ADDITIONALITY: THE NEXT STEP FOR ECOSYSTEM SERVICE MARKETS

KAREN BENNETT*

INTRODUCTION

Natural landscapes, and the benefits they provide humans, have always been freely available—but their existence is now under constant threat. In an attempt to secure the continued provision of nature's benefits, the past decade has seen a rise in new markets and payments for ecosystem services ("PES"),[1] such as wetland mitigation banking, water quality markets, and payments for carbon sequestration from soil and forests. In its most basic form, a PES is where people who benefit from ecosystem services pay the landholders who provide those services. In return for payment, landholders alter their land management practices in ways that restore and preserve natural landscapes.[2] This paper utilizes the terms "payment for ecosystem services" and markets for ecosystem services in their broadest sense, encompassing what others have termed PES, such as the Costa Rica program,[3] ecosystem service markets, such as the international market for carbon offsets,[4] mitigation banking, such as the wetlands program established in the

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* Karen Bennett is a second year student at Duke University School of Law. Prior to entering law school, she worked as a research program coordinator in the ecosystem services program at the World Resources Institute. Karen would like to thank Nicholas Bianco, Derik Broekhoff, Lydia Olander, and Jim Salzman for their comments and support in developing this paper.

1. SVEN WUNDER, PAYMENTS FOR ENVIRONMENTAL SERVICES: SOME NUTS AND BOLTS, OCCASIONAL PAPER NO. 42, at 3 (2005). According to Wunder, a payment for ecosystem service is: (a) a voluntary deal (b) for a specific ecosystem service (or land use determined to produce that service) between (c) at least one purchaser and (d) at least one producer where (e) the producer actually secures the service.

2. *E.g.*, Sven Wunder, *The Efficiency of Payments for Environmental Services in Tropical Conservation*, 21 CONSERVATION BIOLOGY 48, 50 (2007).

3. Stefano Pagiola, *Payments for Environmental Services in Costa Rica*, 65 ECOLOGICAL ECON. 712, 712 (2008).

4. *E.g.*, U.N. Framework Convention on Climate Change [UNFCCC], *Report of the Conference of the Parties on its Seventh Session*, Marrakesh Oct. 29–Nov. 10, 2001, U.N. Doc. FCCC/CP/2001/13/Add.2 (Jan. 21, 2002).

United States,[5] and conservation programs, such as the Conservation Reserve Program.[6,7]

The PES approach to conservation and resource management is quickly growing and can now be found at all governing levels across the globe.[8] The myriad PES programs in existence vary in scope and substance. Most of these systems have grown organically, learning from the experience of others in the field. Many organizations have developed guides to help people creating ecosystem service markets learn from others' experience.[9]

Simultaneously, localities, states, nations, and regions around the globe have begun to implement systems to combat climate change. In so doing, many authorities have created market-based programs to encourage emissions reductions. Many of these programs provide entities required to reduce emissions the option of meeting their targets by buying or funding reductions made by others through technological development and land management changes.[10] The resulting "carbon markets" bear many similarities to ecosystem service markets. Some carbon markets, such as the Kyoto Protocol's Clean Development Mechanism ("CDM") program, which allows crediting of afforestation projects, are in fact ecosystem service markets. Yet many features considered crucial in the carbon market do not always find acceptance in markets for other ecosystem

5. *E.g.*, U.S. Envtl. Prot. Agency, Mitigation Banking Factsheet, http://www.epa.gov/wetlands/facts/fact16.html (last visited June 8, 2010).

6. U.S. Dept. of Agric. Farm Serv. Agency, Conservation Reserve Program, http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp (last visited June 8, 2010) [hereinafter USDA FSA].

7. G. Arturo Sánchez-Azofeifa et al., *Costa Rica's Payment for Environmental Services Program: Intention, Implementation, and Impact*, 21 CONSERVATION BIOLOGY 1165, 1166 (2007).

8. *See, e.g.*, Steven Zwick, *Ecosystem Markets Finish Year on (Relatively) High Note*, ECOSYSTEM MARKETPLACE, Dec. 31, 2008, http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=6414&section=news_articles&eod=1.

9. *See, e.g.*, KAREN BENNETT & NORBERT HENNINGER, PAYMENTS FOR ECOSYSTEM SERVICES IN COSTA RICA AND FOREST LAW NO. 7575: KEY LESSONS FOR LEGISLATORS (2008), *available at* http://www.e-parl.net/eparlimages/general/pdf/090422%20e-Parliament%20Forests%20Initiative.pdf; KATOOMBA GROUP, FOREST TRENDS & UNEP, PAYMENTS FOR ECOSYSTEM SERVICES: GETTING STARTED: A PRIMER (2008) *available at* http://www.forest-trends.org/publication_details.php?publicationID=2347; TO N. NGUYEN ET AL., A GUIDE TO MARKET-BASED APPROACHES TO WATER QUALITY (2006); JANET RANGANATHAN ET AL., ECOSYSTEM SERVICES: A GUIDE FOR DECISION MAKERS (2008), *available at* http://www.wri.org/publication/ecosystem-services-a-guide-for-decision-makers.

10. *E.g.*, UNFCCC, *supra* note 4; *see also* REG'L GREENHOUSE GAS INITIATIVE [RGGI], MODEL RULE § 10 (2008), *available at* http://www.rggi.org/about/history/model_rule.

services. For carbon markets and PES programs to maximize environmental benefits and fiscal efficiency, each should draw lessons from the other type of market.

This paper looks at one element, additionality, which is a fundamental component of most climate change markets,[11] and considers its application to ecosystem service markets. Under a PES program, when someone pays a landholder to implement a certain management practice, technology, or conservation system to secure an ecosystem service, that activity is deemed "additional" if it would not have happened in absence of the payment provided by the PES system.[12] Additionality is a critical component of any environmental market and should be used with more frequency across the spectrum of PES systems. Additionality, however, is often seen as expensive, onerous, and an impediment to quick uptake of new PES systems.[13] This paper reviews common policy approaches to analyzing additionality in an attempt to overcome this criticism and present additionality as a pragmatic, as well as environmentally sound, component of ecosystem service markets.

