EVALUATING CONSERVATION EFFECTIVENESS AND ADAPTATION IN DYNAMIC LANDSCAPES

ADENA R. RISSMAN*

I
INTRODUCTION

Despite the widespread use of conservation easements, their conservation outcomes are relatively unknown.[1] Evaluating conservation easement effectiveness requires interdisciplinary research that reaches beyond legal analysis to examine how easements influence human behaviors, which subsequently influence environmental conditions.[2] Doing so involves social-science research on the formal and informal ways that conservation easements influence the behavior of landowners and other community members. It also involves natural-science research to examine the resulting pattern of species, habitat, and ecosystem protection and restoration. Conservation organizations commonly claim that all the conservation easements they acquire "save" land.[3] Only those acquisitions that result in changes to the trajectory of land use represent real conservation gains. It is impossible to observe the alternative scenario in which conservation easements were not acquired. However, comparative approaches allow for examination of likely alternatives and help to demonstrate conservation effectiveness.

Conservation easement effectiveness is not a fixed target, but is influenced over time by social and ecological landscape change. The promise of perpetuity is central to the appeal of conservation easements within the conservation

This article is also available at http://www.law.duke.edu/journals/lcp.

* Adena R. Rissman is an assistant professor in the Forest and Wildlife Ecology Department, University of Wisconsin—Madison. Many thanks to Adina Merenlender, Nathan Sayre, Sally Fairfax, Kristin Byrd, Rich Reiner, and Lynn Lozier for their invaluable research collaborations. I am grateful to Amy Morris, Jessica Owley Lippmann, Rich Reiner, Lynn Lozier, Jim Olmsted, and the law review editors for their thoughtful advice on a prior draft of the paper.

1. A. M. Merenlender et al., *Land Trusts and Conservation Easements: Who Is Conserving What for Whom?*, 18 CONSERVATION BIOLOGY 65, 66–67 (2004).

2. *See* Oran R. Young & M.A. Levy, *The Effectiveness of International Environmental Regimes*, *in* THE EFFECTIVENESS OF INTERNATIONAL ENVIRONMENTAL REGIMES: CAUSAL CONNECTIONS AND BEHAVIORAL MECHANISMS 1 (Oran R. Young & M.A. Levy eds., 1999).

3. For an example of land-trust claims that all conserved land was saved from development and offsets land lost to sprawl, see Patrick O'Driscoll, *Report: conservation efforts offset land lost to sprawl*, USA TODAY, Nov. 29, 2006.

movement.[4] Yet the value of perpetual conservation easements is widely debated. Conservation easement purposes, rights, and restrictions are individually negotiated for particular social and ecological landscapes, but the balance they strike between landowner rights and conservation restrictions may not be well tailored for future conditions. For instance, ecosystem dynamics, climate change, and socioeconomic change might alter the desired purposes of conservation easements, or the restrictions appropriate to meet those purposes. Issues of adaptive land management pose particular challenges for the conservation easement tool.[5] This article examines the effectiveness and adaptation of conservation easements and provides recommendations for improving the practice and science of conservation through analysis of the conservation literature and multidisciplinary research on conservation easements in a case-study landscape.

Conservation easements are partial-property-rights agreements that bind future landowners, often in perpetuity.[6] In exchange for restricting future land uses such as building, grazing, or timber harvesting, landowners often receive a tax reduction, cash payment, or permit. Nonprofit land trusts and government agencies rely increasingly on conservation easements to protect ecological and cultural resources on private lands, and occasionally on other organizations' lands.[7]

Part II of this article applies the outputs–outcomes–impacts logic model framework—an established approach to the evaluation of environmental policies—to conservation easements.[8] Outputs of the policy-making process refer to laws, agreements, and conservation easements themselves. In this article, outcomes refer to changes in human behavior as a result of environmental policies. In the context of conservation easements, outcomes refer to changes in land use and land management. Finally, impacts refer to changes in environmental conditions that result from these behavioral changes. In order to have positive environmental impacts, conservation easements must result in environmental benefits in addition to what would have occurred without the conservation easement in place.

Part III explores connections between the outputs–outcomes–impacts framework and ongoing debates over conservation easement permanence and

---

4. *See* Nancy A. McLaughlin, *Conservation Easements: Perpetuity and Beyond*, 34 ECOLOGY L.Q. 673, 675 (2007).

5. SALLY K. FAIRFAX ET AL., BUYING NATURE: THE LIMITS OF LAND ACQUISITION AS A CONSERVATION STRATEGY, 1780–2004, at 269 (2005).

6. JULIE ANN GUSTANSKI & RODERICK H. SQUIRES, PROTECTING THE LAND: CONSERVATION EASEMENTS PAST, PRESENT, AND FUTURE 9 (2000).

7. On the importance of private lands for ecological and cultural resources, see J. Michael Scott et al., *Nature Reserves: Do They Capture the Full Range of America's Biological Diversity?*, 11 ECOLOGICAL APPLICATIONS 999, 999 (2001); *see also* Mark W. Brunson & Lynn Huntsinger, *Ranching as a Conservation Strategy: Can Old Ranchers Save the New West?*, 61 RANGELAND ECOLOGY & MGMT. 137, 137 (2008).

8. *See, e.g.*, Oran R. Young, *Hitting the Mark*, ENVIRONMENT, Oct. 1999, at 20, 23.

adaptation. Ecosystems are dynamic, and ecological sciences increasingly recognize nonequilibrium processes rather than linear, cyclical, or climax models of change.[9] In order to continue influencing human behavior and affecting environmental conditions, conservation easements must have mechanisms that allow conservation-oriented adaptation over time. A conservation easement that incorporates an adaptive approach would have clear conservation purposes, link those purposes with compliance terms and indicators, have an organization with staff trained to monitor these terms, and have a process for altering future management decisions based on monitoring results.[10] All four of these realms present challenges, given the ways that conservation easements are typically drafted, monitored, and enforced. Mechanisms for incorporating a flexible approach into conservation easements are also described in Part III: dynamic easement terms, management plans, conservation easement-holder administrative discretion, conservation easement amendment, and conservation easement termination. Opportunities and limitations of these mechanisms for adaptive land management are examined.

In Part IV, a case study of rangeland conservation easements in the Lassen Foothills of northern California provides examples of research on outputs, outcomes, and impacts of conservation easements, and grounds the discussion of adaptive management. The case study relies on multidisciplinary social and ecological research methods to examine the design of conservation easements, their direct and indirect effects on landowner behavior, and their impacts on projected housing growth and ecosystem protection.

