compensatory Mitigation Markets*, 36 HARV. ENVTL. L. REV. 230, 245-46 (2012). However, the Clean Water Act's requirements only apply to wetlands under federal jurisdiction, and there is considerable controversy over just how far this jurisdiction extends. *See, e.g.*, Rapanos v. United States, 547 U.S. 715 (2006); Solid Waste Agency of Northern Cook Cty. v. Army Corps of Engineers, 531 U.S. 159 (2001).

[116] *See* 33 C.F.R. § 332.1(c). These are often referred to as the Act's "sequencing requirements," as they require, in order, first avoidance, then minimization of impacts, and only then compensation for any unavoidable losses. *See* Womble & Doyle, *supra* note 115, at 246. It is worth noting that the Clean Water Act as originally passed did not contemplate mitigation as an acceptable option—this was a later-adopted political compromise, in the interest of not stymying development entirely. *See* Jessica Owley, *The Increasing Privatization of Environmental Permitting*, 46 AKRON L. REV. 1091, 1096-97 (2013).

[117] Salzman & Ruhl, *supra* note 114, at 4.

[118] The Corps shares its permitting authority with the Environmental Protection Agency, which establishes standards for the Corps to apply when ruling on permits. *See* 33 U.S.C. § 1344(b).

[119] "Restoration means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource." 33 C.F.R. § 332.2.

[120] "Enhancement means the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s)." 33 C.F.R. § 332.2.

[121] *See* 33 C.F.R. § 332.3(a)(2) (explaining that "restoration should generally be the first option considered because the likelihood of success is greater and the impacts to potentially ecologically important uplands are

Although the on-site program proved popular as a means of freeing up some wetlands for development,[122] the project-by-project approach "fail[ed] miserably, in terms of environmental protection."[123] The piecemeal approach made creating standardized and effective offset criteria and establishing long-term monitoring very difficult, which in turn led to many poorly conceived and executed projects.[124] For these reasons, the Corps began experimenting in the 1990s with "banking" as an alternative to on-site mitigation.[125] Under a banking system, project developers could purchase the wetlands offsets needed from dedicated wetlands bankers, rather than develop projects on-site themselves.[126] Proponents reasoned that WMB would resolve many of the problems plaguing early efforts at offsets, because it would consolidate the locations and oversight of offset projects, create implementation expertise, allow restoration to occur *ahead* of wetlands development, and ease monitoring costs.[127]

Although it has resulted in robust trading,[128] in practice WMB has failed to resolve compensatory mitigation's challenges. Presidential administrations since George H.W. Bush have pledged to enforce the Clean Water Act in a way that ensures "no net loss" of wetlands,[129] but the United States has continually fallen woefully short of this goal.[130] The

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reduced compared to establishment, and the potential gains in terms of aquatic resource functions are greater, compared to enhancement and preservation"). The preference for restoration is often explained as an effort to achieve maximum "additionality" in offsetting (a concept discussed *infra* with respect to carbon emissions). The preservation option presents an additionality conundrum, as it allows a developer to offset wetlands development by simply preserving wetlands that, should they be separately developed, would presumably require another developer to offset still *additional* wetlands. *See* Maron et al., *supra* note 59, at 146; McKenney & Kiesecker, *supra* note 108, at 170-71. Preservation is deemed acceptable only when it is for particularly important resources that are under threat of destruction, and the preservation can be guaranteed to be permanent. *Id.* at 171; *see also* 33 C.F.R. § 332.3(h).

[122] Salzman & Ruhl, *supra* note 114, at 5.

[123] *Id.* at 5. *See also* Morgan M. Robertson, *The neoliberalization of ecosystem services: wetland mitigation banking and problems in environmental governance*, 35 GEOFORUM 361, 363 (2004); Royal C. Gardner, *Money for Nothing? The Rise of Wetland Fee Mitigation*, 19 VA. ENVTL. L. J. 1, 2(2000) (explaining that the failure of on-site mitigation paved the way for banking and in-lieu fee arrangements).

[124] Salzman & Ruhl, *supra* note 114, at 5.

[125] *Id.*

[126] *Id.* at 2.

[127] *See* Womble & Doyle, *supra* note 115; James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 STAN. L. REV. 607, 653-54 (2000).

[128] *See* Salzman & Ruhl, *supra* note 114, at 2.

[129] *See* Womble & Doyle, *supra* note 115, at 247 (explaining that the 1987 National Wetlands Policy Forum first made the recommendation that the guiding policy of compensatory mitigation should be to prevent "net losses" of aquatic resource functions, and that this recommendation was subsequently endorsed and affirmed by President George H.W. Bush, President Clinton, and President G.W. Bush).

[130] Salzman & Ruhl, *supra* note 113; Salzman & Ruhl, *supra* note 127, at 652-53.

biggest challenge that WMB has encountered is that it is unable to solve the puzzle of "commodifying" something as complex as wetlands ecology into a tradable unit.[131] Most WMB programs use acres as a proxy for measuring the value of wetlands, requiring a developer to offset acres of wetlands lost by an equal or greater amount of acres gained.[132] But one acre of wetlands may provide a very different level of actual ecosystem and habitat services than another acre,[133] and there is a natural tendency for banks to acquire and restore the cheapest acres possible, without regard to habitat quality.[134] Furthermore, although banking has consolidated the locations of restored wetlands, it has not added the incentives or monitoring capabilities necessary to ensure robust, long-term implementation.[135] And finally, while banking unlocks efficiencies by allowing mitigation to

[131] *Cf.* Salzman & Ruhl, *supra* note 127, at 652-53; *see also* Walker et al., *supra* note 12, at 812 (going one step further in asserting that "ecosystem services role" are not only challenging to estimate, but are "effectively unknowable" with current levels of scientific knowledge).

[132] Acres are typically used as a proxy as a matter of expediency. It turns out to be extremely difficult to conduct assessments that accurately and robustly measure and compare the values of two parcels of wetlands. Thus, regulators are faced with a trade-off between (1) designing trading methodologies that account for the many variables that contribute to wetlands' value—which might include acreage, biophysical capacity for nutrient filtration, floodwater retention, habitat provision, and location relative to human populations—but at great expense and loss of efficiency, or (2) resorting to proxy measurements like acreage that are simple to measure and monitor, but fail to capture the underlying complexities involved. *See* Salzman & Ruhl, *supra* note 127, at 635-36, 657-58. As a compromise measure, some WMB administrators (the Corps has largely delegated discretion to determine methodologies to states and local authorities) try to incorporate simple functional methodologies into their evaluations, which are "derived from quickly and easily observed characteristics of a wetland . . . e.g., percent cover of aquatic vegetation." *Id.* at 658 (quoting ENVIRONMENTAL LAW INSTITUTE, WETLAND MITIGATION BANKING 77 (1993)). To compensate for what are known to be likely downgrades in quality, many administrators also employ mitigation offset ratios that require developers to restore a proportionally greater amount of wetlands than they destroy (for example, 2:1 or 3:1). McKenney & Kiesecker, *supra* note 113, at 172.

[133] As explained thoroughly by James Salzman and J.B. Ruhl, problematic nonfungibilities in WMB trades can arise across three dimensions: space, type, and time. Space nonfungibilities occur because an acre of wetland destroyed in one place may provide services to a different and/or larger population than an acre in another. Type nonfungibilities arise because destroyed acres may have higher ecosystem services values that restored acres. And time nonfungibilities arise because a permit may allow destruction of wetlands before the quality of replacement wetlands is known. *See* Salzman & Ruhl, *supra* note 127, at 625-30.

[134] *See id.* at 665 ("Developers have an incentive to use the least expensive currency the government will allow.").

[135] While WMB requires projects utilizing preservation as a compensatory technique to demonstrate permanence, it otherwise presumes that projects will be "self-sustaining once performance standards have been achieved." It is not at all clear, however, that this is typically the case. McKenney & Kiesecker, *supra* note 113, at 172. *See also* Burgin, *supra* note 112, at 807, 813 (critiquing the WMB program's lack of resources for implementation and long-term monitoring). Salzman and Ruhl characterize these two problems as the "front-end" problem—"failure of instrument design," and the "back-end problem"—"failure of implementation through monitoring and enforcement." Salzman & Ruhl, *supra* note 114, at 3. Furthermore, neither the bank nor the project developer (the seller and the buyer of wetlands mitigation credits) has an incentive to ensure quality of restoration, unlike in a typical market, where buyers seek out quality and sellers stake their reputations on it. *Id.* at 17.

occur at locations other than on-site, it adds a geographical complication: not only might one banked acre not be of the same quality as the acre lost, but it also might be in a location where the services provided by the acre are not as valuable as they would have been at the original site.[136] Consequently, studies have consistently found that although the United States has gained in acres of wetlands since the advent of WMB, it has lost when it comes to "functional value" or "service provision."[137] Indeed, some studies estimate that the actual amount of wetlands impacts that have been successfully offset are as low as 20%, which would indicate an 80% net loss in wetlands functions.[138] Thus, in terms of the end goal—preserving environmental quality[139]—the United States' policy of "no net loss" has failed, even though it may look like a success story on paper.

In response to these studies, the Corps implemented new WMB regulations in 2008 that attempt to address some of the problems identified above.[140] The new regulations maintain a preference for wetlands banking[141] but take a "watershed approach," requiring offset projects to occur within the same local watershed as the wetlands destruction but relaxing strict "in-kind" requirements.[142] In theory, this approach should guarantee local

[136] *See* Womble & Doyle, *supra* note 115, at 242-44. For example, population density clearly impacts the value of certain wetlands, as ecosystem services provided near an urban area may be more valuable because they serve a greater population. *Id.* at 244. This deficiency represents the nonfungibility of space identified by Salzman and Ruhl and discussed *supra* note 114.

[137] Salzman & Ruhl, *supra* note 114, at 11, 21 (collecting and describing studies reaching this conclusion).

[138] James Murphy et al., *New Mitigation Rule Promises More of the Same: Why the New Corps and EPA Mitigation Rule will Fail to Protect Our Aquatic Resources Adequately*, 38 STETSON L. REV. 311, 316 (2009) (citing R. Eugene Turner, Ann M. Redmond & Joy B. Zedler, *Count It by Acre or Function: Mitigation Adds Up to Net Loss of Wetlands*, 23-6 NATL. WETLANDS NEWSLTR. 5, 15 (2001)).

[139] *See, e.g.*, 33 CFR § 332.3(a) (declaring that the "fundamental objective of compensatory mitigation is to offset environmental losses," and that projects should be selected based on the "likelihood of ecological success and sustainability").