The analysis is based on the assumption that payments for ecosystem services are made in order to achieve specific environmental outcomes. Some PES arrangements do not have this goal and, instead, are subsidy programs, offering payment for the provision of ecosystem services that would have occurred even in the absence of payment. For example, Costa Rica's system, which pays landholders who conserve forests, use sound forest management, or plant new forest, tries to "recognize" what ecosystem services forest holders are providing, regardless of whether or not that provision is new or dependent on the payment.[14] Systems with goals like Costa Rica's do not necessarily fit under the analysis here, which is based on creating the most efficient system possible to reach a target environmental outcome.

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11. Matthew M. Sommerville, Julia P.G. Jones & E. J. Milner-Gulland, *A Revised Conceptual Framework for Payments for Environmental Services*. 14 ECOLOGY & SOCIETY 34, 40 (2009), *available at* http://www.ecologyandsociety.org/vol14/iss2/art34/.

12. *See, e.g.*, Stefanie Engel, Stefano Pagiola & Sven Wunder, *Designing Payments for Environmental Services in Theory and Practice: An Overview of the Issues*, 65 ECOLOGICAL ECON. 663, 670 (2008).

13. Sommerville et al., *supra* note 11, at 40.

14. Pagiola, *supra* note 3, at 718.

I. WHAT IS ADDITIONALITY?

The fundamental question to determine additionality is: What would have happened without a market incentive? To be additional, pollutant reductions or land-use changes must be made or avoided in direct response to payment.

Take, for example, a farmer in North Carolina offering to plant a riparian buffer along a river that runs next to his property. That buffer would prevent excess fertilizer from running into the river, thereby reducing the nutrient load in the waterway. This project would likely be eligible for payment in an ecosystem service market attempting to lower eutrophication in a water body connected to the farmer's river—but is it additional? In order to find out, the potential buyer or organization managing the market would have to determine whether the farmer would have planted the riparian buffer regardless of receiving funds from a water quality market (in which case his project is not additional) or whether the market was really the impetus for his changed behavior (in which case it would be additional). If the farmer would not have planted the buffer *but for* the water quality payment, then nutrient reductions from his farm would be considered additional.

Most PES programs do not require that projects be additional in order to participate. A 2006 survey of payments made for conservation found that no programs at the time were directly assessing additionality for program participation.[15] A 2008 study cited only one program, the CDM, which accounted for additionality in its upfront analysis of projects.[16] Some PES markets, which are highlighted later in this paper, are incorporating additionality criteria into their operations, but it is often in the form of *ex ante* analysis[17] or secondary inclusion in pursuit of another policy goal.[18] Most carbon markets, on the other hand, explicitly identify additionality as

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15. Paul J. Ferraro & Subhrendu K. Pattanayak, *Money for Nothing? A Call for Empirical Evaluation of Biodiversity Conservation Investments*, 4 PLOS BIOLOGY 482, 483 (2006).

16. Sven Wunder, Stefanie Engel & Stefano Pagiola, *Taking Stock: A Comparative Analysis of Payments for Environmental Services Programs in Developed and Developing Countries*, 65 ECOLOGICAL ECON. 834, 845 (2008).

17. For example, there have been several studies retroactively assessing the additionality of the United States' Conservation Reserve Program. *See, e.g.*,
Ruben N. Lubowski, Andrew J. Plantinga & Robert N. Stavins, *Determinants of Land-Use Change in the United States*, *1982-1997*, (RFF Discussion Paper No. 03-47, 2003); PATRICK SULLIVAN, ET AL., THE CONSERVATION RESERVE PROGRAM: ECONOMIC IMPLICATIONS FOR RURAL AMERICA 48 (2004).

18. Wunder et al., *supra* note 16, at 845.

fundamentally important to the program, though it is not always a requirement for participation in practice.[19]

II. WHY DOES ADDITIONALITY MATTER?

Implementing a PES program without questioning what would have happened in its absence is to proceed "with an unwavering faith in the connection between interventions and outcomes and without a plan to judge the effectiveness of such interventions."[20] Assessing additionality is necessary for a PES scheme to achieve its environmental target with economic efficiency while maintaining investor confidence.

A. Achieving an Environmental Outcome

Environmental markets come in several forms. Under some models, an entity trying to achieve a particular environmental outcome pays another to preserve or enhance the environment. For example, in the 1990s, New York City needed to improve its water quality to meet potable water quality regulations imposed by the United States Environmental Protection Agency ("EPA"). The City acquired land and negotiated contracts governing landowner activity on other lands in the Catskill and Delaware watersheds to improve the quality of the water reaching Manhattan.[21]

In other systems, regulation has put an overall limit on pollution, but pollutant output by one actor is allowed to be "offset" by pollutant reductions from another actor.[22] For example, starting this year, Pennsylvania will "cap" nitrogen and phosphorous discharges from industrial facilities to protect water quality in the Chesapeake Bay.[23] Industries can meet their environmental obligations under the regulation via reductions made offsite, by purchasing credits from other capped entities that have over-complied, or from uncapped regional farmers implementing practices that reduce nutrient runoff

19. DERIK BROEKHOFF, EXPANDING GLOBAL EMISSIONS TRADING: PROSPECTS FOR STANDARDIZED CARBON OFFSET CREDITING 2 (2007), *available at* http://www.ieta.org/ieta/www/pages/getfile.php?docID=2730.

20. Ferraro & Pattanayak, *supra* note 15, at 484.

21. SEAN MURPHY, J. WOLFE TONE & PAUL SCHWARTZBERG, LAND ACQUISITION FOR WATER QUALITY PROTECTION: NEW YORK CITY AND THE CATSKILLS WATERSHED SYSTEM 60 (1995), *available at* http://www.ucowr.siu.edu/updates/pdf/V100_A9.pdf.

22. *See, e.g.*, UNFCCC, *supra* note 4; RGGI, *supra* note 10, at 59; MINDY SELMAN, ET AL., WATER QUALITY TRADING PROGRAMS: AN INTERNATIONAL OVERVIEW (2009).