To address the tension of perpetual agreements in changing landscapes, scholars have suggested a number of non-perpetual agreements.[11] Part V examines these proposals for nonperpetual conservation tools in light of the outputs–outcomes–impacts framework. Nonperpetual agreements are likely justified in some situations, but may also fail to help achieve effective and adaptive land management. Removing perpetuity from conservation easements without a broader rethinking of conservation strategies is not a sufficient solution.

---

9. Nonequilibrium dynamics complicate management of natural resources. For instance, rangelands respond more to weather than to grazing pressure, which has led to the failure of grazing management systems based on static assumptions. *See* Randall D. Jackson & James W. Bartolome, *A State-Transition Approach to Understanding Nonequilibrium Plant Community Dynamics in Californian Grasslands*, 162 PLANT ECOLOGY 49, 49 (2002). Nonequilibrium processes feature plant populations driven more by abiotic factors like weather than herbivore populations, biotic decoupling of populations, and density independence, meaning that populations are not limited as a function of their increasing density. In contrast, equilibrium processes feature resource limitations, biotic coupling, and density dependence. *See* A.W. Illius & T. G. O'Connor, *On the Relevance of Nonequilibrium Concepts to Arid and Semiarid Grazing Systems*, 9 ECOLOGICAL APPLICATIONS 798 (1999).

10. Adena R. Rissman, *Designing Perpetual Conservation Agreements for Land Management*, 63 RANGELAND ECOLOGY & MGMT. 167, 167 (2010).

11. *See, e.g.*, Nancy A. McLaughlin, *Rethinking the Perpetual Nature of Conservation Easements*, 29 HARV. ENVTL. L. REV. 421 (2005); Jesse J. Richardson, Jr., *Conservation Easements and Adaptive Management*, 3 SEA GRANT L. & POL'Y J. 31 (2010).

Based on lessons learned from the conservation literature and the Lassen Foothills case study, Part VI suggests improvements to the conservation easement tool and the need for approaches beyond conservation easements. An understanding of the outputs–outcomes–impacts framework in diverse social and ecological contexts can contribute to designing effective long-term conservation. This requires a clear process for conservation-oriented adaptation over time. Designing such a process will require greater collaboration among legal scholars, practitioners, and social and natural scientists intent on improving the design and evaluation of conservation approaches.

II

AN OUTPUTS–OUTCOMES–IMPACTS FRAMEWORK FOR CONSERVATION EFFECTIVENESS

Examining how conservation easements influence human behavior and environmental conditions provides important lessons on effectiveness, permanence, and adaptation. Evaluating environmental-policy interventions involves an assessment of how inputs into the policy-making process (such as funds, personnel, and other resources) result in outputs (laws, agreements, contracts, and conservation easements), which create outcomes (changes in actors' behavior) and impacts (changes in environmental conditions).[12] In the case of conservation easements designed to protect natural areas or biological diversity, *outputs* are the conservation easement agreements, *outcomes* are represented by changed landowner management or development decisions, and *impacts* are represented by persistence of species, habitats, and ecosystem processes. Variants of the outputs–outcomes–impacts framework can be applied to many types of program assessment. For instance, an output–outcome–impact logic model is used by the Office of Management and Budget to improve federal agency performance.[13]

The effectiveness of conservation easements depends on how they function in complex and dynamic social and ecological systems. Understanding the direct and indirect effects of conservation easements on landowner perceptions and choices is important since these actors play critical roles in private-land conservation.[14] Changes in human behavior do not result automatically from the passage of a law or creation of a new property right, but are embedded in social

12. *See* Young & Levy, *supra* note 2, at 23. For foundations of political analysis of inputs, outputs, and outcomes, see D. EASTON, A SYSTEMS ANALYSIS OF POLITICAL LIFE 3–33 (1979). In other frameworks, outcomes are treated as the short-term effects of the program and impacts are treated as the broader or longer-term effects of the program. *See, e.g.*, R. E. Bowen & C. Riley, *Socio-Economic Indicators and Integrated Coastal Management*, 46 OCEAN & COASTAL MGMT. 299, 309–10 (2003).

13. John A. McLaughlin & Gretchen B. Jordan, *Logic Models: a Tool for Telling Your Program's Performance Story*, 22 EVALUATION & PROGRAM PLAN. 65, 66 (1999).

14. Amy W. Morris, *Easing Conservation? Conservation Easements, Public Accountability and Neoliberalism*, 39 GEOFORUM 1215, 1223–24 (2008).

relations.[15] These social relations include indirect pathways of influence through expectations, norms, and expanded social networks, in addition to direct interactions through monitoring and enforcement. Conservation easements rely on conservation easement holders as well as broader communities for monitoring and enforcement.[16]

Multiple research approaches involving quantitative and qualitative methods provide complementary information on the effects of conservation policies. Large-scale quantitative assessments can identify broad patterns. Impact analysis requires a comparison of observed effects with what would likely happen without the conservation intervention—the counterfactual.[17] Comparative analysis involving model scenarios or matching of paired landscapes can be useful in experimental or quasi-experimental designs. Detailed studies using qualitative methods reveal how particular conservation easements play out in different institutional and ecological contexts.[18] Measuring the broader effects of conservation on environmental conditions requires a landscape-scale approach that extends beyond the boundaries of encumbered properties.

The need to demonstrate performance and to quantify conservation success has increased the focus on monitoring and evaluation in conservation.[19] Studies evaluating land-acquisition effectiveness often focus on the effect of protected areas in protecting biodiversity and natural communities.[20] Protected areas (including nature reserves, wildlife refuges, and many conservation easements) are often established in places with lower potential for agricultural productivity or other economic benefits.[21] Less-threatened areas are less expensive to purchase and may include larger habitat patches, making them more-appealing acquisitions for land trusts and government agencies. Landowners in these areas may be more willing to sell full or partial interests in their properties, reducing the transaction costs of piecing together smaller, more expensive parcels.

---

15. *See* Young & Levy, *supra* note 2, at 4.

16. Adena R. Rissman & Van Butsic, *Land Trust Defense and Enforcement of Conserved Areas*, 4 CONSERVATION LETTERS 31 (2010). For discussion of the "watchful neighbor" in conservation easement monitoring, see Mary Ann King & Sally K. Fairfax, *Public Accountability and Conservation Easements: Learning from the Uniform Conservation Easements Act Debates*, 46 NAT. RESOURCES J. 65 (2006).