[140] *See* 33 C.F.R. § 332.1 et seq. (2014). These rules replaced non-binding guidance that had been the basis of the Corps' WMB policies from the 1990s through 2008. *See* Womble & Doyle, *supra* note 115, at 257.

[141] 33 C.F.R. § 332.3(a) ("In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs. . . ."). In-lieu fee programs allow developers to pay a fee to a local agency in place of undertaking compensatory mitigation efforts. *See* Womble & Doyle, *supra* note 115, at 236. In-lieu fees have been used occasionally in U.S. compensatory mitigation, with mixed success at best. *See id.* at 251 (explaining that while fees are supposed to reflect estimated restoration costs, developers are frequently under-charged in in-lieu arrangements); *see also* Owley, *supra* note 116, at 1098 (noting that at least in theory, the strength of in-lieu fee arrangements is that money can be pooled to work on larger projects—a justification similar to one used to promote banking); Jessica Wilkinson, *In-lieu fee mitigation: coming into compliance with the new Compensatory Mitigation Rule,* WETLANDS ECOL. MANAGEMENT 17:53, 55 (2009) ("Several independent studies have concluded that the in-lieu fee programs [under the WMB program] were potentially beneficial but also deeply problematic.").

[142] 33 C.F.R. § 332.3(b) ("In general, the required compensatory mitigation should be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost

benefits while also providing some flexibility in choosing the most suitable offset locations.[143] The regulations also call for offset sites to be "ecologically suitable for providing the desired aquatic resource functions," suggesting that something more than acreage should be used to determine appropriate mitigation efforts.[144] They do not, however, create any strict requirements in this regard. Scholars have therefore concluded that, while the regulations have promise, much will depend upon their future application.[145]

The design, central challenges, and disappointing results of WMB to date are characteristic of biodiversity offsetting programs operating across the world.[146] Legal and scientific scholars alike have expressed skepticism about the ability of these programs, as currently designed and implemented, to counter development with restoration in ways that achieve true "neutrality" in biodiversity levels. Whether or not their challenges suggest that such programs should be abolished or merely redesigned remains a topic of active debate.[147]

b. Reducing Emissions from Deforestation and Forest Degradation

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functions and services . . . ."); § 332.3(e)(1) (relaxing in-kind requirements by explaining only that "[i]n general, in-kind mitigation is preferable to out-of-kind mitigation").

[143] McKenney & Kiesecker, *supra* note 113, at 168.

[144] 33 C.F.R. § 332.3(d). *But see* § 332.3(f)(1) (allowing for "a minimum one-to-one acreage or linear foot compensation ratio" when a functional assessment is not practicable).

[145] *See, e.g.*, Murphy et al., *supra* note 138 (concluding that although the aspirations embodied in the rules may be commendable, it is not clear that the appropriate incentives or mechanisms are in place for the rules to live up to their promise); J.B. Ruhl, James Salzman & Iris Goodman, *Implementing the New Ecosystem Services Mandate of the Section 404 Compensatory Mitigation Program—A Catalyst for Advancing Science and Policy*, 38 STETSON L. REV. 251, 265 (2009) (concluding that, "[i]n fairness, the rule probably goes as far as policy can take the ecosystem services concept at this time--the work ahead will require a research-based infusion of better understanding of the ecology, economics, and geography of wetland ecosystem services at local landscape scales"). There do not appear to be any quantitative studies yet available on how the picture has changed, with regard to "net loss," since adoption of the new regulations.

[146] *See* McKenney & Kiesecker, *supra* note 113 (reviewing six offset frameworks from around the world to identify common design elements and methodological problems dogging many of them); Gibbons & Lindenmayer, *supra* note 113, at 27 (finding that the poor track record of compliance with offsets programs extends beyond WMB); Maron et al., *supra* note 59, at 143 (finding a "lack of positive evaluations of ecological outcomes" across biodiversity offsetting programs).

[147] Compare Gibbons & Lindenmayer, *supra* note 113, at 26 (concluding that offsets are a "useful policy instrument" where governments plan to allow some land clearing any event), *with* Walker et al., *supra* note 12, at 149 (concluding that achievement of "no net loss" policies through offset regimes is "administratively improbable and technically unrealistic"); Burgin, *supra* note 112, at 814 (finding that the biodiversity offsets "concept is flawed, and decision making around offsets is largely conducted without an appropriate scientific underpinning"); Robertson, *supra* note 123, at 366 ("[T]he story of banking…is the story of an extremely motivated group of capitalists using highly sophisticated ecological arguments to catch a ride on the larger neoliberal project of expanding market relations.").

REDD+ is the UNFCCC program focused on sequestering carbon in forests. Addressing forest carbon harbors tremendous potential for addressing climate change, as deforestation represents around fifteen percent of global carbon emissions.[148] However, unlike WMB, REDD+ is far from an established program with a track record to evaluate; instead, it is very much a work in progress. But while in some ways this makes it less ideal as a case study, REDD+'s slow evolution from theory to implementation itself offers some important lessons for LDNW. Moreover, REDD+'s implementation has received a tremendous amount of scholarly attention, much of which focuses on issues also relevant to LDNW.

The basic concept of REDD+ is straightforward: deforestation represents a large source of carbon emissions that can be prevented or reversed relatively cheaply, as compared to cutting industrialized country emissions.[149] Therefore, countries or companies in the developed world who wish to reduce their overall carbon emissions "footprint" may pay for forests to be preserved or planted instead of making cuts in their own emissions.[150] This desire to "neutralize" developed country emissions with developing country forest preservation forms the underpinning and impetus for REDD+.[151]

However, implementation of this concept has proven "neither fast, nor easy."[152] International climate negotiators first discussed the idea of REDD during the 2005 Conference of the Parties for the UNFCCC in Montreal, where it received wide support at least in broad-brush form.[153] Two years later, UNFCC parties agreed to the "Bali Roadmap,"

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[148] David Takacs, *Forest Carbon (REDD+), Repairing International Trust, and Reciprocal Contractual Sovereignty*, 37 VT. L. REV. 653, 659 (2013). The most recent IPCC report puts this number somewhat lower, around 12%, explaining that emissions from deforestation have been falling recently. *See* Smith et al., *supra* note 46, at 16-17.

[149] *See, e.g.*, Arild Vatn & Paul O. Vedeld, *National governance structures for REDD+*, 23 GLOBAL ENVTL. CHANGE 422 (2013)

[150] Takacs, *supra* note 148, at 656; ERIN C. MYERS MADEIRA, POLICIES TO REDUCE EMISSIONS FROM DEFORESTATION AND DEGRADATION (REDD) IN DEVELOPING COUNTRIES 9 (RESOURCES FOR THE FUTURE 2008).

[151] David Takacs, *Carbon Into Gold: Forest Carbon Offsets, Climate Change Adaptation, and International Law*, 15 HASTINGS W.-NW. J. ENVT'L L. & POL'Y 39, 41 (2009) (explaining the basic conceit behind REDD+ as the idea that northern actors can continue to grow carbon-based economies to extent growth is "offset" by reforestation/afforestation, etc. efforts).

[152] Peter J. Kanowski et al., *Implementing REDD+: Lessons from analysis of forest governance*, 14 ENVTL. SCI. & POL'Y 111, 113 (2011) (internal quotation omitted).

[153] *See* UNFCCC Fact Sheet, Reducing Emissions from Deforestation in Developing Countries: Approaches to Stimulate Action (Feb. 2011), *available at* http://unfccc.int/files/press/backgrounders/application/pdf/fact_sheet_reducing_emissions_from_deforestation.pdf ("At the eleventh session of the Conference of the Parties (COP) (Montreal, 2005) talks on reducing emissions from deforestation in developing countries began, with a proposal on the issue by Papua New Guinea and Costa Rica.").

which created a timeline for the development of an international REDD proposal.[154] REDD also became REDD+, as UNFCCC parties agreed to include within the program not only preservation and reduced deforestation, but also efforts to improve forest management and enhance forest carbon stocks.[155] Since Bali, and with notable progress at the 2010 Conference of the Parties in Cancun, the international community has slowly designed and begun to implement a framework for REDD+.[156] Hopes remain high that REDD+ can play an important role in the new climate regime anticipated in 2015,[157] delivering significant sustainable development finance to developing countries.[158]

REDD+ activities are now being carried out by a multiplicity of actors, with the United Nations' REDD Programme taking a leading role along with the Forest Carbon Partnership Facility (FCPF)[159] and the World Bank's Forest Investment Program.[160] The UNFCCC encourages a three-phased approach to REDD+ implementation: Phases 1 and 2

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[154] The Bali Roadmap is primarily memorialized in the Bali Action Plan, United Nations, Bali Action Plan (Decision -/CP.13), http://unfccc.int/meetings/cop_13/items/4049.php (last visited July 15, 2014); *see also* UNFCCC Fact Sheet, *supra* note 153, at 2.

[155] *See* Mary C. Thompson, Manali Baruah & Edward R. Carr, *Seeing REDD+ as a project of environmental governance*, 14 ENVTL. SCIENCE & POL'Y 100, 101 (2011); Takacs, *supra* note 148, at 658.

[156] In Cancun, parties agreed to an outcome document that delineated five acceptable mitigation activities in the forest sector, and also agreed to include safeguards to prevent adverse social consequences. U.N. Framework Convention on Climate Change, Conference of the Parties, 16th Sess., Nov. 29-Dec. 10, 2010, paras. 69-70, U.N. Doc. FCCC/CP/2010/7/Add.1 (Mar. 15, 2011), *available at*

http:// unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf; *see also* Ashwini Chhatre et al., *Social safeguards and co-benefits in REDD+: a review of the adjacent possible*, 4 CURRENT OPINION IN ENVTL. SUSTAINABILITY 654, 654 (2012). The subsequent UNFCCC Conference of the Parties in Durban in 2011 set up a system to monitor safeguards, but has received criticism for leaving their national application discretionary and for failing to develop performance indicators. *Id.*

[157] Parties to the UNFCCC will convene for the 21st Conference of the Parties in Paris in December 2015. At the 2012 Conference of the Parties in Durban, parties agreed that they would adopt a new protocol or agreement with legal force during the Paris Conference, which will take effect in 2020. *See* Framework Convention on Climate Change, Rep. of the Conference of the Parties, Nov. 28-Dec. 11, 2011, 17th Sess., 2-3, U.N. Doc. FCCC/CP/2011/9/Add.1, ¶ 4 (Mar. 15, 2012), *available at*

http:// unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

[158] Ill Neeff, Daniela Göhler & Francisco Ascui, *Finding a path for REDD+ between ODA and the CDM*, 14 CLIMATE POL'Y 149, 150 (2013); Visseren-Hamakers et al., *supra* note 15, at 1.