23. SELMAN et al., *supra* note 22, at 6.

from cropland, such as no-till agriculture.[24] Supported by a similar philosophy, there are also mitigation banks, which conserve or restore land in one location to "offset" land conversion elsewhere. This approach is used for wetlands, for example, to maintain the no net wetland loss policy of the United States government.[25] Finally, there are conservation payments, where one group pays another to use conservation techniques, such as the United States' Conservation Reserve Program.[26]

Despite their difference in form, under all of these programs one group is paying to secure an ecosystem service in order to pursue a concrete environmental goal. This general philosophy underlies the importance of additionality for all of these systems. If a program pays a landholder to secure an environmental benefit, it counts that reduction toward the overall environmental goal.[27] If the payment does not pay for a new ecosystem service, then the program is counting something without gains actually being achieved. In a PES program with a regulatory limit, such as the example from Pennsylvania, whether or not an industry purchases offsets should not alter the total level of reduction reached. In a system that guarantees additionality, the reductions are simply being achieved in a different place or a different way. Without additionality, the environmental goals of the project may not be met.

Take the example of the sequestration of carbon dioxide by a forest. Through the CDM, a capped entity within a country with a mandatory greenhouse gas emission reduction can partially reach that target by funding an afforestation project in a developing country.[28] The fundamental idea underlying this program is that by enabling additional sequestration of carbon dioxide in trees, the emissions of the funding country will be offset by sequestration elsewhere. If, however, the afforestation project would have happened regardless of the payment provided through the CDM, then no new benefit is obtained through the payment, and the emissions in the funding country are not offset, leading to a higher concentration of

24. *Id.*

25. U.S. Envtl. Prot. Agency, *supra* note 5.

26. USDA FSA, *supra* note 6.

27. *E.g.*, OFFSET QUALITY INITIATIVE, ENSURING OFFSET QUALITY: INTEGRATING HIGH QUALITY GREENHOUSE GAS OFFSETS INTO NORTH AMERICAN CAP-AND-TRADE POLICY 1 (2008), *available at* http://www.offsetqualityinitiative.org/briefings.html; WRI, OVERVIEW OF REGIONAL INITIATIVE'S OFFSET PROGRAM (2009), *available at* http://pdf.wri.org/regional_cap_and_trade_programs_offsets.pdf.

28. UNFCCC, *supra* note 4, at 22.

greenhouse gases in the atmosphere. This failure to uphold the principles of additionality would then lead to Kyoto reduction targets not being met in terms of actual emissions avoided.

B. Economic Efficiency

Another principle underlying the critical importance of additionality is one of economic efficiency. If someone pays for an activity which would have happened regardless of the payment, most would consider this to be a waste of money. In the Costa Rica system, for example, forestholders receive payments to conserve forestland, plant new forest plantations, or better manage forests.[29] Studies have found that many recipients of program funding would have protected or created their forests regardless of the program.[30] Given there is significantly more demand to participate in the program than can be accommodated,[31] greater environmental benefits could be achieved through the program by adding additionality criteria to the program's requirements. If funding was targeted at those who would not conserve or plant forests but for the PES program, then additional forestland could be preserved and created through payments. Those who would have conserved without the payment would still protect their forests.

As stated in the introduction, however, Costa Rica's system explicitly announces that it is paying for environmental services already being provided, as well as those provided additionally in the future.[32] For Costa Rica, PES promotes equity; those with forestland are providing a benefit to society, the ecosystem services on their land. Those who benefit from the services should pay, as they do for most services in most sectors of a free market economy. Other PES programs pursue separate goals outside of environmental benefits, such as poverty reduction.[33] In programs where the main purpose is

29. Bennett & Henninger, *supra* note 9, at 1.

30. Pagiola, *supra* note 3, at 718.

31. Only a quarter of demand is presently met with current funding. KATIA KAROUSAKIS, INCENTIVES TO REDUCE GHG EMISSIONS FROM DEFORESTATION: LESSONS LEARNED FROM COSTA RICA AND MEXICO, 21 (2007), *available at* http://unfccc.int/files/methods_science/redd/application/pdf/incentives_to_reduce_ghg_emissions_from_deforestation_lesson_learned_from_costa_rica_and_mexico.pdf.

32. Pagiola, *supra* note 3, at 718.

33. *See, e.g.*, J.K. Turpie, C. Marais & J.N. Blignaut, *The Working for Water Programme: Evolution of a Payments for Ecosystem Services Mechanism that Addresses Both Poverty and Ecosystem Service Delivery in South Africa*, 65 ECOLOGICAL ECON. 788, 791 (2008); Sven

to reach a particular environmental outcome or promote as much conservation as possible, however, payments to those already protecting or restoring land are inefficient and do not lead to the most successful outcome of the program.[34] This is a fundamental benefit of using additionality as a criterion for program participation. It allows the program's money to be spent on real reductions, rather than using limited resources to fund what would have happened regardless.

C. Investor Confidence

Additionality is also important to give market investors confidence in the system. Unless someone buying into the system knows that their money may be used to pay those already providing ecosystem services, most people assume additionality in the market and expect that their funding will alter "business as usual" in some way. If investors find out that many projects funded through a PES program are non-additional, the program may lose many investors.

III. CURRENT PES SYSTEM MODELS FOR ADDRESSING ADDITIONALITY

As already stated, most PES programs do not currently require that projects be additional to qualify for participation, partially out of fear that assessing additionality will prove to be cost-prohibitive.[35] Additionality standards can be viewed as an impediment to quick, universal adoption and participation in PES systems.[36] As experience in carbon markets has demonstrated, developing and implementing additionality criteria is complicated, since predicting what would have happened in the future is not simple. This can also be a political challenge, since implementing any new participation criteria excludes some people from the PES program.

In order to help those considering implementing an additionality standard and allay fears as to its complexity and cost, this section lays out four options that different PES systems are using to ensure that services receiving payments are additional. After laying out the basic method for each approach, the benefits and downsides of each model are considered. Where possible, approaches for strengthening each

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Wunder, *Payments for Environmental Services and the Poor: Concepts and Preliminary Evidence*, 13 ENV'T. & DEV. ECON. 279 (2008).