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

18. Nathan F. Sayre, *Viewpoint: The Need for Qualitative Research to Understand Ranch Management*, 57 RANGELAND ECOLOGY & MGMT. 668 (2004); *see also* Adena R. Rissman & Nathan F. Sayre, *Conservation Outcomes and Social Relations: A Comparative Study of Private Ranchland Conservation Easements*, SOC'Y & NAT. RESOURCES (forthcoming 2011).

19. C. Stem et al., *Monitoring and Evaluation in Conservation: a Review of Trends and Approaches*, 19 CONSERVATION BIOLOGY 295, 296 (2005).

20. *See also* Kwaw S. Andam et al., *Measuring the Effectiveness of Protected Area Networks in Reducing Deforestation*, 105 PROC. NAT'L ACAD. SCI. 16,089 (2008).

21. *See* Scott et al., *supra* note 7.

Without an analysis of the counterfactual, the estimated gains from these conservation acquisitions are often overstated.[22] For instance, land trusts may take credit for all acres acquired through fee or conservation easement as the amount of land saved, but only a portion of those acres were likely to have been developed or converted to other land uses without that acquisition.[23] In another example, debates over Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) have examined whether protected areas result in carbon storage through avoided deforestation.[24] In this case, only the carbon storage that occurs in excess of what is stored in the business-as-usual strategy (the counterfactual), can be counted as the impact of the conservation intervention. Measuring the effects of conservation easements is challenging because they are highly varied in goals and restrictions, public access to information about them is not easily obtained, and they typically prevent change rather than cause it directly. In complex social and ecological systems, attributing causality between outputs and their resulting outcomes and impacts can be difficult, and effects can be indirect and interacting.[25] Understanding policies and their effects requires an analysis not just of a static system, but also of dynamic changes over time.

III

FOREVER CHANGING: PERPETUITY AND ADAPTATION

> Located on the property is a 42-inch diameter Valley Oak Tree . . . the purpose of this conservation easement is to ensure the Valley Oak Tree will be retained forever in its natural condition. . . .[26]

A. Perpetuity and Adaptation in Dynamic Landscapes

The promise of perpetuity is one of the strongest arguments in support of conservation easements. Property rights are viewed as more resistant to political and economic change than other conservation tools such as regulation. The protection of important places "forever" holds strong appeal for conservation-minded donors and funders.[27] In fact, the Internal Revenue Code requires conservation easements to be perpetual for donors to qualify for charitable income-tax deductions.[28] Many government land-management agencies have also used perpetual conservation easements to build wildlife

22. *See* Andam et al., *supra* note 20; David Newburn et al., *Economics and Land-Use Change in Prioritizing Private Land Conservation*, 19 CONSERVATION BIOLOGY 1411 (2005).

23. *See* O'Driscoll, *supra* note 3.

24. *See generally* Raymond E. Gullison, P.C. Frumhoff, J.G. Canadell, C.B. Field, D.C. Nepstad, K. Hayhoe, R. Avissar, L.M. Curran, P. Friedlingstein, C.D. Jones & C. Nobre, *Tropical Forests and Climate Policy*, 316 SCIENCE 985, 985–86 (2007).

25. Young & Levy, *supra* note 2, at 10–28.

26. Conservation easement deed held by City of Woodland, California, No. 035084, recorded Aug. 26, 2002 (on file with author).

27. McLaughlin, *supra* note 4, at 675–76.

28. *See* I.R.C. § 170(h)(5)(A) (2006); Treas. Reg. § 1.170A-14(g)(6) (2004).

refuges and parks.[29] This emphasis on perpetuity is understandable in light of the persistent threats to conserved areas.[30]

While perpetuity is appealing to many conservation advocates, there are increasing calls for conservation easements to be more flexible and adaptable. Conservation easement holders increasingly face requests from private landowners who want to modify supposedly permanent conservation easement terms. Land trusts and public agencies need guidance to effectively address the difficult issues these requests raise about conservation benefits, private gain, and perpetual restrictions.[31] Some scholars and land-use planners question whether society's needs are best served by rights and restrictions permanently fixed in a negotiated agreement. Some suggest that conservation easements present a "risk of binding future landowners with outmoded and rigid restrictions on land."[32] Conservation scientists raise doubts about unchanging land-management terms. For example, what happens if conservation easement restrictions on timber harvest or grazing levels become insufficient for protecting biological diversity, which is a primary purpose of the conservation easement?[33] Some conservationists advocate for the option to conduct exchanges to trade small, expensive, low-quality parcels for larger, less-expensive parcels with higher conservation value.[34] More broadly, adaptive governance literatures predict that fixed rules governing resource use are likely to fail in the face of sudden ecological, economic, or social change.[35] A process for making decisions about adaptation for particular properties, and across larger regions, is necessary. This process must also prevent undue private benefit and erosion of conservation benefits, which are possible when conservation easement terms are altered.[36]

The legal structure surrounding conservation easements assumes that restricting landowner uses and assigning rights to the conservation easement holder will achieve conservation goals. Restrictions on building and road development might always be valid for conservation purposes (although these too may arguably require some flexibility, for example to allow for a new nature education center or move an allowed building to a more appropriate location). Conservation easements that address more-complex land management such as

29. FAIRFAX ET AL., *supra* note 5, at 130–31.

30. *See, e.g.*, *id.* at 211–14 (2005); WALTER A. ROSENBAUM, ENVIRONMENTAL POLITICS AND POLICY 321–62 (2011).

31. *See* Rissman & Butsic, *supra* note 16.

32. Gerald Korngold, *Solving the Contentious Issues of Private Conservation Easements: Promoting Flexibility for the Future and Engaging the Public Land Use Process*, 2007 UTAH L. REV. 1039, 1042 (2007).

33. *See* Merenlender et al., *supra* note 1, at 67.

34. *See* Richard A. Fuller et al., *Replacing Underperforming Protected Areas Achieves Better Conservation Outcomes*, 466 NATURE 365 (2010).

35. *See* Thomas Dietz et al., *The Struggle to Govern the Commons*, 302 SCIENCE 1907 (2003).

