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INTRODUCTION

BIODIVERSITY PROTECTION AND MITIGATION

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Mitigation banking has raised the bar on compensatory mitigation by instituting accountability, financial assurances, and regular monitoring.[1] The mitigation banking industry has improved mitigation practices throughout the United States, improvements which have carried over to other nations.[2] Market-based systems that transform resources into fungible commodities are an invaluable means of working toward a more ecologically sustainable future.[3] However, as the enthusiasm surrounding market approaches continues to grow, we need to be cautious of overly relying on mitigation banks to protect broader ecosystem services and meet sustainability targets.

Many ecologists fully support market-based mitigation approaches such as conservation banking, wetland banking, water-quality trading, and carbon trading. In 2005, the

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1. Jessica Fox, Gretchen C. Daily, Barton H. Thompson Jr., Kai M. A. Chan, Adam Davis & Anamaria Nino-Murcia*, Conservation Banking*, in *The Endangered Species Act at Thirty: Conserving Biodiversity in Human-Dominated Landscapes* vol. 2, 228, 230–233 (J. Michael Scott, Dale D. Goble & Frank W. Davis eds., Island Press 2006).

2. *See* Louisa Mamouney, Jennifer Stace & Caroline Heathcote, *Incentives for Biodiversity Conservation in NSW, Australia*, 38 Stetson L. Rev. 357 (2009) (describing the Australian mitigation banking project known as BioBanking).

3. Fox et al., *supra* n. 1, at 242.

Millennium Ecosystem Assessment expressed support for market-based systems as a means of achieving sustainability.[4] Indeed, these budding industries have turned housing developers into habitat protectors, brought business people to ecological conferences, and have provided business-based arguments for protecting habitat instead of building golf courses.[5] The 972-hectare (2400-acre) Silverado Ranch in Riverside, California is a case in point.[6] The ranch was originally purchased to be subdivided and developed into residential homes. However, due to "healthy populations of the federally protected Stephen's kangaroo rat (*Dipodomys stephensi*) . . . the owners had the option to establish a bank."[7] The landowners were able to justify this alternative land management strategy because banking offered the potential for substantial revenues and eliminated the need to implement mitigation measures necessary to develop the site.[8] So, instead of a subdivision, the ranch is now a privately owned conservation bank.[9]

The growth of market mechanisms for addressing impacts and conservation has given rise to private tracking systems for these markets, including the recently launched speciesbanking .com[10] and ecosystemmarketplace.com.[11] The first handbook on

4. Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Synthesis* 2 (2005) (available at http://www.millenniumassessment.org/documents/document.356.aspx.pdf).

5. Jessica Fox & Anamaria Nino-Murcia, *Status of Species Conservation Banking in the United States*, 19 Conserv. Biology 996, 1001 (2005).

6. *Id.*

7. *Id.*

8. *Id.* at 1001.

9. *Id.*

10. Katoomba Group, *Speciesbanking.com*, http://www.speciesbanking.com/ (accessed Apr. 27, 2009). Speciesbanking.com represents the first comprehensive source of information for the species credit trading industry. *Id.* at http://www.speciesbanking.com/pages/dynamic/about_us.landing_page.php (accessed Apr. 27, 2009). The site provides a centralized location for basic information about species banks, such as the number and location of banks, species included, credit availability, and contact information. *Id.* In the past, such information, if available at all, was difficult to find, scattered across different Web sites and quickly becoming outdated. *Id.*

11. Katoomba Group, *Ecosystem Marketplace*, http://www.ecosystemmarketplace.com/ (accessed Apr. 27, 2009). The Ecosystem Marketplace hopes to emerge as the leading source for information about markets for ecosystem services such as biodiversity, water quality, and carbon sequestration. *Id.* at http://ecosystemmarketplace.com/pages/static/about.php (accessed Apr. 27, 2009). The site provides reliable information about market-relevant issues, such as pricing, regulation, and scientific data. *Id.*

conservation and biodiversity banking was recently published,[12] with a forward by the president of The Nature Conservancy,[13] as was the first comprehensive book on voluntary carbon markets,[14] with a forward by former Vice-President Al Gore.[15] Credit registries are active for carbon, and emerging efforts are taking shape to develop credit-trading registries for biodiversity, wetlands, and water quality.[16] These markets are being lumped together for convenience and referenced as "ecosystem service markets" and "eco-asset markets." It is clear that the eco-asset train has left the station, carrying teething investors, ecologists, business people, and mitigation seekers.