34. Pagiola, *supra* note 3, at 717.

35. Sommerville et al., *supra* note 11, at 40.

36. *See* Wunder et al., *supra* note 16, at 845; *see also* Ferraro & Pattanayak, *supra* note 15, at 486.

option are also presented, including possibilities for combining models. The approaches presented here are not exhaustive. They are simply illustrative of what is currently being employed with at least some success.

Additionality assessments in carbon markets typically take the form of project-by-project assessments or standardized tests.[37] These two models are laid out first. The third model explored, discounting, bases crediting levels on the likelihood that an activity is additional. The fourth, probability assessments, builds on a PES system in Mexico. The final subsection discusses how to update and correct additionality assessments once they are in place.

A. Project-specific Assessment

Project-by-project assessments are the most intuitive model of additionality assessment. Here, a project developer submits a proposal to a regulating entity, which reviews and evaluates whether the project is additional. Generally programs have established guidelines for evaluating the projects, but ultimately, the decision rests on a subjective evaluation of the application.

The world's largest PES system, the Kyoto Protocol's Clean Development Mechanism,[38] employs this approach. Under the Kyoto Protocol, industrialized nations are able to fund projects to lower greenhouse gas emissions in developing economies.[39] A CDM project must result in a reduction of greenhouse gas emissions "that is additional to any that would otherwise occur," meaning emissions "are reduced below those that would have occurred in the absence of the registered CDM project."[40] The CDM project approval process is

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37. Broekhoff, *supra* note 19, at 3.

38. Some have noted the uniqueness of CDM; it is the only major offset market designed to work in multiple countries for nearly any industry. Because of this need for broad applicability with limited resources, CDM may be a unique case requiring at least some project-specific evaluation and bottom-up development of assessment processes. *Id*. at 32.

39. UNFCCC, *supra* note 4, at 23.

40. *Id.* at 14, 16. Note that this is the political definition documented in the UNFCCC treaty. In reality, the definition is circular and problematic. "[I]n the absence of the registered CDM project" logically requires that in the counterfactual scenario the project would not have occurred without CDM. In practice, the tests implemented by the CDM Board look beyond this political definition and determine whether, in fact, the project would have been implemented in the absence of CDM funding.

governed by an executive board, which in turn uses independent verifying agencies to review proposals.[41]

The executive board examines a baseline, specific to each project, that represents what would have happened in the absence of the CDM program.[42] The project must show that there is an alternative for the land that is more likely to have occurred had CDM not existed.[43] Developers also must show either that there is a lack of financing for the project or that the activity proposed faces a significant barrier to implementation without CDM.[44] Finally, projects cannot be common practice.[45] For CDM, no project can be classified as additional solely by meeting certain objective criteria (as opposed to the standardized approach presented in the following section).[46] Other programs use project-specific approaches as well. California's Climate Action Reserve ("CAR"), for example, looks to see whether there is an imminent and known threat of forestland conversion.[47] If a project developer can show through contracts or financial offers that there is a threat of land conversion within five years, that plot is eligible for avoided conversion credits under the program.[48]

In theory, project-specific assessments should be the most accurate determinate of additionality. This approach is flexible, since regulating entities can use discretion in granting project credits.[49] Also, a project-specific approach looks more directly at individual intent, unlike standardization, which may judge the additionality of one person's action based on the rest of the surrounding community (see, for example, the common practice criteria in the following section).[50]

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41. *See* Michael W. Wara & David G. Victor, *A Realistic Policy on International Carbon Offsets* 14 (Stanford Univ. Program on Energy and Sustainable Dev., Working Paper No. 74, 2008).

42. U.N. Framework Convention on Climate Change, *Tool for the Demonstration and Assessment of Additionality, Version 05.2*, at 4, *available at* http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf.

43. *Id.*

44. *Id.* at 5–9.

45. *Id.* at 10.

46. Broekhoff, *supra* note 19, at 35.

47. CAL. CLIMATE ACTION REGISTRY FOREST CERTIFICATION PROTOCOL: ENTITIES & PROJECTS: VERSION 2.0 § IV.2.5.B.3 (2007) [hereinafter CAR].

48. *Id.*

49. *See* Broekhoff, *supra* note 19, at 6 (reviewing the pros and cons of a project-specific method).

50. *See id.*

Due to its nature, however, a project-specific approach is time consuming and costly. Project-specific analysis is complicated, and anyone's ability to subjectively determine individual intent is often questioned. An investor's decision to pursue a project is a complex balance of options, risks, and barriers.[51] Project-by-project certification is often a cumbersome and slow process given its complexity—a 2008 study reported that CDM credits are being issued at a rate that is only 2.5 to 5 percent of what is needed.[52] The complexity can also lead to high administrative costs. If there is significant financial burden placed on project developers, there is a worry that projects will become unviable on the market.[53] Some have suggested that project approval depends more on the "packaging" of information than on the data actually provided.[54] A 2007 study of a sample of Indian CDM projects found that many of the projects had not provided information required for additionality analysis.[55] Where information was provided, it often lacked detail and was unsubstantiated.

There is also a question of whether project-specific approaches may "fail to see the forest for the trees." Wara and Victor[56] recount an example of a series of Chinese hydropower, wind, and natural gas plants that have applied for CDM credits on an individual basis. The Chinese government has a national policy to move toward these renewable energy sources and away from coal due to environmental health concerns and the national coal supply's inability to keep up

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51. *See* LAMBERT SCHNEIDER, IS THE CDM FULFILLING ITS ENVIRONMENTAL AND SUSTAINABLE DEVELOPMENT OBJECTIVES? AN EVALUATION OF THE CDM AND OPTIONS FOR IMPROVEMENT 40 (2007).

52. Wara & Victor, *supra* note 41, at 5.

53. *See id*. at 14 (stating that extensive investigation of CDM project proposals would price out small projects because of cost and uncertainty).

54. AXEL MICHAELOWA & PALLEV PUROHIT, ADDITIONALITY DETERMINATION OF INDIAN CDM PROJECTS: CAN INDIAN CDM PROJECT DEVELOPERS OUTWIT THE CDM EXECUTIVE BOARD? 13 (2007); *see also* Schneider, *supra* note 51, at 29.