[159] FCPF describes itself "a global partnership of governments, businesses, civil society, and Indigenous Peoples focused on reducing emissions from deforestation and forest degradation, forest carbon stock conservation, the sustainable management of forests, and the enhancement of forest carbon stocks in developing countries (activities commonly referred to as REDD+)." *See* About FCPF, https://www.forestcarbonpartnership.org/about-fcpf-0 (last visited May 28, 2014).

[160] *See* Mary C. Thompson, Manali Baruah & Edward R. Carr, *Seeing REDD+ as a project of environmental governance*, 14 ENVTL. SCIENCE & POL'Y 100, 101 (2011); Esteve Corbera & Heike Schroder, *Governing and implementing REDD+*, 14 ENVTL. SCIENCE & POL'Y 89, 90-91 (2011).

focus on "readiness" activities,[161] while Phase 3 will deliver a "results-based" REDD+ (with funding contingent upon demonstrated emissions reductions).[162] Most current REDD+ funding is for readiness activities, which aim to prepare nations to participate in an eventual international REDD+ market. Such funding takes the form of grants, concessional loans, and technical assistance.[163] In this way, REDD+ readiness funding conforms to the traditional model of country-to-country foreign aid, although several multilateral funds have also been established.[164] Readiness activities include development of national or local capacity for land-cover change monitoring, governance reforms, and more discrete promises like logging moratoria.[165] The breadth of these targeted governance reforms suggests that "the policy and institutional reforms necessary for successful implementation of REDD+ will be substantial."[166]

Significant financing has already been pledged and delivered for REDD+ readiness activities, with donor countries and international institutions dispensing a total of over $5 billion in REDD+ funding to 49 countries.[167] While not yet tied explicitly to demonstrated emissions reductions, most funding has at least been contingent on the demonstration of "meaningful mitigation actions and transparency in implementation."[168]

In addition to these national-scale REDD+ readiness activities, there are also many pilot and demonstration projects underway, particularly in East Asia and the Pacific and

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[161] More specifically, Phase 1 entails "developing a REDD+ strategy supported by grants," while Phase 2 consists of "implementing a REDD+ strategy supported by grants or other capacity building funds, as well as "payments for emissions reductions measured by proxies." UN REDD Programme, Frequently Asked Questions, at 2, http://www.un-redd.org/FAQs/tabid/586/Default.aspx (last visited July 15, 2014).

[162] *See* UN-REDD Programme, The UN-REDD Programme Strategy 2011-2015, at 3 (2010); *see also* Neeff, Göhler & Ascui, *supra* note 158, at 151; Danae Maniatis et al., *Financing and current capacity for REDD+ readiness and monitoring, measuring, reporting, and verification in the Congo Basin*, PHIL. TRANS. R. SOC. B 2013 368, 20120310 (22 July 2013).

[163] David Takacs, *Environmental Democracy and Forest Carbon (REDD+)*, 44 ENVTL. L. 71, 104 (2014); Neeff, Göhler & Ascui, *supra* note 158, at 151.

[164] Neeff, Göhler & Ascui, *supra* note 158, at 150-51.

[165] Cerbu, Swallow, & Thompson, *supra* note 16, at 170; *see also* Neeff, Göhler & Ascui, *supra* note 158, at 158-59 (detailing Indonesia's agreement to implement a logging moratorium as a condition of receiving $1 billion in REDD+ financing from Norway, but also noting concerns over whether the moratorium will prove enforceable); Press release, Norway & Indonesia in partnership to reduce emissions from deforestation, Norwegian Office of the Prime Minister (May 26, 2010).

[166] Kanowski et al., *supra* note 152, at 113.

[167] *See* REDD+ Database, http://reddplusdatabase.org/ (last visited May 15, 2014) (website collecting information voluntarily reported to the REDD+ project by either funders or funded entities); *see also* Takacs, *supra* note 163, at 77; UN-REDD Programme FAQ, *supra* note 161.

[168] Takacs, *supra* note 148, at 690.

Amazon regions, which are occurring independently from the national-scale activities.[169] These are implemented by a variety of actors: local communities, private developers, government entities, or landowners.[170] These pilots, along with the readiness activities, are intended to pave the way to Phase 3 of REDD+, which will entail "rigorous quantification" of emissions reductions as the prerequisite for funding.[171] Such emissions reductions could be demonstrated on a project-by-project basis, or over a larger area, such as a national or regional-level effort to halt or reverse deforestation trends.[172] Ultimately, given the ways in which REDD+ projects may adversely influence land use patterns beyond their immediate boundaries, some experts predict—and many advocate for—more future activity at national scales, rather than at localized levels.[173] Others have suggested "nested" governance approaches, where state-based measures might be integrated with bottom-up and public-private initiatives.[174] How precisely such integration might occur remains unclear, and the future permissibility of various scales of activity may be determined by upcoming climate negotiations and/or convergence around a particular set of measurement, monitoring, and verification protocols, which will be necessary to ensure that Phase 3 results in real emissions reductions.[175] Similarly, open questions remain over how and when the transition will occur from Phases 1 and 2 of REDD+ to Phase 3, where the bulk of REDD+ funding is expected to materialize.[176] Only a handful of countries are currently receiving results-based financing of the type envisioned in Phase 3.[177]

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[169] Takacs, *supra* note 163, at 104; Vatn & Vedeld, *supra* note 149, at 430 (REDD+ pilots currently occurring are quite separate from national REDD+ processes). The REDD+ Database reports a current total of 305 demonstration and pilot activities, although the actual total could be higher because reporting is voluntary. *See* REDD+ Database, *supra* note 168.

Cerbu, Swallow & Thompson, *supra* note 16, at 170 (expressing concern that not many demonstration activities are occurring in Africa).

[170] Takacs, *supra* note 163, at 75; *see also* Corbera & Schroder, *supra* note 160, at 91 ("REDD+ is rapidly morphing into a slew of unorchestrated, multi-level, multi-purpose and multi-actor projects and initiatives.")

[171] Neeff, Göhler & Ascui, *supra* note 158, at 151.

[172] Takacs *supra* note 163, at 75.

[173] Vatn & Vedeld, *supra* note 149, at 430; Jacob Phelps, Edward L. Webb & Arun Agrawal, *Does REDD+ Threaten to Recentralize Forest Governance?*, 328 SCIENCE 312 (16 April 2010) (noting that a national approach is often considered "integral to the success" of REDD+ because it helps avoid leakage (where emissions are reduced in one location, only to cause deforestation or degradation in another, unmonitored location), ensure permanence, and create reliable monitoring, reporting, and verification).

[174] Kanowski et al., *supra* note 152, at 113.

[175] Neeff, Göhler & Ascui, *supra* note 158, at 151. The topic of monitoring, reporting, and verification is explored further *infra. See* notes 188-195 & accompanying text.

[176] Neeff, Göhler & Ascui, *supra* note 158, at 151.

[177] *Implementing REDD+*, EU REDD Facility,

Even in these early stages, credits generated by REDD+ projects can be, and are being, sold within both voluntary and compliance carbon markets.[178] The forestry carbon offset market was worth $216 million in 2013, with 95% of this value transacted in the voluntary market (where demand is driven by private sector buyers fulfilling corporate social responsibility pledges).[179] REDD+ credits made up about $70 million of this market, meaning that for the present time donor country funds for REDD+ readiness dwarf private actors' market-based contributions.[180] Carbon compliance markets generally have tight restrictions on the REDD+ credits that qualify,[181] suggesting that these markets do not view many of the credits being transacted on the voluntary market sufficiently reliable to be included within a mandatory regime.[182]

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http://www.euredd.efi.int/portal/home/what_is_redd_/implementing_redd_/#.U3Uao_ldXTo ("A few developing countries are also undertaking results-based incentives that contribute to national REDD+ strategy implementation, namely Brazil, Indonesia and Guyana through bilateral agreements with Norway.")

[178] Carbon markets currently exist for both compliance and voluntary purposes. Compliance carbon markets exist to help entities subject to a mandatory carbon cap meet their emissions reductions obligations, and are by far the larger type of carbon market. *See* William Boyd & James Salzman, *The Curious Case of Greening in Carbon Markets*, 41 ENVTL. L. 73, 78-79 (2011). Examples of such markets are the European Union Emissions Trading Scheme, the northeastern US's Regional Greenhouse Gas Initiative, and California's new Cap and Trade Program. Voluntary markets, on the other hand, serve to allow corporations or individuals who wish to make non-mandatory contributions to combating climate change (but do not necessarily wish to undertake their own emissions reductions) to purchase credits through exchanges operated by various entities. *See* Aaron Ezroj, *Climate Change and International Norms*, 27 J. LAND USE & ENVTL. L. 69, 83 (2011) (explaining that there is a significant voluntary market in the US that operates with little government oversight). Significant concerns exist about the quality of the carbon credits that are transacted in voluntary markets. *See* Rowena Maguire, *Opportunities for Forest Finance: Compliance and Voluntary Markets*, 5 CARBON & CLIMATE L. REV. 100, 109 (2011).

[179] ECOSYSTEM MARKETPLACE, COVERING NEW GROUND: STATE OF THE FOREST CARBON MARKETS v (2013).

[180] *Id.* at x. This funding pattern is unsurprising, given that most countries are concentrating their efforts on broader REDD+ readiness activities. *See* Neeff, Göhler & Ascui, *supra* note 158, at 153 (noting that "REDD+ is likely to move over time from predictable, upfront readiness funding, with low co-funding requirements, to something more like a market, where funders will seek to purchase emission reduction 'results' cost-effectively. . .").

[181] For example, the Clean Development Mechanism—the primary international market for carbon emissions generated in the developing world—may only accept one percent of total credits from projects in land use, land-use change and forestry, and does not include projects aimed at preventing deforestation rather than restoring degraded areas. *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, adopted Dec. 10, 1997, 37 I.L.M. 22 (entered into force Feb. 16, 2005), Art. 3; Takacs, *supra* note 151, at 57-58; Cerbu, Swallow & Thompson, *supra* note 16, at 169. Domestic and regional carbon markets even further restrict these credits; for example, the European Union's Emissions Trading System forbids the use of international offsets generated from land-use or forestry practices. *See* Council Directive 2004/101/EC, 2004 O.J. (L 338) 18 (EC), Art. 11a.3(b).