36. The public invests in the conservation promises of conservation easements through grants, tax incentives, and permits. It would be unfair for private landowners to receive windfall profits in the form of increased property values if conservation easement restrictions are removed.

timber harvests, grazing, and agriculture pose additional challenges as environmental and economic factors—and the best available science—change over time. If humans are seen as an integral part of ecosystem management, rather than as threats to be restricted, the basic structure of conservation through restricted land-use options is called into question.[37]

The recognition that ecosystems are dynamic rather than static has provoked a dramatic rethinking of environmental policy and law in some circles.[38] Over the past several decades, ecological sciences have emphasized dynamic, nonequilibrium, heterogeneous, and historically contingent landscape change rather than linear or cyclical climax community models of vegetation change.[39] Disturbance events such as fire, storms, grazing, or invasive species are recognized as normal features of ecosystems.[40] In previous scientific models of change, natural systems were seen as moving along a linear path from early succession to late succession, or from poor condition to excellent condition.[41] In contrast, current models recognize that disturbance can create entirely new ecological conditions, and that ecosystems do not reliably shift back to earlier conditions or progress toward predictable states.[42] This more-complicated understanding of ecosystem change has important implications for land management and conservation. One implication is that the effects of human actions are often variable and unpredictable, and can sometimes create shifts to novel states.[43] This complicates efforts to create rules and restrictions for land management in perpetual conservation easements. To address dynamic and unpredictable ecosystem change, management of conserved landscapes demands an adaptive approach.[44]

B. Adaptive Management and Conservation Easements

What is adaptive management, and what are its implications for conservation easements? An adaptive management system involves altering management strategies as a result of monitoring feedback, and may treat

---

37. *See* William Cronon, *The Trouble with Wilderness: Or, Getting Back to the Wrong Nature*, ENVTL. HIST., Jan. 1996, at 7.

38. See Richardson, *supra* note 11; A. Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOYOLA L.A. L. REV. 1121 (1993).

39. S.A. Moore et al., *Diversity in Current Ecological Thinking: Implications for Environmental Management*, 43 ENVTL. MGMT. 17, 17 (2009). On the relationship between lack of equilibrium and rangeland degradation, see Illius & O'Connor, *supra* note 9.

40. Moore et al., *supra* note 39, at 24

41. *See* E.J. Dyksterhuis, *Condition and Management of Range Land Based on Quantitative Ecology*, 2 J. RANGE MGMT. 104 (1949).

42. *See* D.D. Briske et al., *State-and-Transition Models, Thresholds, and Rangeland Health: A Synthesis of Ecological Concepts and Perspectives*, 58 RANGELAND ECOLOGY & MGMT. 1 (2005).

43. *See* NANCY LANGSTON, WHERE LAND & WATER MEET: A WESTERN LANDSCAPE TRANSFORMED 151–69 (2003); A.L. Mayer & M. Rietkerk, *The Dynamic Regime Concept for Ecosystem Management and Restoration*, 54 BIOSCIENCE 1013, 1013 (2004).

44. *See* R.J. McLain & R.G. Lee, *Adaptive Management: Promises and Pitfalls*, 20 ENVTL. MGMT. 437, 437 (1996).

management approaches as experiments.[45] A conservation easement that incorporates an adaptive approach would have, at a minimum, clear conservation purposes, established links between those purposes and compliance terms or indicators, trained staff to monitor and enforce these terms, and a process for altering future management decisions based on monitoring results. All four of these factors present challenges for how conservation easements are created, monitored, and enforced.

Most conservation easements have a statement of purpose, usually listing several purposes such as preservation of natural habitat, open space, recreation, agriculture, or scenic resources. The listed purposes are often very general and closely mirror the acceptable purposes outlined in the state and federal laws that govern conservation easements. Few conservation easements with multiple purposes indicate a prioritization among purposes. Reconciling multiple conservation purposes and linking those purposes with particular land-use restrictions raises complicated issues for landowners, lawyers, and land-trust or government agency staff.[46]

Conservation easements designed to protect biological diversity provide an example of the disconnect between easement purposes and terms (outputs) and biodiversity protection (impacts). These conservation easements often state purposes such as conserving native-plant and animal communities or specific species. For example, the state of Wisconsin uses conservation easements as part of a mitigation plan related to incidental-take permits for the state-threatened Butler's gartersnake, *Thamnophis butleri*.[47] Hypothetically, maintaining a viable population of Butler's gartersnake could be a mandatory term in the conservation easement, and the landowner would be violating the conservation easement if the population declined on the property. An indicator, or specific measure, of Butler's gartersnake presence and abundance could be selected. However, conservation easements associated with the Butler's gartersnake incidental-take permit do not include a population-related compliance term. Instead, they require the landowner to maintain habitat

45. *See* Bernard T. Bormann, Richard W. Haynes & Jon R. Martin, *Adaptive Management of Forest Ecosystems: Did Some Rubber Hit the Road?*, 57 BIOSCIENCE 186, 186–88 (2007).

46. The challenges of aligning rules with multiple goals are common in public administration, and public land management provides relevant examples. *See, e.g.*, Task Group on Unity in Concepts and Terminology Committee Members, *New Concepts for Assessment of Rangeland Condition*, J. RANGE MGMT., May 1995, at 271 (describing issues of public land grazing restrictions); Stubble Height Review Team, *Using Stubble Height to Monitor Riparian Vegetation*, RANGELANDS, Feb. 2006, at 23.

47. An incidental take permit is a permit issued under Section 10 the Federal Endangered Species Act to non-federal parties whose actions will result in take of a threatened or endangered species. It requires the applicant to create a habitat conservation plan to minimize and mitigate the effects of the authorized take, which may include a plan for acquiring land and conservation easements. See, for example, conservation easements associated with incidental-take permits for the Butler's gartersnake, such as a 2005 conservation easement which states that "the purpose of this easement is to promote the existence of the Butler's gartersnake and the Conservancy Area and to ensure that the Conservancy Area's conservation value for the snake will not be destroyed or substantially degraded . . . ." *Available at* http://sos.nmtvault.com/pdf/THEOSOS_128/images/00043092.pdf [hereinafter Butler's gartersnake easement].

according to the site conservation plan, and prohibit building, dumping, agriculture, altering hydrology, and all commercial, industrial, and residential activity.[48]

Quantitative biodiversity indicators are considered more objective, reliable, replicable, and communicable than subjective biodiversity measures.[49] However, proxies for biodiversity rarely serve as compliance terms in conservation easements because biodiversity goals are difficult to define and operationalize, and because it is difficult to hold landowners responsible for maintaining native-plant diversity or viable animal populations on specific parcels.[50] Restrictions related to land-use choices are often easier to monitor than environmental conditions. In addition, factors outside a landowner's control such as climate change, nearby development, and offsite pollution can influence wildlife abundance, water quality, and other environmental conditions. Therefore, restrictions and requirements on building, roads, habitat maintenance, and other land uses (the outcomes) become compliance terms, with the expectation that they will result in biodiversity conservation (the desired impacts). Furthermore, nonequilibrium ecology predicts that vegetation changes are driven more by abiotic factors such as temperature and rainfall rather than biotic interactions controlled by land managers (such as grazing).[51] This complicates efforts to provide a causal link between management practices and vegetation change.[52] These issues are a particular concern in landscapes that are especially vulnerable to climate-change impacts, such as arid and semiarid ecosystems.[53] Conservation easements and other environmental regulations must define compliance terms, but compliance is recognized as a narrow measure of performance.[54]