55. Michaelowa & Purohit, *supra* note 54.

56. Wara and Victor's analysis may not actually signify a problem with the CDM. The study focuses on projects that have been submitted, not necessarily those that have been registered and given credit. The CDM Executive Board may take this type of problem into account. Recent news articles, in fact, report that the CDM Executive Board has been taking a hard line against Chinese renewable projects. Bruce Einhorn, *UN and China Squabble over Wind Subsidies*, BUSINESS WEEK, Dec. 2, 2009, http://www.businessweek.com/globalbiz/blog/eyeonasia/archives/2009/12/un_and_china_sq.html. Regardless of the practical outcome of this particular example, however, the overarching point is still important, and additionality systems need to account for it in their screening analysis.

with demand.[57] Each renewable energy plant seems additional standing alone; they typically cost more than a new coal fired plant.[58] But if CDM were to approve all of these plants, they would ignore the drive toward hydro, wind, and natural gas that would have happened regardless due to China's national policy.[59] This type of problem may be avoided under a standardized approach.

B. Standardized Additionality Assessments

In recognition of the challenges presented by a project-specific approach, many carbon markets are moving toward standardized criteria in their additionality assessments.[60] Standardized approaches use general criteria to assess whether a particular project is likely to be additional.[61] Therefore, standardization works best when there are clear distinguishing features between "business-as-usual" behavior and "additional" activities, and those features can be transformed into objective criteria.[62] These general criteria are built around observations of what characteristics additional projects typically have. These characteristics are then turned into objective, predefined criteria to sort projects into those likely to be additional and those that likely will not be additional.[63] Projects that match the criteria typical of activities that are additional are eligible to participate in the PES program.

Types of criteria used by existing carbon and ecosystem service markets are varied. They include:

- *Legal/regulatory*: exclude projects that are required by law.[64] Many carbon markets, such as the Regional

57. Wara & Victor, *supra* note 41, at 13.

58. *Id.* at 14.

59. *Id.* at 13.

60. *See, e.g.*, Midwestern Greenhouse Gas Reduction Accord [MGGRA], *Advisory Group Draft Final Recommendations* § 4.2.2 (2009); RGGI, *supra* note 10, at § 10.1; W. Climate Initiative, *Design Recommendations for the WCI Regional Cap-and-Trade Program* § 9.5 (2009); American Clean Energy and Security Act, H.R. 2454, 111th Cong. § 1396 (2009).

61. BROEKHOFF, *supra* note 19, at 6.

62. One study of carbon markets found that those systems crediting natural carbon sequestration were harder to standardize as compared to other technological options, such as those for the energy, industry, building, and waste management sectors. *Id.* at 20–22. This brings into question how useful standardization can be for many PES systems that do not revolve around technological options.

63. *Id.* at 4.

64. This simple proclamation may require refinement when implemented in real policy. Systems will need to clarify what it means to be required by law. BROEKHOFF, *supra* note 19, at 26. Additionally, systems will need to decide how to handle laws that regularly are not enforced

Greenhouse Gas Initiative ("RGGI"),[65] the Midwestern Greenhouse Gas Reduction Accord ("MGGRA"),[66] and CAR,[67] only credit projects that are implementing practices not legally mandated.

- *Date*: exclude projects initiated before a set date. The United States Government's Environmental Quality Incentives Program ("EQIP"), for example, will only fund practices not previously adopted by the landowner applying for funds.[68] The related Conservation Reserve Program ("CRP"), which provides farmers payments for retiring farmland into non-crop use, requires that people applying for funding show that their farmland produced crops four out of six years prior to the program's start date.[69] This criterion should not be used in isolation to determine additionality, but can be an easy[70] way to exclude some business-as-usual projects.[71]
- *Performance standard*: require projects to achieve pollutant or emissions levels better than a previously defined benchmark.[72]
- *Financial*: look for evidence that the project could not be implemented without the PES funding.[73] Some systems

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and therefore are often not followed. Federal law in Brazil, for example, requires landowners to maintain 80% of the natural vegetation on their property. BRASIL C. FLOR. COMENTADO, Lei No. 4,771 (Sept. 15, 1965). Historically, the law has not been enforced, though efforts have been increasing over the past few years.

65. RGGI, *supra* note 10, at § 10.3.d.1.

66. MGGRA, *supra* note 60, at § 4.2.2.

67. CAR, *supra* note 47, at § IV.2.5.B.1.

68. Environmental Quality Incentives Program, 7 C.F.R. § 1466.10(b) (2009).

69. USDA FSA, *supra* note 6.

70. The ease with which this criterion can be assessed is of course circumstantial. With some management practices, such as conservation tillage, it can be much more challenging to establish whether or not the activity was occurring before the PES program was put into place. *See* Roger Claassen, Andrea Cattaneo & Robert Johansson, *Cost-effective Design of Agri-environmental Payment Programs: U.S. Experience in Theory and Practice*, 65 ECOLOGICAL ECON., 737, 749 (2003).

71. *See* BROEKHOFF, *supra* note 19, at 26.

72. How to determine a standardized baseline is beyond the scope of this paper. For nearly any additionality system, however, having a baseline is crucial to monitoring the program's effectiveness. By definition, monitoring additionality entails having an established and credible baseline since additionality is changing "business-as-usual" behavior to achieve the best environmental outcomes possible. For more on developing baselines, see BROEKHOFF, *supra* note 19.

exclude projects that are already receiving public funding to support their development.[74] RGGI, for instance, excludes projects collecting some public subsidies.[75] The Great Miami River Watershed Water-Quality Credit Trading program will not approve projects already funded through Farm Bill conservation programs or Clean Water Act funding provided by the state.[76]

- *Common practice*: show that the proposed activity is uncommon. The American Carbon Registry ("ACR"), for example, does not credit projects that are prevalent in the project's region.[77]
- *Technology*: [78] develop a list of new technologies, potentially using a "best available technology" standard, which are not business-as-usual.[79] RGGI assesses the qualification of some projects based on the market penetration of the technology being implemented. For example, projects lowering carbon dioxide emissions from natural gas must use technologies with a market penetration rate of less than 5 percent.[80]
- *Size*: disallow projects that are either below or above a certain size. This approach is useful where business-as-

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73. An alternative to this approach, which may be easier to implement, but is likely less stringent, is to develop a list of "least-cost options" for various industries and land. If the project does not match what is on the list, then it passes this financial threshold. *Id*. at 26.