[182] *See, e.g.*, Takacs, *supra* note 151, at 58-60 (noting skepticism with forest carbon offsets to date, as illustrated by the fact that they are thriving as part of the voluntary market but are not generally permitted to meet actual targets). There has also been, more generally, considerable debate around the validity of the offsets offered in the voluntary carbon offset markets—concerns that the World Wildlife Fund has tried to

As REDD+ proceeds, major ideological and practical concerns have emerged around how to best implement the program's intended goal of carbon neutrality through developing country forest offsetting of developed country emissions. Most significantly, there is robust disagreement over whether REDD+ should pursue a market-based approach; how real emissions reductions can be assured in ways acceptable to all parties; and whether REDD+ is capable of being implemented in ways that respect community involvement and promote equity and justice. These concerns are quite similar to some of the main concerns likely to be raised as LDNW proceeds.

The first major issue REDD+ actors are grappling with is whether or not the ultimate form that REDD+ takes should be a market-driven regime.[183] There is general agreement that the long-term goal for REDD+ is to move to something beyond foreign-aid like assistance, but this does not lead inexorably to the conclusion that a private-actor, market-driven model is the best way forward.[184] Instead, there are a number of forms a results-based REDD+ might take: in addition to a pure market approach, where buyers are predominantly private parties and sellers are predominantly the owners of forests, there might be national funds, run in or outside of current national administrations, which collect international finance money and guarantee on-the-ground emissions reductions results; or funding might occur in the form of "conditional budget support," where countries are awarded more generalized funding in exchange for demonstrated results.[185] Recent research also suggests that funding might focus more on fostering and nurturing *existing* commitments and rules of sovereign governments, as many countries have reasonably good forestry laws that are simply not enforced.[186]

In these fund-driven models, both developed countries and private entities might supply financing, although there are questions over whether such designs would be likely to

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address through the creation of "gold standard" carbon credits, which certify that the credits were produced in a "premium" manner that should ensure additionality. The market has shown a fair amount of demand for such premium credits. *See generally* Boyd & Salzman, *supra* note 178.

[183] Vatn & Vedeld, *supra* note *supra* note 149, at 422 (noting that a market-based approach to REDD+ is controversial and comparing various governance options available at the national level); *see also* Phelps, Webb & Agrawal, *supra* note 173, at 312 (expressing concern that REDD+ threatens to recentralize forest governance due to strict requirements necessary for market participation).

[184] Neeff, Göhler & Ascui, *supra* note 158, at 160; Chhatre et al., *supra* note 156, at 654 (concluding that while the international discussion around REDD+ has "endeavored to construct REDD+ in the image of a pure market model," in reality the program is "likely to involve complex pathways to eventual reductions in net deforestation, driven by the agendas of multiple actors whose interactions are governed by a suite of institutions beyond the putative carbon market").

[185] Vatn & Vedeld, *supra* note 149, at 422, 424. As Vatn and Vedeld note, however, there is plenty of developing country resentment over the conditional support model, and strict performance-based conditionalities may reduce the will of host countries to participate in the REDD+ scheme. *Id.* at 428.

[186] Kanowski et al., *supra* note 152, at 111.

attract as much private finance as a pure market approach.[187] Each of these models has benefits and drawbacks relevant to LDNW, which are discussed in the following section.

A second major challenge in REDD+ implementation has been the design of robust but practicable regimes to ensure that emissions reductions claimed from the forest sector actually occur, and that they achieve an acceptable level of permanency.[188] "Leakage" of forest emissions—where emissions are reduced in one location, only to cause deforestation or degradation in another, unmonitored location—is a significant concern (and one that has driven many of the calls for national, or at least regional, scales of implementation).[189] Similarly, "additionality" is also of critical importance, meaning that developed countries want to "pay only for changes in carbon stocks that would not otherwise have taken place."[190] Measuring whether or not changes are "additional" requires the establishment of baselines from whence to measure change—another issue that has been fraught with methodological debates. REDD+ baselines are particularly challenging because they must measure forward-looking "business as usual"—that is, what national forest emissions and/or deforestation would have been expected to be, in the future, in the absence of REDD+.[191] These predictions are extremely hard to construct because of the "complexity of forest-cover change" and the "sheer number of forest-cover change drivers."[192] To help ensure that these REDD+ methodological challenges are properly addressed, developed countries are pushing for the adoption of internationally overseen monitoring, reporting, and verification (MRV) regimes.[193] Developing countries, on the other hand, want to ensure that such international regimes do not infringe upon their sovereign rights, though they are mindful that they must accede to a regime stringent enough to guarantee the funding flows

[187] Vatn & Vedeld, *supra* note 149, at 428.

[188] Takacs, *supra* note 148, at 668 (explaining that monitoring, reporting, and verification must be "sufficiently rigorous to be meaningful, but cost-effective enough to be practical"); L.C. Stringer et al., *Challenges and opportunities in linking carbon sequestration, livelihoods and ecosystem service provision in drylands*, 19-20 ENVTL. SCIENCY & POL'Y 121, 129 (2012) (asserting that monitoring regimes should be as low-cost and simple as is feasible).

[189] Alan Grainger & Michael Obersteiner, *A framework for structuring the global forest monitoring landscape in the REDD+ era*, ENVTL. SCIENCE & POL'Y 14 (2011), 127-139; *see also* Takacs, *supra* note 151, at 58 (identifying leakage as a key challenge); MADEIRA, *supra* note 150, at 11.

[190] Vatn & Vedeld, *supra* note 149, at 423; Takacs, *supra* note 151, at 58.

[191] Sean Sloan & Johanne Pelletier, *How accurately may we project tropical forest-cover change? A validation of a forward-looking baseline for REDD*, 22 GLOBAL ENVTL. CHANGE 440, 440-41 (2012).

[192] *Id.*; *see also* Takacs, *supra* note 148, at 669; Cerbu, Swallow & Thompson, *supra* note 16, at 169 (noting that baseline methodology debates have been intense); MADEIRA, *supra* note 150, at 11.

[193] *See* Takacs, *supra* note 148, at 720.

they desire.[194] MRV debates are also intricately linked to the question of what the goals of REDD+ are, as MRV parameters should be designed to measure performance objectives.[195]

This issue of just what the goals of REDD+ are brings us to the third and most vociferous debate raised over the REDD+ carbon neutrality framework. While REDD+ has a clear mission to reduce carbon, most participants—and particularly developing country participants—envision it as having more than a single-minded focus on carbon neutrality, which would call for strategic targeting of the cheapest, most carbon-rich forest assets.[196] Ideally, REDD+ should facilitate a "triple win," with improved forest management contributing to the goals of carbon reduction, poverty alleviation, and biodiversity protection.[197] Otherwise, REDD+ risks being, in the words of one scholar, "anti-democratic, Northern self-interested, and human-rights impairing."[198]

In recognition of REDD+'s broader goals, parties to the UNFCCC agreed in Cancun in 2010 to include an annex on REDD+ "safeguards," which parties will "promote" and "support."[199] These safeguards include commitments to make REDD+ activities "country-driven" and consistent with "environmental integrity" and "sustainable development needs and goals," and to support "transparent and effective" governance structures and respect indigenous rights, local communities, and biodiversity conservation.[200] While most saw this annex as a good first step, serious questions remain over what further steps need to be taken to guarantee full integration of biodiversity and development goals into REDD+.[201]

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[194] *Id.* at 668, 704. MMRV is likely to require both "geospatial surveillance" and field measurements, which some countries worry will allow outsiders to "pry into a nation's internal doings," and may also involve "intrusive . . . protections, including protections for indigenous populations and third-party verifiers . . . ." *Id.* Takacs, however, argues that REDD+ MMRV should be reconceived as a "reciprocal" regime that employs a "tit-for-tat" methodology to reconstruct sovereignty, wherein Southern nations accept MMRV as a corollary to Northern financing. *Id.* at 730-31.

[195] *See id.* at 668-70. There is particular discussion over somehow including "sustainability indicators" within REDD+ MRV. However, selecting such indicators has proven challenging, as it is difficult to find comprehensive measures that are also suitable to "practical monitoring." Alan Grainger, *Forest sustainability indicator systems as procedural policy tools in global environmental governance*, 22 GLOBAL ENVTL. CHANGE 147, 148, 158 (2012).

[196] Takacs, *supra* note 151, at 56 (observing that REDD+ is like the Clean Development Mechanism in this regard, which has the dual aims of promoting emissions reductions and sustainable development).

[197] Vatn & Vedeld, *supra* note 149, at 422 (noting an emphasis in the discourse over how to make REDD+ a "triple win").

[198] Takacs, *supra* note 148, at 660.

[199] The Cancun Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, Decision 1/CP.16, U.N. Doc. FCCC/CP/2010/7/Add.1, ¶ 69 (Mar. 15, 2011).

[200] *Id.* Annex 1, ¶¶ 1-2.

[201] As observed *supra* note 156, significant criticism has been leveled at the international community's failure to develop performance indicators for safeguards and its decision to leave their national application discretionary.

Similarly, persistent doubts linger about whether REDD+ frameworks will in practice fully respect indigenous and local rights, including non-Western notions of property, or will adequately embrace the participatory norms called for in the Cancun Agreement.[202] These concerns are also likely to play a central role in LDNW implementation, as discussed further in the following section.

It remains to be seen whether REDD+ will prove the kind of comprehensive sustainable development and environmental management strategy desired by developing countries. Its future will depend in no small part on the role assigned to it under the new international climate change mitigation regime, expected to be agreed to at the 2015 UNFCCC Conference of the Parties in Paris, France.[203] In the meantime, however, some are hopeful that even without an overarching international REDD+ framework, "local communities can harness the global discourse on safeguards in REDD+ to their advantage in local and national arenas, without waiting for an international consensus on the architecture of REDD+."[204] That is to say, REDD+ may already be having a positive impact on national and local discourses and actions, irrespective of the ultimate shape that the 'Phase 3' regime assumes—a type of early benefit that LDNW developers might also want to foster.