Monitoring is a critical component of the adaptive management cycle.[55] Monitoring allows managers to observe system status and change. In the case of conservation easements, even basic compliance monitoring such as annual visits

48. *See* Butler's gartersnake easement, *supra* note 47. For more information on conservation easements associated with Endangered Species Act mitigation, see Jessica Owley Lippmann, *Exacted Conservation Easements: The Hard Case of Endangered Species Protection*, 19 J. ENVTL. L. & LITIG. 293 (2004).

49. David L. Pearson, *Selecting Indicator Taxa for the Quantitative Assessment of Biodiversity*, PHIL. TRANSACTIONS: BIOLOGICAL SCI., Jul. 29, 1994, at 75, 75–76.

50. *See* Rissman, *supra* note 10.

51. M. Westoby et al., *Opportunistic Management for Rangelands Not at Equilibrium*, 42 J. RANGE MGMT. 266 (1989).

52. *See* Tarlock, *supra* note 38.

53. L.M. Kueppers et al., *Modeled Regional Climate Change and California Endemic Oak Ranges*, 102 PROC. NAT'L ACAD. SCI. 16,281 (2005).

54. D.J. FIORINO, THE NEW ENVIRONMENTAL REGULATION 3 (2006).

55. *See generally* C.S. HOLLING, ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT (1978).

to encumbered properties may not occur.[56] More comprehensive monitoring of environmental indicators is even less common.[57]

Finally, incorporating lessons from monitoring results in future decisions is particularly challenging given the structure of conservation easements. In fee-simple public and private land-management contexts, the landowner has the flexibility to change management choices over time by integrating prior learning within a set of constraints. However, there is generally no established process for incorporating lessons from monitoring into existing conservation easement terms. Where active management—the implementation of specific management actions such as restoration, grazing, fire, invasive species removal, or timber harvest—is required for meeting conservation purposes, restrictions on landowner action are insufficient. If original conservation easement terms are excessively detailed and prescriptive, it may be very difficult to adapt land-management strategies over time while remaining in compliance, even if new management approaches would have clear conservation benefits. Scientific, social, economic, ecological, and technological uncertainties complicate conservation easement design, and make it difficult to draft prescriptive conservation easement terms that will provide optimal conservation over the very long term. The four minimum components of adaptive management pose challenges for conservation easements (clear purposes, purposes linked with terms, monitoring, and feedback of monitoring results).

C. Modifying Existing Conservation Easements

Although conservation easements are often described as perpetual or static, several mechanisms are already in use for flexibility over time, including dynamic easement terms, management plans, conservation easement holder administrative discretion, conservation easement amendment, and conservation easement termination.

Dynamic easement terms are compliance terms that include a flexible or changing metric for compliance.[58] For example, conservation easements can require compliance with government or nongovernmental organization (NGO) policies. A mandatory compliance term could include state government best management practices for water quality or Forest Stewardship Council standards for certified sustainable forestry.[59] These government or NGO

56. A survey of conservation easements in the nine-county San Francisco Bay Area in 1998 revealed that only fifty-one percent of the conservation easements were monitored. *See* BAY AREA OPEN SPACE COUNCIL, ENSURING THE PROMISE OF CONSERVATION EASEMENTS (1999), *available at* http://learningcenter.lta.org/attached-files/0/56/5613/EnsuringThePromise_of_CEs.pdf.

57. Joseph M. Kiesecker et al., *Conservation Easements in Context: A Quantitative Analysis of Their Use by The Nature Conservancy*, 5 FRONTIERS ECOLOGY & ENV'T 125, 125 (2007).

58. Duncan M. Greene, *Dynamic Conservation Easements: Facing the Problem of Perpetuity in Land Conservation*, 28 SEATTLE U. L. REV. 883 (2005).

59. For instance, the Wisconsin Department of Natural Resources conservation easement with Plum Creek Timberlands funded by the federal Forest Legacy Program requires the landowners to follow BMPs for water quality (document on file with author).

policies can be updated over time, creating changing compliance standards without requiring amendment of the conservation easement. One limitation of this approach is that the conservation easement holder is reliant on the outside government policy or certification standard for determining compliance. This complicates monitoring and accountability.

Management plans are another approach to providing flexibility for agricultural, forestry, and grazing operations. A conservation easement can require that management operations be conducted in accordance with a management plan or specify conditions under which a future management plan would be required. Management plans are a common tool of many state and federal conservation programs,[60] and they are designed to be updated periodically. However, depending on how a management plan is designed, it may not clearly delineate restricted and permitted uses, making legal enforcement more challenging. Any changes to the management plan would need to be mutually agreed upon by the landowner and the conservation easement holder, creating additional transaction costs. In addition, if management plans are written after the landowner has been compensated, the conservation easement holder has reduced leverage to negotiate for restrictive terms.[61]

The administrative-discretion approach to flexibility gives the conservation easement holder broad discretion to determine which landowner actions to permit. Discretionary-consent clauses can prohibit certain activities unless the consent of the holder is obtained. Discretionary-consent clauses may require consent to be written, and provide a standard for that consent, such as "not to be unreasonably withheld." However, this opens the door to time-consuming requests for modification. The conservation value of conservation easements is questionable if discretionary-consent clauses allow the holder to consent to increased subdivision, building, mining, and other activities incompatible with the conservation purposes. Some conservation easements may prohibit all land uses with the exception of uses allowed through a conditional-use permit. This option provides the conservation easement holder with strong rights to modify land uses to produce optimal conservation effects. Landowners may be hesitant or unwilling to agree to this type of conservation easement if they intend to actively manage the land. In another example, Wisconsin's Great River Road scenic easement program required landowners to apply for variances to modify easement terms. Those easements provided the holders with active management rights to manage vegetation and maintain scenic views, which became critical for replanting trees after an outbreak of Dutch elm disease.[62]

---

60. *See, e.g.*, R. Shepard, *Nutrient Management Planning: Is It The Answer to Better Management?*, 60 J. SOIL & WATER CONSERVATION 171, 171 (2005).