74. Whether this type of criteria is appropriate or not is currently up for debate. Many projects currently eligible for some funding under PES systems are interested in receiving additional money for other ecosystem services generated by their activities that are not currently being "sold". This issue of "stacking" is explored more in several recent articles. *See* WORLD RESOURCES INST., STACKING PAYMENTS FOR ECOSYSTEM SERVICES 2 (2009).

75. RGGI, *supra* note 10, at § 10.3.d.3.

76. *See* Steven Zwick, *Ohio Water Trading: Driving Without Drivers*, ECOSYSTEM MARKETPLACE, June 10, 2008, http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=5915&section=home.

77. Am. Carbon Registry, *Technical Standard Version 1.0*, at 9 (2009), *available at* http://www.americancarbonregistry.org/carbon-accounting/ACR%20Technical%20Standard%202009%20v1.0.pdf.

78. This approach could also work for certain types of land uses. Some have argued, for example, that forestland without any harvesting is almost always a low-value use of a piece of land. Therefore, under some systems, it may make sense to automatically allow afforestation projects.

79. BROEKHOFF, *supra* note 19, at 26.

80. RGGI, *supra* note 10, at § 10.5.d.1.ii.c.

usual projects are usually beyond or beneath a distinct size threshold.[81]

These categories display the full range of standardization criteria currently used in carbon markets. Some of these criteria types are more applicable to PES while others have fairly limited potential. Performance standards, for example, as currently used are only relevant for markets that monitor a pollutant emission rate. This criterion is likely to be helpful in a water quality market, but may not apply to other PES programs that do not involve pollutant baselines, such as wetland mitigation banking. Common practice or date criteria, on the other hand, will likely pertain to most PES systems.

It is important to note that, in most cases, using just one of these factors will not go very far in addressing additionality. For example, the CRP additionality criteria noted above, under "date", is the only additionality criteria the program considers.[82] Proving what has happened in the past does not show what would have occurred in the future. This shows in the program's estimated additionality rates. One study estimates that only 10 percent of the land enrolled in CRP in 1997 would have shifted to non-crop use without any CRP payments.[83] Another study estimated that only 51 percent of lands renewing in the CRP program are additional.[84] CRP may have achieved a better additionality rate if it had implemented further standardized criteria screens.

As noted earlier, most programs that address additionality use a system at least partially comprised of standardized criteria.[85] Standardization can lower administrative and transaction costs of a program. Though it can be resource and time intensive to set up initially, standardization decreases administrative challenges for implementation. Developers and investors in PES projects tend to prefer standardization as well because the system is transparent and certain.[86] Unlike a project-specific evaluation, project developers know under a standardized system that if their project meets certain

81. BROEKHOFF, *supra* note 19, at 26.

82. USDA FSA, *supra* note 6.

83. Lubowski et al., *supra* note 17, at 23.

84. SULLIVAN ET AL., *supra* note 17, at 48.

85. *See* RGGI, *supra* note 10, at § 10.1; *see also* MGGRA, *supra* note 60, at § 4.2.2; W. Climate Initiative, *supra* note 60, at § 9.5; American Clean Energy and Security Act, *supra* note 60, at § 1396.

86. MICHAEL LAZARUS ET AL., EVALUATION OF BENCHMARKING AS AN APPROACH FOR ESTABLISHING CLEAN DEVELOPMENT MECHANISM BASELINES ii (1999).

predefined criteria, it will be approved. That said, a standardized system might credit projects that are not additional and exclude projects that are.

C. Discounting or Trading Ratios

There is inherent uncertainty in any prediction of what would have happened in the absence of a PES. Sometimes in an acknowledgment of uncertainty, regulating agencies will implement trading ratios to discount the amount of ecosystem services landholders are credited with providing.[87] In the face of uncertainty, trading ratios enable programs to use conservative estimates of the ecosystem services provided by the program, thereby securing environmental and market integrity.[88]

Many water quality trading programs use trading ratios to offset uncertainty[89] in the nutrient reductions achieved through best management practices.[90] Virginia's water quality program establishes a market for nitrogen and phosphorous that allows wastewater treatment plants to offset their nutrient effluents by purchasing credits from reductions made by farmers. Offsets from farms are discounted 2:1.[91] Therefore, for every 100 units of nitrogen that a wastewater treatment plant emits, they would need to purchase credits to cover 200 units from a farmer. A 2009 survey of existing water quality trading programs found that while several utilized trading ratios to protect against uncertainty, none of those ratios were based on scientific or statistical analysis.[92] The ratios instead were set

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87. *See* LYDIA OLANDER, DESIGNING OFFSETS POLICY FOR THE U.S.: PRINCIPLES, CHALLENGES AND OPTIONS FOR ENCOURAGING DOMESTIC AND INTERNATIONAL EMISSIONS REDUCTIONS AND SEQUESTRATION FROM UNCAPPED ENTITIES AS PART OF A FEDERAL CAP-AND-TRADE FOR GREENHOUSE GASES 40 (2008).

88. *Id*.

89. In water quality trading markets, this type of discounting is often known as an "uncertainty ratio." Water quality markets also use discounting to serve other purposes, such as the "delivery ratio," which adjusts credit amounts for the attenuation of the nutrient load between the site of crediting and the water body whose nutrient levels are being regulated. SELMAN ET AL., *supra* note 22, at 10–11.

90. *See, e.g.*, Suzie Greenhalgh & Paul Faeth, *Trading on Water*, 16 FORUM FOR APPLIED RESEARCH AND PUB. POL'Y 71, 74 (2001) (discussing trading in the context of nutrient impairment); NGUYEN ET AL., *supra* note 9, at 15.