With the excitement of this new industry, recent discussions seem to conflate the concept of these markets with ecosystem services themselves. We need to remember that, as currently structured, markets are based in mitigation, or offsetting impacts.[17] Regulatory-driven markets such as mitigation banking and conservation banking are not intended to achieve sustainability.[18] They may be a better mitigation option than in-lieu fees that are inadequately applied, or permittee projects that are ill-planned and implemented,[19] but they are still just mitigation. Market mechanisms will be critical for achieving mitigation targets, but they are just one tool that needs to be applied for achieving sustainability.[20]

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12. *Conservation & Biodiversity Banking: A Guide to Setting Up and Running Biodiversity Credit Trading Systems* (Nathaniel Carroll, Jessica Fox & Ricardo Bayon eds., Earthscan 2008) [hereinafter *Conservation & Biodiversity Banking*].

13. Stephanie Meeks, *Foreword*, in *Conservation & Biodiversity Banking*, *supra* n. 12, at ix–x. Ms. Meeks is the former acting president and chief executive officer of The Nature Conservancy. *Id*. at x.

14. Ricardo Bayon, Amanda Hawn & Katherine Hamilton, *Voluntary Carbon Markets: An International Business Guide to What They Are and How They Work* (Ricardo Bayon, Amanda Hawn & Katherine Hamilton eds., Earthscan 2007) [hereinafter *Voluntary Carbon Markets*].

15. Al Gore, *Foreword*, in *Voluntary Carbon Markets*, *supra* n. 14, at xiv.

16. *About Ecosystem Marketplace*, *supra* n. 11.

17. *See e.g.* Fox et al., *supra* n. 1, at 233 (noting that the objective of an endangered species bank is simply to mitigate impacts on threatened or endangered species).

18. *See e.g.* Bayon, Hawn & Hamilton, *Voluntary Carbon Markets*, *supra* n. 14, at 4 (discussing carbon offset markets and their inability to make a polluting company carbon neutral).

19. Sherry Teresa, *Perpetual Stewardship Considerations for Compensatory Mitigation and Mitigation Banks*, 38 Stetson L. Rev. 337 (2009).

20. *See e.g.* Janet Peace, *An Economist's Perspective on the Voluntary Carbon Market: Useful but Not Sufficient*, in *Voluntary Carbon Markets*, *supra* n. 14, at 64 (describing the

A much broader effort beyond updating the federal compensatory mitigation regulations will need to be employed to protect the complex set of interacting ecosystem services that we rely on. This gap has already been recognized by several federal agencies and discussions have shifted from project-specific impacts, to the protection of ecosystem services. For example, the U.S. Fish and Wildlife Service's ecosystem approach has been implemented to facilitate conservation because,

> we can't just look at a single animal, species, or piece of land in isolation from all that is around it. We all realize that we are not going to achieve conservation within the boundaries of a National Wildlife Refuge, that we are not going to restore aquatic resources with a National Fish Hatchery, and that listing an endangered species is not going to conserve the system. All of these are interconnected. If we disturb or manage one, all of the others will be affected.[21]

Similarly, the U.S. Environmental Protection Agency recently began its Ecosystem Service Research Program[22] which "is transforming the way we account for the type, quality, and magnitude of nature's goods and services so that they can be considered in environmental management decisions." The program's research provides "data, methods, models, and tools needed by states, communities, and tribes to understand the cost and benefits of using ecosystem services."[23]

The U.S. Forest Service is "exploring national opportunities to advance markets and payments for ecosystem services."[24] The Office of Ecosystem Services and Markets was established under the U.S. Department of Agriculture to aid in the implementation of Section 2709 of the Farm Bill.[25] The mission of this office "will

importance but insufficiency of carbon offset markets).

21. U.S. Fish & Wildlife Serv., *Ecosystem Conservation*, http://www.fws.gov/ecosystems/ (accessed Mar. 30, 2009).

22. U.S. Envtl. Protec. Agency, *Ecosystem Services Research Program*, http://www.epa.gov/ecology/ (updated Mar. 25, 2009).

23. *Id*.