61. *See* Rissman, *supra* note 10, at 172.

62. Brian W. Ohm, *The Purchase of Scenic Easements and Wisconsin's Great River Road: A Progress Report on Perpetuity*, 66 J. AM. PLAN. ASS'N 177, 183 (2000).

Amendment of conservation easements requires mutual consent of landowners and conservation easement holders. Because amended easements may provide reduced conservation value and undue private gain, many legal scholars and conservation practitioners are concerned about amendments. Many organizations now have conservation easement-amendment policies, and some organizations have strongly discouraged amendment.[63] Debates over amendment have been heated within the Land Trust Alliance community, centering on whether donated conservation easements are subject to the charitable-trust doctrine and therefore whether cy pres proceedings conducted by courts should be required for amendment.[64] Theoretically, amendments could change conservation purposes, landowner rights, easement-holder rights, land-use restrictions, or other components of a conservation easement. However, amendments that alter the conservation purposes may be invalid due to federal charitable tax requirements for perpetuity, state enabling legislation, and other limitations.

Finally, termination of conservation easements through mutual consent of the landowner and conservation easement holder is gaining attention, particularly since the Dowd cases. In *Hicks v. Dowd* and *Salzburg v. Dowd*, first a local resident and then the Wyoming Attorney General filed suit to challenge a county government's attempt to terminate a conservation easement that had been donated to the county by a prior landowner. The resulting settlement maintained the conservation easement.[65] Termination could be used to remove conservation restrictions, or it could potentially be used to exchange conservation restrictions in one location for conservation restrictions elsewhere.

In addition to these five mechanisms, conservation easements can be modified or extinguished through condemnation by a government agency. Oversight and a process for change can also result from public and private funders, state enabling statutes, and the tax code and IRS regulations. In summary, conservation easements embody a tension between perpetuity and change. Several mechanisms are in place for modifying conservation easements over time, but these remain contentious and may not provide a robust system for adaptive land management.

---

63. *See, e.g.*, LAND TRUST ALLIANCE, AMENDING CONSERVATION EASEMENTS: EVOLVING PRACTICES AND LEGAL OPINIONS (2007).

64. *See id.*; *see also* McLaughlin, *supra* note 11.

65. Hicks v. Dowd, 157 P.3d 914, 916–17 (Wyo. 2007); Salzburg v. Dowd, Stipulated Judgment, Civil Action No. CV-2008-0079 (Wyo. 2010). The landowner approached the county about terminating the conservation easement after the subsurface mineral rights holder conducted coal-bed methane mining on the property. *See* Nancy A. McLaughlin & W. William Weeks, Hicks v. Dowd*, Conservation Easements, and the Charitable Trust Doctrine: Setting the Record Straight*, 10 WYO. L. REV. 73 (2010).

IV

A CASE STUDY OF CONSERVATION EASEMENTS IN THE LASSEN FOOTHILLS, CALIFORNIA

A. Interdisciplinary Research in the Lassen Foothills, California

This case study of rangeland conservation easements in the Lassen Foothills of northern California relies on the outputs–outcomes–impacts framework to examine issues of adaptation and effectiveness. The analysis addresses the question, "Are conservation easements successful in conserving biodiversity and ecosystem processes on private lands?" In this case study, outputs include conservation easement agreements and their terms. These outputs create outcomes, such as changes in landowner management and other behavior, which create impacts such as improvements in habitat protection and fire management. This interdisciplinary research draws on the fields of conservation and regional planning, public policy, human geography, and conservation biology to examine conservation easement agreements, relationships between landowners and conservation easement holders, and projected impacts of conservation easements on residential growth, habitat protection, and ecosystem processes such as fire patterns.

The Nature Conservancy (TNC) is the largest nonprofit conservation easement holder in the United States. Its Lassen Foothills project area covers over 364,000 hectares and extends from the peak of Mt. Lassen down in elevation through conifer forests, oak woodlands, and grasslands to the Sacramento River in the Central Valley. TNC seeks to protect the area's unfragmented oak woodlands, vernal pools that support endemic plants and animals, and riparian corridors and creeks that support anadromous fish.[66] TNC's goal in the Lassen Foothills is "to work with private landowners, local organizations, and the community to ensure the sustainability and economic viability of private land uses and the ongoing health of the area's plants and animals."[67]

Most of the Lassen Foothills project area is in eastern Tehama County. The Tehama County general plan designates most of the area as cropland (valley agriculture) or grazing land (upland agriculture).[68] Urban and commercial centers and the majority of the county's population are located near major highways in Sacramento Valley.[69] To the east of these transportation corridors,

66. *See* THE NATURE CONSERVANCY, *California Lassen Foothills*, http://www.nature.org/wherewework/ northamerica/states/california/preserves/art6320.html (last visited Aug. 30, 2010).

67. *Id.*

68. For further description of conservation easement impact research in the Lassen Foothills, see Kristin B. Byrd et al., *Impacts of Conservation Easements for Threat Abatement and Fire Management in a Rural Oak Woodland Landscape*, 92 LANDSCAPE & URB. PLAN. 106, 107 (2009).

69. *Id.*

the land is dominated by large ranches in the foothills, and federal, state, and timber industry holdings in the higher-elevation forests.

Most conservation easements in the project area target foothill ranches—privately owned, seasonally grazed, blue-oak woodlands and grasslands, bisected by coldwater trout and salmon streams. Landowners include both long-time ranchers and recent second-home buyers. Many landowners were active in watershed groups created in the 1990s, but those with conservation easements were not organized or active as a group.

B. Outputs: Conservation Easement Agreements

1. Research Findings: Conservation Easement Agreements[70]

Lassen Foothills conservation easements present an interesting approach to incorporating adaptive, management-oriented terms into conservation easements on working ranches. In general, more-detailed conservation easement terms are expected to provide greater clarity about restricted and permitted actions, and are expected to better withstand legal challenges in comparison with vague terms.[71]

TNC acquired twenty-two conservation easements in the Lassen Foothills between 1997 and 2008 covering over 32,300 hectares, with public funding contributing $12.9 million to their purchase. Of the twenty-two easements, sixteen were purchased with private, state, and federal funds, two were partially purchased and partially donated, two were donated, and two were retained by TNC when it sold the land. A TNC ecologist, attorney, and project manager with planning experience all worked together to negotiate conservation easement terms with landowners. The analysis of conservation easement terms in this paper relied on a database I created by categorizing conservation easement purposes, rights, and land-use restrictions.