IV. DESIGNING LDNW FOR INTEGRITY

In comparison to WMB and REDD+, LDNW has enormously ambitious aims. Whereas WMB focuses exclusively on wetlands and REDD+ exclusively on forests, LDNW capaciously includes *all* types of land degradation within its purview. Similarly, whereas WMB focuses specifically on preserving ecological functions, and REDD+ at least nominally

[202] *See, e.g.*, Visseren-Hamakers et al., *supra* note 16, at 1 (asserting that the key question for REDD+ is whether it can "promote synergies for a range of sustainability goals", including not only climate mitigation but biodiversity conservation and poverty alleviation and social justice issues); Takacs, *supra* note 148, at 684 (observing that some early REDD+ projects diminished biodiversity by allowing for monocultures and non-native species, and "locked up forests on which local communities depended"); Smita Narula, *The Global Land Rush: Markets, Rights, and the Politics of Food*, 49 STAN. J. INT'L L. 101, 112 (2013) (noting that REDD+ has in some cases been a large-scale land acquisition driver, and that land may "appear" available under a legal conception even when it is heavily relied upon by local populations for sustenance); Mary C. Thompson, Manali Baruah & Edward R. Carr, *Seeing REDD+ as a project of environmental governance*, 14 ENVTL. SCIENCE & POL'Y 100, 101 (2011) (observing that major questions remain open about how to manage resources for carbon while also meeting the needs of local people who depend on the same resources); Chhatre et al., *supra* note 156, at 655 (claiming that the "paradox of REDD+" is that "the infusion of financial value in forests is likely to encourage the dispossession of politically and economically marginal forest-dependent communities"); Takacs, *supra* note 163, at 74 (arguing that meaningful local participation offers the best means of "warding off the [potential] negative impacts" of REDD+, but finding that even the best schemes fall short in some respects).

[203] Kanowski et al., *supra* note 152, at 114 (observing that the future of the global climate regime and REDD+ remain unsettled).

[204] Chhatre et al., *supra* note 156.

focuses on carbon sequestration,[205] LDNW aims to neutralize land degradation in order to advance a suite of social, economic, and environmental policy goals.[206] But LDNW's broader focus also suggests that a tremendous amount of knowledge might be gleaned from each of these smaller (and still ambitious) attempts to implement a version of land neutrality. To advance this contention, this section highlights three major issues and suggests how LDNW can learn from past attempts to construct a program with scientific and legal integrity.

a. Defining and Measuring Degradation

One of the major first challenges that an LDNW framework will need to tackle is the translation of its broad definition of land degradation into meaningful measurements—often called "indicators" in institutional parlance—that represent its multifaceted goals. As both WMB and REDD+ illustrate, the way that the scientific/social problem at issue is translated into legal terms has profound impacts on what is considered as "success" and how well this accords with a program's original aims.

In its current conceptual form, LDNW leaves major decisions over the definition of "land degradation" unarticulated. But definitional fuzziness, which has already proven a challenge in the implementation of the UNCCD,[207] will prove considerably more problematic in a regime committed to "neutralizing" degradation, as the concept necessarily implies a netting of all losses and gains. Land degradation's current definition includes "reduction or loss of the biological or economic productivity and complexity of [land]."[208] Such a capacious definition assists in uniting parties with potentially different driving concerns—biodiversity loss, ecosystem preservation, economic development, etc.—but it may well detract from the program's ability to measure degradation at a level of specificity acceptable for establishing progress towards neutrality.

One initial question regarding land degradation measurement is whether degradation should be made into a binary concept that allows land to be categorized as either "degraded" or "not degraded" for netting purposes. If so, much nuance will be lost in the translation, given that land may be in various stages of degradation, with severe degradation of more concern than mild. If a binary framework is rejected, considerable

[205] As noted above, there is strong pressure, and some basic international agreement at least in principle, that REDD+ must also work to promote sustainable development, poverty alleviation, biodiversity conservation, and participatory processes if it is to have real legitimacy and success. *See supra* notes 193-99 & accompanying text.

[206] *See, e.g.*, A STRONGER UNCCD, *supra* note 7, at 3 ("Land and the fertility of its soil are critical natural capital essential for sustainably ensuring food, renewable energy and water security while eradicating rural poverty, conserving terrestrial biodiversity and building the resilience of our agricultural systems to climatic shocks.").

[207] *See supra* note 74.

[208] ZNLD BRIEF, *supra* note 3, at 6.

complications will arise regarding how various degrees of degradation and restoration are factored into an overall measure of "neutrality."

REDD+ has skirted this problem in part by focusing its neutrality framework specifically on carbon, a single variable where "a ton is a ton"[209] and forests are labeled by their strength as "carbon repositories."[210] In this way, degrees of forest degradation obtain an objective scientific measure. In contrast, WMB has had to confront head on the complicated question of assigning degrees of value to wetlands, and it has struggled to do so.[211] Some WMB practitioners have developed algorithms that use "easily measured site characteristics to make inferences about harder-to-measure 'wetland functions,'" turning these into numeric scores that rank a wetland's value.[212] But even within this single domestic program focused exclusively on wetlands, use of these more rigorous systems to attempt to rank various parcels of land has been spotty, and wetlands have mostly been traded on the basis of acreage because it serves as a cheap and easy proxy.[213] As this experience suggests, LDNW will want to think carefully about whether and how to define degradation either in shades of black and white or along a spectrum that is meaningful without being overly onerous.

More fundamentally, additional definitional clarity will be critical to understanding how land is to be measured and classified in an LDNW scheme. As a starting point, more precision on the goals of land degradation neutrality is important. Ongoing REDD+ and WMB debates about the goals of those programs suggest that early, frank discussion of program goals should ideally underpin legal definitions and frameworks, and that failure to reach early resolution on these issues is likely to lead to implementation controversies down the road.[214] Moreover, in the case of WMB, selection of inappropriate proxies to

[209] Ruhl & Salzmann, *supra* note 127, at 665.

[210] Takacs, *supra* note 148, at 728. However, given the debate discussed *supra* over whether REDD+ needs to more explicitly incorporate biodiversity and livelihood goals into its measures of success, it too could face more challenges in measuring forest quality in the future. *See* Visseren-Hamakers et al., *supra* note 16, at 5 (suggesting that "a new definition of REDD+ success may be necessary, incorporating climate, biodiversity and livelihoods goals instead of only focusing on reducing carbon emissions" (internal citation omitted)).

[211] *See supra* notes 131-139 and accompanying text.

[212] Robertson, *supra* note 123.

[213] *Id.*

[214] As explored *supra*, REDD+ has engendered considerable controversy during early stages of implementation due to its focus on carbon storage potential as the primary measure of success, which parties have attempted to remedy through the addition of later "safeguards" adding what many hope will be complementary goals of equity, community participation, biodiversity protection, and poverty eradication. For some, this conversation around broader goals happened far too late. *See, e.g.*, Visseren-Hamakers et al., *supra* note 16, at 1 (2012) (suggesting that rather than framing REDD+ in terms of "safeguards" and "co-benefits," it should instead have three "pillars" of carbon, biodiversity, and community). Similarly, WMB has suffered from a lack of clear legal expectations that functionality, rather than acreage, be the relevant metric for determining whether

serve as the measure of program success has done more than merely stir up controversy: it has caused a program that appears successful on paper in terms of achieving "no net loss" to fail on the true goal of delivering functionally equivalent wetlands.[215]

There have already been myriad efforts to define and quantify land degradation, but as one recent critique described:

> Most of these studies have focused on deforestation, overgrazing, salinization, soil erosion, and other visible forms of land degradation rather than on the degradation of less visible characteristics of soils (e.g. carbon content, top soil depth, etc.) or the less direct consequences of land degradation such as human suffering and the loss of ecosystem services.[216]

These discrete scientific measurements stand in contrast to the broad goals articulated in documents setting forth the LDNW vision, where land is presented as a "nexus issue" uniting concerns around energy, food, water, climate, and biodiversity.[217] LDNW enshrines the diverse objectives of both agricultural intensification and preservation of non-agricultural lands.[218] To encompass this diversity, LDNW program design will have to reach some level of consensus over how to balance these goals. Moreover, LDNW's expansive social and environmental objectives suggest that attention should be paid at the definitional

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"neutrality" has been achieved. *See* Salzman & Ruhl, *supra* note 127, at 635-36, 657-58; McKenney & Kiesecker, *supra* note 113, at 172.

[215] Murphy et al., *supra* note 138, at 316 (2009).

[216] Joachim von Braun et al., *The Economics of Land Degradation*, Draft Issue Paper for Global Soil Week, Berlin Nov. 18-22, at 9 (2012).

[217] *See, e.g.*, Technical Support Team of the UNCCD, *Issues Brief: Desertification, Land Degradation and Drought*, at 2-3; ZNLD BRIEF, *supra* note 3, at 9 ("Land is central to the "nexus" that links energy, food, water and environmental health in an interdependent loop.").

[218] ZNLD BRIEF, *supra* note 3, at 9 (noting that increased food, energy, and water needs will "require 175 million to 220 million hectares of additional cropland"); Chasek et al., *supra* note 58, at 3 (arguing that humanity cannot afford to increase arable land and must instead increase the productivity of land currently under use while restoring degraded land); *see also* Lal et al., *supra* note 23, at 23. The problem of conversion of agricultural lands in the developing world into biofuels production rather than food production might be relevant to considerations of the extent to which agricultural yields should be used as a proxy measure of land that is serving to advance the goals of sustainable development. *See, e.g.*, Robert Howarth et al., Rapid Assessment on Biofuels and the Environment: Overview and Key Findings, at 4 (SCOPE International Biofuels Project Rapid Assessment Project, 2009) ("The rapidly growing production of biofuels requires additional cropland. In some cases, this additional land comes from agricultural land previously used to grow food or feed crops. In a hungry world, these diverted crops must be made up elsewhere, thus driving land conversion– perhaps in different countries and on different continents – to compensate for the loss of food-crop production. Additional land for food and feed production usually comes from the conversion of native ecosystems such as grasslands, savannahs, and forests, or by returning permanent fallow or abandoned croplands to production.").

phase to distributional equity and ensuring that LDNW works to the benefit of local populations to proactively address some of REDD+'s controversies.[219] The ongoing process of selecting "indicators" to serve as measurements for the state of desertification under the UNCCD may provide a helpful departure point for this conversation.[220] The UNCCD indicators combine more ecological units (e.g., "proportion of change in each land use category to another per unit of time," and "biodiversity condition of a region relative to a 'pristine' state") with explicit measures of poverty ("proportion of the population in affected areas living above the poverty line") and other measures of development (e.g., the Human Development Index as a measure of "approximate status and change in the wellbeing of populations").[221] However, reaching agreement on these desertification indicators was a long, fractious process and full implementation of these measurements still appears years away.[222] To expedite a similar process for LDNW, one way forward might be to develop a simpler set of universal indicators that all regions and countries will use, and then allow flexibility in selecting additional regionally specific ones, at least in early stages of implementation. Such a strategy would avoid the need for worldwide consensus on a set of complete measurements and allow for experimentation as to what measures best ensure success.