24. U.S. Forest Serv., *Ecosystem Services*, http://www.fs.fed.us/ecosystemservices/ (updated Dec. 16, 2008).

25. *Id*. at http://www.fs.fed.us/ecosystemservices/Farm_Bill/index.shtml (updated Mar. 17, 2009). The Farm Bill, also known as the Food, Conservation, and Energy Act of 2008, is the means by which the U.S. Department of Agriculture administers its programs and policies. Pub. L. 110-246, 122 Stat. 1651 (2008).

focus on scientifically rigorous and economically sound methods for quantifying carbon, air and water quality, wetlands, and endangered species benefits in an effort to facilitate the participation of farmers, ranchers, and forest landowners in emerging ecosystem markets."[26]

As highlighted in the objectives of the various government agencies above, there seems to be an increasing exchange of the concepts of mitigation markets and ecosystem services. I wonder if there is an underlying misunderstanding of the differences between broader ecosystem services and isolated mitigation markets. The U.S. Environmental Protection Agency defines ecosystem services as "the many life-sustaining benefits we receive from nature—clean air and water, fertile soil for crop production, pollination, and flood control."[27] These ecosystem services are often mistakenly taken for granted as being unlimited and free, despite their importance to our health and well-being.[28] Markets for species, wetlands, water, and carbon are very isolated elements of ecosystems.[29] These markets trade tons of carbon, acres of wetland, acres of endangered species habitat, and pounds of water quality pollutants.[30]

Even for carbon, the most studied of all these markets, there is debate over the extent that these markets offer permanent benefits to climate regulation.[31] For the other markets, including species, wetlands, and water quality, there are few, if any, rigorous studies that evaluate the role of these markets in protecting ecosystem services.[32] As questioned previously, what are the implications of conservation banking for biodiversity? Some argue that conservation banks offer merely a way of "[fiddling] at the margins of the threats faced by threatened and endangered species."[33]

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26. *U.S. Forest Serv.*, *supra* n. 24.

27. *Ecosystem Services Research Program*, *supra* n. 22.

28. *Id*.

29. Jessica Fox, *Getting Two for One: Opportunities and Challenges in Credit Stacking*, in *Conservation & Biodiversity Banking*, *supra* n. 12, at 173.

30. Jessica Fox, *The Value of Your Eco-assets*, 31 *Elec. Persp.* 18, 20 (Mar.–Apr. 2006).

31. *Voluntary Carbon Markets*, *supra* n. 14, at 4.

32. *See e.g.* Fox & Nino-Murcia, *supra* n. 5, at 1005 (describing the lack of any studies evaluating the success or failure of conservation banking for endangered species compared to other mitigation options).

33. Fox et al., *supra* n. 1, at 240.

In reality, we do not know if banks are achieving mitigation, let alone protecting ecosystem services. One study revealed that 94% of conservation banks are preserved and mitigating impacts to species using preserved habitat could result in a net loss of inhabitable acres on the landscape.[34] With wetland banking being primarily based on restored habitat, this industry is plagued by concerns over the ecological value of created and extensively restored habitat.[35] Given this uncertainty, it makes sense that risk-averse businesses such as the electric power industry have been somewhat hesitant to invest in banks for wetlands and biodiversity.[36] Despite massive land-management responsibilities and the continual need for cost-effective management options, one of the concerns is that the bottom might fall out of eco-asset markets because there is limited ecological basis for the trading.[37] There is concern that in the midst of the excitement of a nascent industry, the approach has been oversold.[38] Conducting rigorous assessments to validate the ecology of these markets will not only provide support to the mitigation banking community, which has invested so much time and equity, but it will provide assurances that the foundation on which these markets are built, offering more effective ecological and economic outcomes, is in fact solid.[39]

In the process of validating existing markets, it may be possible to identify ways to expand mitigation markets to include ecosystem services. Of course, part of the limitation in considering banking for ecosystem services is that there are few easily employed methods for assessing ecosystem services. Specifically, there is a lack of tools for converting the interests of the agencies in ecosystem services into performance standards that banks need to abide by.[40] In addition, mitigation in the United States is not based on ecosystem services; it is based on acres, pounds, and tons.[41] Therefore, the banking industry offers mitigation in these