Purposes included protecting specific species and ecological communities. One typical conservation easement stated that the purpose of the conservation easement is to "preserve, protect, enhance, and restore in perpetuity the Conservation Values of the Property including, without limitation, vernal pools, grasslands and unfragmented open space . . . ." Furthermore, the agreement stated that the conservation easement is intended to "foster ranching practices on the Property in harmony with the protection and preservation of the Conservation Values . . . ."

The easements limited new buildings and subdivision of the property. They typically specified a building envelope (one or more acres where building is allowed) and restrictions on the number of buildings permitted within that area. Terms also included restrictions on new roads, mining, dumping, plowing, and other potential land uses.

---

70. Research in this section is based on Byrd et al., *supra* note 68, and Rissman, *supra* note 10.

71. *See* Rissman, *supra* note 10.

Adaptive management of grazing was another important component. To prevent overgrazing, eighty percent of Lassen Foothills conservation easements required a minimum level of residual dry matter (RDM, measured in pounds per acre) be left on the ground at the end of each grazing season. Since rainfall and forage production vary considerably from year to year, a static limit on the number of grazing animals would be too low some years and too high other years. RDM is a quantitative measure that is more adaptive and measurable than a limit on the number of grazing animals.[72] TNC staff indicated that RDM became a common compliance term because it is directly linked to grazing pressure, creates shared language with landowners, is relatively inexpensive to monitor, and provides a quantitative standard for accountability.

TNC often negotiated for the rights to conduct invasive-species removal and prescribed burning, generally with some form of landowner approval. One conservation easement states, "The [Nature] Conservancy may, at its own cost and expense, employ the use of pesticides, herbicides or other biocides, or any other means necessary, to control or eliminate exotic plant species and replace them with native vegetation in order to restore the riparian habitat."

A related statewide study of fifty-two rangeland conservation easements created or held by TNC throughout California (including the Lassen Foothills) found that TNC's rangeland conservation easement terms became increasingly complex between the 1970s and 2000s.[73] In addition, the study found that terms were most complex for conservation easements that TNC purchased on private lands, and least complex in donated conservation easements and conservation easements on public lands. TNC easements provided flexibility through exceptions for drought years, reference to best-management practices, TNC's administrative discretion, and through easement amendment (although amendments were very rare). Interviews with TNC staff revealed that although individual conservation easements remained relatively fixed once they were established, subsequent easements incorporated new lessons learned from easement monitoring, enforcement, management, and applicable science.

2. Conclusions: Incorporating Adaptive Compliance and Active Management Terms

In the TNC Lassen Foothills case study, the staff involved in negotiating the conservation easements had clearly defined biodiversity-protection goals and strong scientific backgrounds in ecology and natural resources management. As a result, TNC staff intentionally focused on providing mechanisms for adaptive management and obtained important land-management rights in the conservation easements. They were successful in defining specific goals, linking some of those goals with compliance terms, and monitoring those terms.

---

72. JAMES W. BARTOLOME ET AL., CALIFORNIA GUIDELINES FOR RESIDUAL DRY MATTER (RDM) MANAGEMENT ON COASTAL AND FOOTHILL ANNUAL RANGELANDS (2002).

73. *See* Rissman, *supra* note 10.

TNC recognized that conservation easements in working landscapes must address land management in order to sustain natural resources and biological diversity. TNC staff also recognized that incomplete knowledge of future economic and ecological factors means that conservation easement terms related to land management must have some flexibility for change over time.[74] TNC introduced performance-oriented terms such as RDM, which allows TNC to quantitatively determine compliance, but also allows landowners to make management decisions that change with changing ecological conditions (since an RDM term allows landowners to graze more cattle when there is more rainfall and more available forage). RDM is helpful for measuring overgrazing and serves as an indicator for soil erosion, but it is not an indicator for native-plant and animal diversity. Even in this case, where conservation science, biodiversity protection, and adaptive management were priorities, providing adequate mechanisms for adaptive management was a significant challenge. Close relationships between natural-resource scientists, attorneys, and planners seem to have resulted in well-tailored conservation easement terms and adaptive monitoring and management approaches. These collaborations are likely to be a key element in improving the effectiveness of conservation investments in other areas as well.

C. Outcomes: Landowner Behavioral Change and Social Relations

1. Research Findings: Landowner Behavioral Change and Social Relations[75]

In order to be effective, conservation easements (outputs) must affect human behavior (outcomes). Outcomes analysis in the Lassen Foothills relied on analysis of conservation easement-monitoring reports and interviews. All landowners with conservation easements in the Lassen Foothills were contacted, and sixteen of twenty-two were interviewed, which involved one to 3.5 hour semi-structured interviews. In addition, twenty-two interviews were conducted with TNC staff, staff from other easement-holding organizations, and regional conservation and real-estate experts. Interview questions were designed to elicit information about the direct or indirect effects of easements, if any, on land use and ranch management. TNC's monitoring reports revealed the organization's approach to monitoring and working with landowners to address violations.

When asked to compare their management before and after the easement, most landowners in the Lassen Foothills said their ranching practices have not

74. For a discussion of science and uncertainty in ecological management, see Helen M. Regan et al., *A Taxonomy and Treatment of Uncertainty for Ecology and Conservation Biology*, 12 ECOLOGICAL APPLICATIONS 618 (2002). *See also* Holly Doremus, *Precaution, Science, and Learning While Doing in Natural Resource Management*, 82 WASH. L. REV. 547 (2007). For more on iterative ecological science in policy, see K. Carden, *Bridging the Divide: The Role of Science in Species Conservation Law*, 30 HARV. ENVTL. L. REV. 165 (2006).

75. See Rissman & Sayre, *supra* note 18, for substantiation of this section.

changed. In the Lassen Foothills, RDM is monitored by TNC through a site visit at the end of the grazing season just before winter rains begin. Monitoring reports revealed that easement terms including minimum RDM levels were nearly always upheld. Standard business practices in the Lassen Foothills involve leaving some grass on the ground when ranchers take their cattle elsewhere for the summer, in case they have to bring them back before the fall rains start. This reduces the threat of overgrazing. TNC likewise indicated that easement terms were designed to support existing grazing practices, which they judged compatible with—or even responsible for—the high native-plant diversity in the grasslands. RDM terms were included to prevent overgrazing in the future.