The definitions and measurement "indicators" selected for land degradation will filter into the next critical step for the success of an LDNW framework, which has proven an Achilles heel of desertification policy and REDD+ to date: establishing baselines from whence the rate of change can be measured.[223] As in REDD+, baselines will be scientifically challenging to assess, because they will necessarily require parsing *persistent* degradation from temporary fluctuations. And frustratingly, the more LDNW is able to encapsulate its

[219] *Cf.* Chatre et al., *supra* note 156 (listing potential concerns with REDD+ including land grabbing and maldistribution of benefits, and suggesting that ensuring land tenure security within the REDD+ regime will be a key to minimizing risks to local people).

[220] *See* Barron J. Orr, *Scientific review of the UNCCD provisionally accepted set of impact indicators to measure the implementation of strategic objectives 1, 2 and 3,* White Paper Prepared for the UNCCD (Feb. 2011).

[221] *Id.* at 9-10.

[222] As Dr. Orr describes in more detail, work developing indicators for the UNCCD has been ongoing since 1998. *Id.* ¶ 11. *See also* Jeff Tollefson & Natasha Gilbert, *Earth summit: Rio report card*, NATURE 6 June 2012 (giving the UNCCD a grade of "F" and explaining that it took the desertification community until 2009 to agree on a set of 11 "impact indicators" to measure progress on desertification, and that even submitting data on two of these, as required in 2012, would be tough for some participating countries).

[223] *See* M. Akhtar-Shuster et al., *Improving the Enabling Environment to Combat Land Degradation: Institutional, Financial, Legal and Science-Policy Challenges and Solutions*, 22 LAND DEGRADATION & DEVELOPMENT 299-312 (2011) (observing that efforts to combat land degradation have been hampered to date by insufficient national-level monitoring and reporting). Within REDD+, forest degradation has also proven harder to measure than deforestation—a harbinger of some of the challenges LDNW may face in defining and measuring land degradation. *See* MADEIRA, *supra* note 150.

broad goals within its measurement of success by choosing a robust set of social and economic indicators of land degradation, the harder the problem will then become to quantify and measure.[224] Similarly, as with REDD+, questions are sure to arise over the extent to which baseline methodologies should be universal or tailored to regional or national situations.[225] These challenges will not make the process an easy one, and likely any methodologies selected will remain susceptible to some criticism. Nevertheless, to bolster accountability and attract funding, considerable emphasis should be placed on the establishment of scientifically defensible, even if imperfect, baselines worldwide as a critical first step in LDNW. Again, universal guidelines coupled with regional experimentation may provide an early path forward that maintains integrity without requiring unanimity at a stage where it may be detrimental to progress.

Beyond definitional and baseline concerns, WMB and REDD+ are also instructive on the issue of designing monitoring, reporting, and verification (MRV) regimes. To attract international finance, LDNW will need to follow REDD+'s efforts to construct a "good enough" MRV scheme; that is, one that satisfies the stringency criteria of international donors, while not proving so intrusive or expensive as to preclude its adoption by countries, localities, or project developers.[226] In the case of LDNW, the MRV effort will have to include finding new ways to inject rigor into measuring progress on land degradation, in order to supply the accountability that the desertification regime has lacked to date.[227] WMB's troubled experience in securing long-term monitoring, combined with REDD+ concerns over permanency, also suggests that MRV scheme designers should think up-front about ways to emphasize *long-term* accountability in MRV processes.[228] Designing pilot programs where funding is incremental and contingent upon certain demonstrated mile-markers of success might aid in determining how to successfully incentivize long-term LDNW MRV. One further point worth noting is that LDNW's MRV need not necessarily be as exacting as REDD+'s, if the program is not intended to facilitate compliance with international carbon regimes, so

[224] *Cf.* Grainger, *supra* note 195, at 158 (noting the difficulty of finding comprehensive indicators also suitable to "practical monitoring").

[225] MADEIRA, *supra* note 150, at 11.

[226] *See* Takacs, *supra* note 148, at 668 (suggesting that the key for REDD+ MRV has been to construct a regime "sufficiently rigorous to be meaningful, but cost-effective enough to be practical").

[227] *See, e.g.*, Stringer et al., *supra* note 188, at 121 (noting that desertification has suffered from a lack of accurate accounting models, including deficient data and a lack of appropriate local monitoring methods or regional protocols). *Cf.* Takacs, *supra* note 148, at 673 (noting that funding for REDD+ hinges on MMRV that accurately measures deforestation and reforestation rates).

[228] *See* McKenney & Kiesecker, *supra* note 112, at 172 (WMB); Burgin, *supra* note 112, at 807, 813 (WMB); Takacs, *supra* note 148 (REDD+).

long as MRV tracks reasonably well those measures that are important to the program's success.[229]

In sum, the experiences of both REDD+ and WMB suggest that early, inclusive conversations over the *purposes* driving a neutrality-based land preservation scheme are critical to creating a program able to transform social and environmental goals into meaningful legal frameworks backed by best available scientific knowledge. Program aims must filter down into definitions, measurements, and monitoring schemes in order to achieve not just compliance but on-the-ground success. If LNDW is able to have productive early conversations and reach an acceptable level of basic consensus on a design that will ensure integrity of the worldwide goal, balanced by regional flexibility where appropriate, it can hopefully avoid some of the lengthy implementation challenges facing REDD+, as well as WMB's failure to deliver on its "no net loss" goals.

b. "Neutrality" as an Organizing Principle

Several particular challenges arise with LDNW's focus on "neutrality," that is, the offsetting of land degradation losses with equivalent land restoration gains.[230] We use "offset" here broadly, not intending to refer specifically to market-driven regimes, but to a program that relies on measuring losses against gains as its means of assessing performance.[231] In this way, LNDW closely resembles the structure of WMB, which is similarly organized around a "no net loss" goal. In contrast, REDD+, although espousing a "neutrality" framework that permits developed country donors to claim credit for developing country forest carbon, differs somewhat in that it does not set a "no net loss" of forests goal. It is the special challenge of no net land loss goals that we probe in this section.

The first challenge of a "no net" program is that a certain measure of "equivalence" is embedded in the concept of land offsets that is extremely hard to achieve in practice.[232]

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[229] *See infra* section IV(c)(2) for more detailed discussion of LDNW and carbon regimes. Note that REDD+'s MRV is also expanding beyond mere carbon accountability, with many exploring how the REDD+ MRV program can also be used to measure other indicators of performance, including governance reforms, development benefits, and human rights adherence. *See* Takacs, *supra* note 148, at 670. In this way, REDD+ MRV may prove a useful model for LDNW.

[230] *See* Press Release, UNCCD, *Global conference steps up action to move to a land-degradation neutral world*, 15 November 2012 ("Land-degradation neutrality refers to a global shift in land stewardship such that degradation of new areas is avoided, and unavoidable degradation is offset by restoring an equal amount of already degraded land in the same time and in the same ecosystem.")

[231] *See* R.K.A. Morris et al., *The creation of compensatory habitat—Can it secure sustainable development?*, J. FOR NATURE CONSERVATION 14:106, 107 (2006) (observing that offsets can take a wide variety of shapes, and may or may not include a market component like banking as an "extension" of the program).

[232] Maron, *supra* note 110, at 141.

As WMB and other biodiversity offsetting schemes show, there is an inherent tendency in any offsetting scheme to replace higher-value land with lower-value land, and real difficulty in creating the kinds of long term incentives that will ensure that restoration persists.[233] Accordingly, even if LDNW does not adopt the kind of market-based trading program that WMB embodies, there will always be questions of whether land lost to degradation is, as a matter of *scientific* integrity, being counterbalanced with equal parcels of land being restored, even when paper compliance is achieved. To complicate the picture, some recent research suggests that given the challenges of achieving "equivalency," no net loss may be the wrong focus; focusing on achieving certain *priorities* maybe a more cost-effective way to determine what parcels of land should be used for offsetting.[234] This point underscores the importance of creating robust definitions and MRV regimes that capture the most essential qualities that the LDNW program seeks to protect, as a way to guard against the almost inevitable erosion in value that will occur of any land characteristics that are not embedded within the scheme's measurement and MRV systems.

A "no net loss" structure also raises questions about the balance to be struck between preservation and restoration. To be "land degradation neutral" suggests indifference to whether land is preserved or restored, so long as restoration keeps pace with degradation.[235] But several factors should make us wary of constructing a legal framework that endorses this indifference. The first is the tendency noted in the previous paragraph for functional value to be lost when certain degraded parcels are "offset" with the restoration of others. This tendency suggests that in most cases, halting the initial degradation would have been more beneficial than permitting degradation accompanied by restoration. The second factor that calls into question a program that imbeds no preference for preservation over restoration is the scientific challenge, discussed *supra* section one, of actually restoring degraded land. Scientists are much more confident in the ability of certain land management practices to prevent degradation than they are of their ability to restore degraded land.[236] All of these factors suggest that perhaps a premium

[233] *See, e.g.*, James Murphy et al., *supra* note 138, at 3-4 (observing that in the WMB program, banking sites tended to be in inexpensive areas, potentially far from the area where actual wetlands impacts were being lost, and that monitoring was of questionable quality).

[234] *See* T.J. Habib et al., *Economic & Ecological Outcomes of Flexible Biodiversity Offset Systems*, 27 CONSERVATION BIOLOGY 1313, 1313 (2013).

[235] *Cf.* Sandra Brown & Daniel Zarin, *What Does Zero Deforestation Mean?*, SCIENCE VOL. 342, 15 NOV. 2013, 805 (asserting that net deforestation targets "inherently and erroneously equate the value of protecting native forests with that of planting new ones").

[236] *See* Katharine Suding, *Toward an Era of Restoration in Ecology: Successes, Failures, and Opportunities Ahead*, 42 ANNU. REV. ECOL. EVOL. SYST. 465, 469-70 (2011) (noting that restoration is unlikely to result in "complete recovery," making compensation programs challenging because "future gain is uncertain whereas the immediate loss is permanent"). It is also the case that some ecosystems recover better than others. *See*

should be put on preservation—a premium that can be lost in a "no net" scheme like LDNW.[237]

LDNW's "no net degradation" focus combines with the breadth of its scope to raise another important question: because it covers multiple land types and demands neutrality within each of these,[238] is the aim of LDNW to preserve each of these land types in precisely the quantities in which they now exist? Climate change is likely to prove a confounding factor that may make this goal impossible in many regions. As the earth continues to warm, many regions will naturally[239] evolve to have a different mix of ecosystems than they currently do—for example, the tropics are likely to get drier, while in the far north frozen tundra is expected to shrink.[240] It therefore might be a fool's errand to try to restore and maintain particular ecosystems at their current levels of productivity and expansiveness in the face of forces beyond local or national control.