91. VA. DEP'T OF ENVTL. QUALITY, TRADING NUTRIENT REDUCTIONS FROM NONPOINT SOURCE BEST MANAGEMENT PRACTICES IN THE CHESAPEAKE BAY WATERSHED: GUIDANCE FOR AGRICULTURAL LANDOWNERS AND YOUR POTENTIAL TRADING PARTNERS 7 (2008), *available at* http://www.deq.virginia.gov/export/sites/default/vpdes/pdf/VANPSTradingManual_2-5-08.pdf.

92. SELMAN ET AL., *supra* note 22, at 10.

at levels thought to be sufficiently conservative, yet still politically viable.[93]

Instead of discounting on the basis of uncertainty analysis, credits can be granted based on the degree to which the technology or activity utilized by the project has penetrated the market.[94] For example, if 10 percent of farmers in a given area use riparian buffers, then a project proposing to implement riparian buffers would be considered 90 percent additional and would receive 90 percent of the credits for the project. This approach would provide a dynamic reflection of the market, so that as practices become more common, their additionality and therefore potential to receive credits would decrease. This approach provides payment to "early actors", but may be harder to apply in PES systems that pay for conservation, as opposed to the implementation of new activities.

There are several problems with discount rates. Primarily, if the discount rates are too extreme, costs may be too high to allow sufficient participation in the PES system.[95] Discounting rates are also somewhat unfair to projects that are additional. Projects that do maintain environmental and market integrity are required by the system to carry the financial burden of the system's inability to screen out non-additional projects.[96] To the extent that discounting allows participation by "early actors," however, it promotes fairness by providing payment to those who were already acting in an environmentally responsible way.

A system may be able to lower its discounting rate by applying some standardized criteria before assessing the appropriate discount rate. Programs could apply basic criteria, such as excluding projects that are legally required or started before the program date, and then discount the remaining projects at a less extreme rate to account for the additional uncertainty. Setting discount rates involves balancing the precautionary principle[97] with the need of the system to provide

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93. *Id*.

94. ZACH WILLEY & BILL CHAMEIDES, HARNESSING FARMS AND FORESTS IN THE LOW-CARBON ECONOMY: HOW TO CREATE, MEASURE, AND VERIFY GREENHOUSE GAS OFFSETS 46-47 (2007).

95. OLANDER, *supra* note 87, at 40.

96. *Id*.

97. The precautionary principle holds that when there is a dearth of scientific proof, people should protect against environmental degradation if there is a threat of significant or irreversible natural damage. U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, Principle 15, U.N. Doc. A/CONF.151/26 (Vol. I) (Aug. 12, 1992), *available at* http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm.

adequate payment to incentivize landholders to alter their behavior. Discounting makes the most sense for programs that trade offsets under a regulatory cap, such as water quality markets, or to evaluate the comparative value of different projects. This approach is probably not appropriate for PES programs that promote an overall environmental goal, such as the program in Costa Rica or New York's Catskill watershed.

D. Probability Assessment

Mexico has implemented a payment for hydrological environmental services (pago de servicios ambientales hidrológicos, or "PSAH") program with an econometric system to assess the deforestation risk of lands applying for program participation.[98] The PSAH has just begun to use the model to prioritize applicants for participation,[99] but this approach could be a promising option moving forward to ensure project additionality.

The PSAH has allocated a limited pot of money to pay landholders to preserve their forests in order to secure hydrological ecosystem services from the land.[100] Since it is important to the program to obtain the maximum level of conservation possible for the funding available, researchers from the Instituto Nacional de Ecología ("INE") have developed an econometric model of deforestation as an indicator of opportunity cost and risk of deforestation on each plot of land.[101] The INE compared satellite images from 2000 with images from 1994 to discover which lands in Mexico were deforested in that timeframe.[102] INE then analyzed patterns of deforestation to assess the relative contribution of a variety of factors, including slope, altitude, distance to population centers, potential agricultural yields, poverty, forest type, and natural protected areas.[103] For example, the potential agricultural yield calculates the potential value of land left as forest as compared to the value of the land if converted to agriculture; this value is translated into corresponding deforestation risk.[104] Based on this data, INE has

98. Carlos Muñoz-Piña et al., *Paying for the Hydrological Services of Mexico's Forests: Analysis, Negotiations and Results*, 65 ECOLOGICAL ECON. 725, 731 (2008).

99. *Id.* at 732.

100. *Id.* at 725.

101. *Id.* at 729.

102. *Id.* at 731.

103. *Id.*

104. *Id.*

created a map of deforestation risk and sorted forest areas accordingly.[105]

The agency administering PSAH adopted the model along with factoring in hydrological and social importance of the plot in its 2006 rules to prioritize program applicants.[106] As such, PSAH is not currently using additionality per se as qualification criteria for program participation. They are instead using their model of deforestation risk to prioritize applications based on likelihood that their project is additional.

In order for Mexico's econometric approach to be transformed into a true additionality test, the program would have to set a cut-off limit. For example, the program could only allow participants whose land had at least an 80 percent chance of deforestation. This could further be combined with a discounting system, as explained in the previous section. The rules of the program could predefine a cut-off limit (as a standardized performance baseline); those projects which had, for example, an 80 percent or higher risk would receive payments, but only at a 80 percent crediting rate.

For many PES systems, particularly those involving conservation rather than changing land-use or management in some way, risk analysis is a realistic approach to addressing additionality. This method may also be helpful for climate offsets, particularly those related to land management. Mexico's PSAH econometric model is promising because it allows policymakers to implement a dynamic additionality system. Regulating agencies can observe what happens on the land screened out of the program as too low risk to qualify as additional. If real world results do not match what was predicted in the model, the model can be adjusted for future PES determinations.

What happens on the land not included in the system may still be affected by the program, though. There is a large risk in this system that leakage[107] will subvert the gains thought to have been achieved. If a program conserves high-risk land, as this system could, pressure to deforest may simply move to other land. In order to be certain that leakage will not happen, a program would need to have 100

105. *Id.*

106. *Id.* at 732.