34. Fox & Nino-Murcia, *supra* n. 5, at 1005.
35. *Id.*
36. Fox, *supra* n. 30, at 26.
37. Fox & Nino-Murcia, *supra* n. 5, at 1006.
38. Fox, *supra* n. 30, at 26.
39. Fox & Nino-Murcia, *supra* n. 5, at 1005–1006.
40. *Id.* at 1006.
41. *See* Natl. Research Council, *Compensating for Wetland Losses under the Clean Water Act* 6 (Natl. Acad. Press 2001) (available at http://books.nap.edu/openbook.php ?record_id=10134&page=R1) (describing instances where, though the strict acreage re-

same terms. If agencies begin requiring mitigation in terms of water purification, flood control, and pollination services, the mitigation banking industry may respond by providing these more comprehensive credit types. Instead of selling acres of wetlands, which may or may not provide any flood control benefits or species habitat, credits will only be generated once the services are verified. Similarly, for species banking, credits may no longer be based on acres of "potential" habitat, but rather they will be generated by the number of offspring that an endangered species has actually produced on a particular site. Pollination services, among other ecosystem services, are absent from the banking arena, as they should be because mitigation of impacts to pollination services is not enforced by agencies.[42]

Even though there was an effort by the banking industries to unbundle ecosystem services into definable credit types, it may ultimately be the mitigation bankers that unknowingly drive markets toward more comprehensive credit types. Interest in credit stacking—acquiring credits under multiple market-based strategies on a single parcel of property—is growing.[43] The interest in stacking makes business sense; there is an economic incentive to get as much return as possible for a given investment.[44] There is an incentive for getting both carbon and wetland credits at a single site, or both species and water-quality credits for one improved buffer strip.[45] The market is starting to rebundle natural resource values into more comprehensive, and expensive, credit types.[46] This drive by the bankers to bundle credits may present a collaborative opportunity, if recognized, to work with agencies that are focused on implementing ecosystem service initiatives. Ultimately, bankers will follow the demands of the mar-

quirements for mitigation banks had been met, the resulting ecological benefit was questionable or limited).

42. *See* Commn. European Community, *The Economics of Ecosystems and Biodiversity: An Interim Report* 35 (2008) (available at http://ecosystemmarketplace.com/documents/cms_documents/teeb_report.pdf) (noting the exclusion of some ecosystem services from governmental studies on ecosystem welfare losses).

43. Fox, *supra* n. 29, at 171.

44. *Id.*

45. *Id.*

46. *Id.* at 173. For a more complete discussion of credit stacking, *see id.* at 171 (describing credit stacking, the opportunities afforded by it, and the dangers of its misuse).

ket. If agencies require mitigation for ecosystem services, the bankers will respond.

The challenges of converting the mitigation-focused markets in the U.S. to true ecosystem service markets are substantial. However, we may learn some early lessons by looking at efforts defined as Payment for Ecosystem Services (PES).[47] PES schemes reward those whose lands provide ecosystem services, with subsidies or market payments from those who benefit.[48] This could mean, for example, that downstream users of water purified by an upstream forest, such as bottling companies, pay those who manage these upstream forests to ensure a flow of this service. Lessons from emerging PES schemes can be studied for strategies for transforming our mitigation-centric approach to markets to selling ecosystem service credits. At the very least, we should be looking to PES schemes and similar efforts for examples of how to modify the existing mitigation markets to acknowledge more fully the suite of impacts that development projects have on ecosystem services. While we wait for these lessons and begin to use the terms "mitigation banking" and "markets for ecosystem services" interchangeably, we need to be clear on the gap that needs to be filled before we are trading credits that represent a full complex of ecosystem services.

While wetland and species banking offer significant and effective ways to mitigate impacts to isolated natural resources, we need to verify the ecological underpinnings of current markets. Further, we need to be sure we are not unduly relying on mitigation banking to protect our global ecosystem services—such an expectation would neither be fair to the bankers nor to the ecosystem services. The articles included in this volume of *Stetson Law Review* provide a needed basis for understanding the pitfalls, challenges, and improvements in compensatory mitigation for wetlands and biodiversity. While reading these articles, consider the mechanisms that can be used to go beyond just mitigation, so we can maintain the vital ecosystem services on which we all rely.

47. Francisco Alpizar, Allen Blackman & Alexander Pfaff, *Payments for Ecosystem Services: Why Precision and Targeting Matter*, Resources 20, 20 (Spring 2007).

48. *Id.*