Regional variability highlights the broader challenge of geography.[241] The goals of LDNW will not be accomplished if the whole of Africa sees severe land degradation, but Latin America achieves equal land restoration.[242] Thus, as with WMB, LDNW will have to select appropriate geographical boundaries within which to net gains and losses. Based on the particularities of the WMB scheme, the Corps chose in its refined version of WMB to emphasize a "watershed" approach to "no net loss," instructing (though not commanding)

Maron, *supra* note 59, at 144. This difference among ecosystem types is another factor that might suggest the advisability of disaggregated targets by both preservation/restoration and land types.

[237] On the other hand, if a legal baseline exists that requires anyone intending to degrade certain parcels of land to offset their actions with restoration, as in WMB, then a preference for restoration does make more sense, as preservation is essentially the default. *See supra* note 121 (explaining that WMB's preference for restoration is an effort to achieve maximum "additionality," since there is essentially a baseline of preservation presumed under the Clean Water Act's prohibition on infilling wetlands without a permit). However, a broad "no degradation" baseline is unlikely to exist or be enforceable in many countries, as evidenced by the world's poor track record to date on preventing degradation.

[238] *Cf.* Press Release, UNCCD, *supra* note 230 (envisioning neutrality as requiring unavoidable degradation to be offset by "restoring an equal amount of already degraded land in the *same time* and in the *same ecosystem*" (emphasis added)).

[239] At least, "naturally" inasmuch as it will be climactic rather than on-the-ground forces at work in changing the mix of land types, although it is now well established that anthropogenic forcing is the dominant cause of these climactic changes. *See* Smith et al., *supra* note 46, at 45.

[240] *See id.* (predicting moderate risk of die-back of tropical forests due to prolonged drought in South America, with lower risk of the same in African and Asian tropical forests).

[241] *See generally* Womble & Doyle, *supra* note 115.

[242] *Cf. id.* at 428 (observing, with respect to WMB, that a "no net loss" program "inherently requires specification of an ecologically and socially appropriate scale at which losses and gains of wetlands and streams will be balanced," as it would do no good for the U.S. to achieve no net loss of wetlands but deplete entire regions of their wetlands in the process).

that offsets should occur within the same watershed as the wetlands lost.[243] Similar discussion will need to take place in LDNW as to appropriate geographic areas over which to net out progress. At the same time, REDD+ offers a different important tale regarding geography, which is that international financing is likely to flow to those countries best equipped to deliver and document results, which is a different set of countries from those that most need assistance in preserving their forests.[244] Creators of the LDNW framework will also want to think carefully about how the scheme can be designed to maximize the fair distribution of benefits and funding worldwide.

These complexities lead us to a suggestion that has been made in other contexts that LDNW might be wise to import[245]: encouraging the establishment of separate preservation and restoration goals, particularized to the appropriate scale. Under the broad rubric of ensuring no net degradation, LDNW might encourage regions, countries, or localities to assess their land use patterns and history in order to determine what the appropriate mix among ecosystems and between preservation and restoration is for a given locale. Then, the relevant entity could set appropriate, disaggregated targets for restoration and preservation.[246] In this way, LDNW might achieve worldwide neutrality in land degradation when targets are amalgamated, without actually implying a potentially indefensible indifference to whether or where land is preserved or restored.

c. Administering LDNW

In this final subsection, we derive suggestions for how to administer a global, land-focused neutrality program like LDNW from WMB and REDD+. Three tensions predominate: the appropriate scale of projects, the role of the private sector, and the challenge of mobilizing funding.

i. The Scale of Projects

[243] *Id.* at 259. However, even the term "watershed" will lead to major variations in scale across the United States, as watersheds depend topography and can vary greatly in size. *Id.* at 261.

[244] *See* Visseren-Hamakers et al., *supra* note 16, at 4 (noting that REDD+ has distributive dimensions and that the scheme should be designed to ensure that REDD+ financing actually reaches the poor).

[245] *See* Brown & Zarin, *supra* note 235, at 805 (suggesting that in place of certain time-bound targets for achieving "zero deforestation," it would be better to set separate targets for reductions in clearing of native forests (gross deforestation) and increases in the establishment of new forests (reforestation)).

[246] *Cf. id.* at 807 (suggesting place-based deforestation targets that take into account current characteristics). One downside of this suggestion is that measuring preservation of land from degradation will undoubtedly face many of the same thorny challenges that REDD+ has in determining appropriate baselines that project what degradation *otherwise would have been in the future*, absent policy intervention, in order to ensure additionality. *See supra* note 191. Nevertheless, it seems ill-advised to let measurement challenges dictate an embedded preference for the inefficient and less effective strategy of restoration over preservation.

LDNW is framed as a global target, but with recognition that it will need to be broken down into somewhat smaller pieces, be that regional targets, national targets, or targets that are even more localized. In determining how to proceed, debates over scale similar to those that have driven discussion of the REDD+ architecture are likely to arise. Perhaps even more so than in the forest context, land degradation policymakers have increasingly come to understand that both the causes and solutions to land degradation are highly localized, and to place a premium on local and traditional knowledge. But in the case of REDD+, many have expressed concern that the decentralization trend that has predominated forest governance more recently may be reversed by the push for national-level policies, which have the advantage of better preventing leakage and thereby enhancing efficacy.[247] Similar leakage concerns within an LDNW framework are likely to counsel against a highly localized strategy, as focusing on neutralizing degradation in one locality might have the undesirable consequence of causing land in neighboring, non-participating localities to face steeper degradation pressures.[248]

Accordingly, LDNW is likely to experience the same tension REDD+ has between local, participatory solutions capable of accomplishing multiple sustainable development objectives and protecting local populations from exploitation, and the desirability of national accountability frameworks.[249] One possible direction forward for LDNW, suggested by the REDD+ experience, is to embrace the kind of pluralistic experimentalism that has propelled REDD+ forward in the face of this tension. As described *supra*, REDD+ has allowed national- and local-level efforts to proceed in tandem, with the intention of possibly harmonizing these into some sort of "nested governance" approach down the road.[250] While this strategy offers little in the way of certainty, it might allow for much-needed experimentation on the question of what types of LDNW governance are likely to prove successful. At the same time, LDNW drafters might consider early adoption of international

[247] *See* Phelps, Webb & Agrawal, *supra* note 173, at 312 (noting that a national approach is often considered "integral to the success" of REDD+ because it helps avoid leakage, ensure permanence, and create reliable MRV, but that it also makes national governments the primary forest stakeholders).

[248] *Cf. supra* notes 122-127 and accompanying text (explaining that WMB also evolved out of an effort to end project-by-project wetlands restoration due to a perception that it was less effective and more difficult to manage and monitor).

[249] *Cf.* Takacs, *supra* note 163, at 74 (arguing that local, meaningful, informed participation offers the "best means of warding off the [potential] negative impacts" of REDD+); Herrmann & Hutchinson, *supra* note 37, at 550 (observing that most African countries are moving to a "bottom-up approach" to combating desertification, but that such approaches are "more difficult to reconcile with the terms of bilateral and multilateral funding than their top-down counterparts").

[250] *See* Kanowski et al., *supra* note 152.

guidelines on local participation rights, to ward off later tensions around issues of decentralization and distributional equity.[251]

ii. The Private Role

Proponents of LDNW insist that it is not "a rationale for market-based offset or compensation schemes."[252] Nevertheless, LDNW will inevitably face the same tensions as WMB and REDD+ over the extent to which the program is to involve public versus private actors.[253] It seems unlikely that LDNW will evolve to have the same sort of compliance market that predominates in WMB and is anticipated to ultimately predominate in REDD+, unless it were to pursue the strategy of trying to integrate into the international carbon marketplace. This option is frequently discussed,[254] although it presents major hurdles due to (1) the fact that forests contain far more carbon than other land types[255]; (2) the challenges of precisely measuring carbon sequestered over the long term through sustainable land management techniques rather than in the more tangible medium of trees;[256] and (3) the risks associated with reducing land degradation management to a carbon reduction strategy alone, when it is intended as a broad livelihood-enhancing measure.[257] On the flip side, carbon markets provide a revenue source that would undoubtedly be quite valuable in LDNW implementation, if these challenges could be

[251] *Cf.* Phelps, Webb, & Agrawal, *supra* note 173, at 313 (noting that early REDD+ readiness applications did not adequately address issues of decentralization); Takacs, *supra* note 163, at 130 (suggesting that in order to ensure appropriate local participation and benefits from REDD+, all local communities might start with a "community protocol" that is a working agreement setting forth how participation will proceed, how local norms/customs will be respected, and what the local understanding of land use patterns and land tenure are).

[252] A STRONGER UNCCD, *supra* note 7, at 9.

[253] *See* Chasek et al., *supra* note 5, at 1 (describing the need for strong partnerships between the public and private sectors to fund ZNLD and LDNW initiatives).

[254] *See, e.g.*, Cerbu, Swallow & Thompson, *supra* note 15, at 169 (noting that REDD+ is spurring movement towards including "net negative changes in carbon stocks across all lands and land uses" within future international compliance mechanisms); Visseren-Hamakers et al., *supra* note 16, at 4 (noting complex tensions over whether to broaden REDD+ beyond forests to include agriculture).

[255] Takacs, *supra* note 151, at 56 (noting that "half of the global terrestrial pool of carbon is stored in forests").

[256] Many have expressed skepticism as to whether the complex type of management regimes necessary to treat desertification could lend themselves to the strict monitoring, reporting, and verification procedures of carbon markets (similar to the problems that Reduced Emissions from Deforestation and Forest Degradation (REDD) has faced). *See, e.g.*, CLIMATE CHANGE IN AFRICAN DRYLANDS, *supra* note 43, at 43-44 (noting that "[c]arbon finance projects require a clear project boundary, clear tenure rights in national law . . . and that rangeland owners can effectively exclude others from use," all generally lacking for many dryland pastoralists); *see also* Chasek et al., *supra* note 5, at 1.

[257] *See* Stringer et al., *supra* note 188, at 129 (marshaling evidence that "projects emphasizing multiple environmental and social goals (e.g. biodiversity conservation, reduced erosion, improved food security, employment opportunities, etc.) are much more likely to succeed than those specializing in carbon sequestration alone").

overcome or cabined in ways that didn't otherwise compromise the integrity or manageability of the program. One could also imagine that given LDNW's diverse goals, some might call for a "credit stacking" approach, whereby the same parcel of land might participate in various credit markets that reward it for preserving different functions, although this is a relatively new concept that presents many risks.[258] A full exploration of the role of environmental markets for LDNW is beyond the scope of this article, but merits discussion as LDNW gains momentum and takes further shape.