107. Leakage refers to an increase in a particular activity in one region as a result of reductions in that activity made in another region pursuant to an environmental goal. In climate, for example, reducing deforestation in one country to sequester higher levels of carbon dioxide could lead to increased deforestation in another country to fill international demand for timber.

percent participation. Shy of that, separate methodologies can be developed to assess leakage and account for it in additionality systems.[108]

The econometric model utilized in Mexico would also be a more sophisticated way to determine the uncertainty trading ratios that are currently utilized by water quality markets.[109] Instead of setting a discount rate based on balancing political needs with generally perceived uncertainty risk, PES systems could actually quantify specific rates at a project level using the econometric model developed by INE.

One challenge to implementing this sort of system is that it requires significant upfront data collection and analysis. For those thinking about implementing a program similar to Mexico's, it is important to note that the development of PSAH's econometric model was eased by using data already collected by the government.[110] For example, to add data on potential agricultural yields, INE used data that was already being collected by the National Statistics Institute.[111] Using preexisting data where possible will lower the time and resource cost of developing a model.

E. A Learning Approach to Additionality

While experience in analyzing additionality is growing, there is still a fair amount to learn to ensure that a PES system is paying only for ecosystem services which would not be provided but for the program's incentives. Once an initial approach to additionality

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108. *See, e.g.*, Louise Aukland, Pedro Moura Costa & Sandra Brown, *A Conceptual Framework and its Application for Addressing Leakage on Avoided Deforestation Projects*, 3 CLIMATE POL'Y 123, 129–33 (2003) (presenting a step-by-step approach to identify and assess leakage generated by a project).

109. Academic studies have been conducted on how to build uncertainty analysis into water quality trading ratios. *See, e.g.*, Arun S. Malik, David Letson & Stephen R. Crutchfield, *Point/Nonpoint Source Trading of Pollution Abatement: Choosing the Right Trading Ratio*, 75 AM. J. OF AGRIC. ECON. 959 (1993) (quantifying the uncertainty in water quality trading of stochastic nonpoint loadings and of the effectiveness of management plans); H.X. Zhang, *Linking Trading Ratio with TMDL (Total Maximum Daily Load) Allocation Matrix and Uncertainty Analysis*, 58 WATER SCI. & TECH. 103 (2008) (calculating water quality trading ratios based on an uncertainty analysis of results from best management practices and of source distance to the water body).

110. Muñoz-Piña et al., *supra* note 99, at 731; Christian Layke, *Measuring Nature's Benefits: A Preliminary Roadmap for Improving Ecosystem Service Indicators*, 4 (World Research Institute Working Paper, 2009), *available at* http://www.wri.org/publication/measuring-natures-benefits.

111. Muñoz-Piña et al., *supra* note 99, at 731.

analysis is established, project approval and crediting can commence, but it is important to monitor the program to determine how successful the process is at determining project additionality. The system will need to be adjusted over time based on lessons learned. For example, if a standardized approach is authorizing projects that are not additional and excluding some projects that are additional, the criteria may need to be adjusted to balance the overall additionality of the program or a discounting approach may need to be layered onto the standardization process. No set of additionality tests can ever be perfect; additionality screens will have to be continuously adjusted to balance the complex objectives of any program.[112]

One approach to monitoring the success of an approach to additionality determination is to track a control group of projects not included in the PES. This *ex post* analysis has been used in the regional integrated silvopastoral ecosystem management project of Colombia, Costa Rica, and Nicaragua.[113] There, the regulating agency monitors land-use changes by a group of non-participants along with watching PES recipients.[114] By monitoring the additionality of different types of technology or land-use behavior in a particular region, a program can check its assumptions about the likelihood of additionality. In implementing this approach, programs need to be careful about the control group used—there may be problems with leakage, as mentioned in the previous section. Additionally, some have questioned whether individuals who participate in PES are really analogous to those who do not. Participants may be more likely to have an environmental interest,[115] thereby making these landholders more likely to pursue environmental goals even without PES.[116] In a program where there is greater participation demand

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112. *See* Mark C. Trexler, Derik L. Broekhoff & Laura H. Kosloff, *A Statistically-Driven Approach to Offset-Based GHG Additionality Determinations: What Can We Learn?*, 6 SUSTAINABLE DEV. LAW & POL'Y 30 (2006) (addressing how a statistical assessment of false positives and false negatives of additionality in existing systems can be used to ensure environmental integrity in offset systems).

113. Stefano Pagiola et al., *Paying for Biodiversity Conservation Services in Agricultural Landscapes*, at 1, (World Bank Env't Dep't Papers No. 96, 2004).

114. *Id.*; *see also* Wunder et al., *supra* note 16, at 845.

115. A study in Costa Rica found that landholders with a personal conviction to protect the environment were more likely to participate in Costa Rica's laws surrounding Protected Areas. Jeffrey A. Langholz et al., *Economic Considerations of Privately-Owned Parks*, 33 ECOLOGICAL ECON. 173, 180–181 (2000).

116. Ferraro & Pattanayak, *supra* note 15, at 485; *see also* Katherine Smith & Marca Weinberg, *Measuring the Success of Conservation Programs*, 2 AMBER WAVES 14, 16 (2004).

from ecosystem service providers than funds available, the program could monitor projects that were not accepted into the program, even though their project qualified. This should allow for a control group comparable to those participating.

CONCLUSION

Additionality is essential in promoting the environmental and market integrity, as well as the economic efficiency, of PES programs. Choosing an approach to assess additionality is a decision that inevitably involves a balancing of economic costs, social equity, environmental integrity, and political realities. Additionality assessments never operate perfectly. It will inevitably be a policy decision as to whether a strict limit makes sense, with emphasis on excluding non-additional projects, or whether to implement a process that is more lenient,[117] which could encourage incentives and opportunities. Transparency and stakeholder engagement in this decision process will be absolutely essential to developing a successful methodology. Each of the four systems presented here is a promising approach to additionality assessment, and yet each comes with a set of problems. Identifying the strengths and weaknesses of each system and considering how they can be used in combination will allow continued improvement in ensuring additionality in all environmental markets.

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117. There are also policy options to account for non-additional projects mixing into the system, such as discounting. Another possibility is adding a buffer in the cap to deal with the imperfections.