Even if LDNW does not pursue a strategy of integrating into carbon markets, private actors might be involved in the program in several ways. First, similar to some REDD+ countries, LDNW might pursue a national fund model, perhaps with financing contingent upon certain demonstrated actions, into which both developed country governments and private entities might donate.[259] In this case, private finance would likely be generated primarily by corporate social responsibility commitments.[260] This method of engagement with the private sector is likely to be the least lucrative and may never generate significant sums, but it would also be the safest in terms of insulating the program from the types of concerns that have accompanied private sector involvement in REDD+.[261]

A WMB model presents a second option for private sector engagement: national governments could use LDNW as an opportunity to shift domestic legal baselines to require developers of projects that would degrade certain land to engage in an equal amount of restoration.[262] This strategy might be more difficult in the case of land degradation than wetlands infill, given degradation's myriad causes and the diverse actors involved, but it might at least work to contain land degradation caused by major new developments. Of course, such a scheme would also be subject to all the pitfalls of WMB and other biodiversity offsetting schemes, with restoration offsets unlikely to measure up to land degradation losses for reasons discussed *supra*.[263] Nevertheless, given that most countries have a current baseline of *no* requirement of offsetting for developers, even less-than-perfectly-successful domestic LDNW offsetting requirements might produce some gains.

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[258] *See generally* Royal C. Gardner & Jessica Fox, *The Legal Status of Environmental Credit Stacking*, 40 ECOLOGY L.Q. 713 (2013); David Cooley & Lydia Olander, *Stacking Ecosystem Services Payments: Risks and Solutions*, 42 ENVTL. L. REP. NEWS & ANALYSIS 10150 (2012).

[259] *See generally* Vatn & Vedeld, *supra* note 149.

[260] *See* ECOSYSTEM MARKETPLACE, *supra* note 179, at v (explaining that most voluntary market purchases of REDD+ credits have come from social corporate responsibility initiatives).

[261] *See supra* notes 197-204 & accompanying text.

[262] *Cf.* 33 U.S.C. §§ 1311, 1344 (2012) (making discharge of pollutants into water illegal except under specific sections, including receipt of a dredge and fill permit).

[263] *See supra* notes 129-139 & accompanying text.

Finally, one other option that LDNW could pursue to engage private actors is the creation—perhaps in conjunction with a leading non-profit—of a certification scheme for "land degradation neutrality." Certification could be awarded to corporations operating in developing countries that are verified to responsibly offset any land degradation they cause via local restoration projects (similar to schemes operating for forest management and carbon sequestration in other contexts).[264] This strategy would again tackle only a subset of the causes of land degradation, but might be a worthwhile component of a larger program. It also, however, might involve risks of "greenwashing." i.e., creation of a standard not backed by real achievements on the ground, if not well-managed.[265]

These latter two options—domestic LDNW requirements codified into law, or a private certification scheme for corporate LDNW achievements—present many of the implementation risks that have riddled REDD+. In asking corporations to engage in restoration work directly, it is possible that they may do so in ways not conducive to local participation or not in the best interest of all local stakeholders.[266] Accordingly, in designing LDNW, plans for private participation should be accompanied by careful thinking about advance protections that might best help corporate partners engage with local communities in ways that ensure that their actions will achieve LDNW's core goals. Or, LDNW might also explore whether WMB's "in lieu fee" alternative—where developers pay into government-run funds instead of undertaking actions themselves—presents a more appropriate model in the land degradation context.[267]

iii. The Financing Challenge

Much like REDD+ (at least in its current early stages), LDNW is likely to attract a preponderance of its funding from developed country governments. Will the LDNW

[264] *Cf.* Michael P. Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129, 148, 162, 170 (2013) (tracking the rise of such systems of "private environmental governance," including 400 eco-labeling schemes now in existence, and arguing that they can play an important role in tackling environmental problems, particularly cross-boundary ones); Boyd & Salzman, *supra* note 178 (tracing the rise of the "gold standard" in carbon markets that guarantees the quality of carbon reductions at a level above that required by many compliance markets).

[265] *See* Vandenbergh, *supra* note 263, at 137 (noting that private activity is "meaningless or even harmful if it is just green-washing --private activity designed to give the appearance of environmental benefits without delivering actual benefits").

[266] *Cf.* Narula, *supra* note 202, at 145 (arguing that any framework that treats land as a commodity raises distributional concerns, as local populations may have their rights or customary uses trampled by private developers).

[267] *See supra* note 141. As noted earlier, Brazil has chosen to pursue a fee-based, rather than an action-based, biodiversity offsetting program that might present an interesting option for further study in this regard. *See supra* note 111.

framing boost contributions from the disappointing levels achieved under the desertification regime? We believe that a well-executed LDNW plan does indeed have this potential, precisely because of the UNCCD Secretariat's observation that it "is strikingly clear and easy to communicate."[268] The clarity of the LDNW vision creates accountability—one of the key factors missing in the desertification regime.[269]

To facilitate this accountability, sufficiently reliable baselines will be a critical first step, and a challenging one. Although the desertification community has struggled in the past to develop baselines, ,[270] promising new technologies are being developed on this front. As just one example, the Africa Soil Information Service has announced an innovative effort to develop a "standardized methodology for soil and land use monitoring and digital soil mapping . . . utiliz[ing] novel data collection methodologies that are efficient, cost-effective, and vastly improve the analytical precision of the landscape level estimates."[271] Strategic use of such rapidly developing technologies may enable LDNW to leapfrog some of the challenges encountered by past baseline establishment efforts. And indeed, the new LDNW framework presents a tremendous opportunity for a new call to action for the international community, perhaps one framed around "LDNW readiness funding." Such dedicated funding could be used to establish global and regional baseline methodologies and to apply these methodologies to create global and regional baselines from whence to commence action. Country- or locality-specific readiness funding might also be used to implement necessary governance reforms or run pilot projects, similar to REDD+. REDD+ has proven quite successful in generating readiness funding that is tied explicitly to establishing baselines and building the governance and monitoring capacities necessary to move to results-based funding.

Ultimately, it seems unlikely that LDNW will achieve the same financial proportions as REDD+, as it will never be able to promise the same scale of carbon reductions. But LDNW's strength lies in the multiplicity of its aims. While not delivering the same carbon "punch" as forests, other land types certainly do have the ability to sequester carbon when well-managed.[272] Similarly, LDNW may be able to serve as a crucial adaptation tool as climate change continues to transform and further degrade land.[273] And as an anti-poverty,

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[268] A STRONGER UNCCD. *supra* note 7, at 7.

[269] *Cf.* Takacs, *supra* note 148, at 690 (observing that funding for climate has been contingent on "meaningful mitigation actions and transparency on implementation").

[270] *See supra* note 220.

[271] *See Key Goals of the AfSIS Project*, African Soil Information Service, http://www.africasoils.net/about/messages (last visited July 16, 2014).

[272] *See* Grainger et al., *supra* note 25, at 363; CLIMATE CHANGE IN AFRICAN DRYLANDS, *supra* note 43, at 38.

[273] *See generally* SAHARA AND SAHEL OBSERVATORY, CLIMATE CHANGE ADAPTATION AND & THE FIGHT AGAINST DESERTIFICATION 9-10 (2007) (outlining ways that measures to halt and reverse desertification can contribute to

rural empowerment tool, LDNW also addresses international security and migration issues that are of importance to donor countries. It will be through this type of multi-faceted pitch, combined with a new framework and ability to monitor and measure progress, that LDNW might mobilize funding more successfully than its predecessor efforts. Ultimately, though, the program's ability to mobilize steady streams of funding will rest first upon creating strong legal and scientific foundations, capable of ensuring that legal definitions and measured variables equate with real success.

A conversation must also be had about the international institutional mechanisms necessary to carry LDNW forward. The UNCCD, to be sure, has played and might continue to play a crucial role, but its limited mandate will not allow for supervision and implementation of the type of expansive program it has articulated for LDNW.[274] Nevertheless, actions within the scope of the UNCCD might also be a part of the pluralistic activities that drive LDNW forward—one could imagine, for example, a "No Net Desertification" goal and convention protocol as successfully clarifying and reorienting that convention in the same way that the LDNW goal is intended to function more broadly. Further research and discussion about institutional avenues forward is therefore important but not necessarily a crucial prerequisite to action.

V. CONCLUSION: MOVING LDNW FORWARD, WITH INTEGRITY

At this point, LDNW remains more of a vision than a reality. The Rio+20 Outcome Document provides a foundation from which to proceed, but it is not yet clear how much further traction LDNW can secure, or whether it is the right pathway forward. We feel cautiously optimistic, however, that if well designed, it would represent an advancement in desertification policy and land policy more generally. Implementing an LDNW regime is unlikely to rapidly escalate land degradation up the world's agenda or to quickly transform an ailing governance framework into a robust and effective one. Nevertheless, it holds much promise, in part because there is such universal agreement that the current efforts to combat desertification and land degradation are struggling and insufficient. Certainly, there is some risk in broadening the focus away from desertification alone, to include all land types within a single program's goal. On the other hand, LDNW also offers an important crystallization of the concept of *land* as central to a number of development objectives, which may help attract funding that otherwise might not have gone specifically to desertification. Moreover, a neutrality framework—challenging as it may be in some

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the goals of adaptation, by countering vulnerabilities through implementing measures that "increase capabilities or decrease risks," ideally through "anticipatory adaptation" that occurs before impacts occur).

[274] *Cf.* UNCCD, *supra* note 1, Art. 2 (setting forth the Convention's objective as specifically focused on combatting desertification and mitigating the effects of drought).

ways—offers the distinct advantage of requiring, as a prerequisite for any ability to claim success, a more rigorous assessment and quantification of the state of land degradation in the world currently. To be sure, such an assessment will prove difficult and is likely to be imperfect, but it will nevertheless be an important first step to building accountability into the land degradation management regime that in turn unlocks more international funding.

The examples of REDD+ and WMB do not allow for enthusiastic endorsement of "neutrality"-framed land management programs. "To neutralize" requires consensus around, and reasonable measurements of, what is gained and what is lost in ways that have proven ecologically and practically challenging for both programs, for diverse sets of reasons that we have explored. But these efforts have also laid the groundwork for the next generation of such programs to proceed with greater knowledge of how to design with integrity, for success. While we would not recommend importing such models into contexts where the status quo is adequate but imperfect, land degradation offers (if the pun can be excused) fertile ground for experimentation in reframing and reorganizing development targets and agendas, given the persistent decline in land quality under current policies. REDD+ and WMB's lessons, if heeded, will hopefully allow LDNW to take the best and leave the worst of their models.