Landowners most often pointed to two major land uses where the easement had a direct influence on their actions: riparian fencing and rock harvesting. Several easements required fencing to exclude cattle from riparian areas. In some cases this was a requirement that came from the state funder. The conservation easements also restricted removal of rocks from the volcanic Lassen Foothills. Nearly every rancher indicated that without these restrictions on rock removal, they would gladly sell rocks from the ranch. Several landowners had previously sold rocks, and rock harvesting was ongoing on several ranches without conservation easements. Rock harvesting for residential and commercial landscaping is relatively lucrative, but TNC considered it incompatible with the preservation of native-plant and animal diversity in Lassen Foothills grasslands. Additionally, several of the easements required restoration such as removing an old orchard or restoring streambank vegetation. At least one landowner indicated a potential interest in generating renewable energy, but establishing windmills was prohibited by the easement.

In addition to restricting land uses considered incompatible with conservation purposes, conservation easements also had significant indirect outcomes, through the landowner–NGO relationships they created or the broader social relations they affected. Easement relations helped strengthen landowner connections with NGOs and government agencies. Some landowners met TNC staff through local watershed councils, which are an important nexus for landowner connections to water policy and riparian-restoration initiatives. The easements further strengthened these relations, providing some landowners a sense of political clout through their alliance with TNC, and indicating to local environmentalists that the ranchers cared about protecting their lands for the long term. Because of the easement, one landowner felt less pressure to sell the land to a public agency with holdings nearby. Easements provided significant funding, built closer social networks with government agencies and scientists, and helped to attract support for prescribed fire, restoration, and research. The easements influenced landowner turnover and provided newcomers with local social and ecological knowledge.

Of the sixteen landowners interviewed in the Lassen Foothills, two expressed mild to moderate dissatisfaction with constrained land-use options.

One of these landowners claimed to have threatened to contact every Western newspaper in the country if TNC did not amend a conservation easement to permit a levy setback along a creek and a flood easement. TNC staff in this situation concluded that the requested modifications (moving a levy farther from the creek) would enhance the conservation values on the property, were consistent with the existing conservation easement terms, and were permitted without an amendment.

2. Conclusions: Social Relations and Organizational Capacity in Changing Landowner Behavior

Social relations and institutional context are key to understanding the outcomes of easements for conservation- and natural-resources management. The outputs, outcomes, and impacts of conservation easements are all mediated through the social relations between landowners, easement holders, and other community members, both before and after easements are established. Social relations between landowners and easement holders directly shape easement requirements as well as monitoring and enforcement.

Through landowner interviews, several immediate direct effects of the conservation easements on land management became clear. Landowners claimed that without the conservation easement restrictions, they would likely harvest rocks from their properties. Some of the conservation easements required and funded riparian fencing or other restoration that would not otherwise be in place. Restrictions on orchards and windmills prevented these land uses in places where landowners would otherwise have established them, resulting in net conservation gains for unfragmented open space and onsite biodiversity protection. Landowner decisions about grazing did not seem to be influenced by the conservation easements, which were designed to be consistent with existing practices.

In unexpected ways, relationships between landowners and easement holders may also shape ecosystem management, scientific research, social networks, financial constraints and opportunities, and landownership turnover. Relations are unique in each case, depending on goals, personalities, local histories, and the delineation of rights and restrictions in each easement. Finally, landowners can attempt to pressure easement holders into amending conservation easements. In the Lassen Foothills example, TNC staff referred to the organization's policy for amending conservation easements and determined that the requested levy setback would benefit conservation values.

D. Impacts: Residential Growth, Vegetation Protection, and Fire Patterns

1. Research Findings: Residential Growth, Vegetation Protection, and Fire Patterns[76]

The final study on Lassen Foothills conservation easements quantified their impacts on development and the resulting benefits for habitat protection and fire as an ecosystem process. In this study, Kristin Byrd, Adina Merenlender, and I used a regional growth model to compare development projections for two alternative scenarios: with and without conservation easements.[77] Lassen Foothills conservation easements aim to reduce exurban rural residential development, which is the fastest-growing land-use type in the United States.[78] This low-density development affects biodiversity, wildlife habitat, and ecosystem processes including fire regimes.[79]

We selected two measures of environmental impact to provide both narrow and broad indicators of the effects of housing development on environmental conditions. First, we compared the amount of vegetation converted to buildings and roads in both scenarios. Second, we compared the effects of development on fire planning and management between the two scenarios, which we expected to be sensitive to small changes in the spatial pattern of development.

To compare landscape scenarios with and without conservation easements, we modeled suburban and exurban growth in Tehama County through the year 2050, based on population projections developed by the State of California. The model predicted that the Lassen Foothills in Tehama County would gain about 184 new homes with easements present, compared with 223 homes if easements were absent. To measure the effect of new homes on amount of vegetation lost, we mapped development footprints on 760 existing rural residential parcels in the region through automated remote sensing.[80] Based on calculated footprint sizes we projected site-level habitat loss for each scenario. Given the average residential footprint size of 0.34 ± 0.25 hectares (mean ± standard deviation), we found that easements appear to slightly reduce vegetation conversion, protecting an additional 16.8 hectares than would be protected without the easements.

This is a surprisingly low amount of prevented vegetation loss for a landscape with over 32,000 hectares in conservation easements. Part of the reason for the low number is that the residential growth prevented within

---

76. Research in this section is based on Byrd et al., *supra* note 68.

77. For additional information on research methods and the full results of the study, see *id.*

78. D.G. Brown et al., *Rural Land-Use Trends in the Conterminous United States, 1950–2000*, 15 ECOLOGICAL APPLICATIONS 1851, 1855–58 (2005).

79. A.J. Hansen et al., *Effects of Exurban Development on Biodiversity: Patterns, Mechanisms, and Research Needs*, 15 ECOLOGICAL APPLICATIONS 1893 (2005); *see also* Brown et al., *supra* note 78, at 1851.

80. We used object based image classification software to identify developed areas from a color aerial photograph of the region.

easement boundaries was redistributed to the ample rural space outside of easement boundaries. The easements often allowed for one or more new residences to be established, reducing their effect on displacing development in this low-threat landscape. There are caveats to these findings, of course. Developers can obtain variances or advocate for zoning changes to cluster new houses in higher densities than the model predicted, and could conceivably place those developments in areas particularly important for riparian restoration, grassland conservation, or migratory animal connectivity that are now protected by conservation easements. Also, human population estimates can be either too low or too high.

We also examined the impact of projected exurban housing on fire planning and management, which are influenced at a regional scale. Fire may reduce nonnative annual grasses, increase native annual grasses, and possibly increase native-species richness in the Lassen Foothills.[81] To determine whether increased housing would affect managers' ability to implement prescribed burns or allow for reduced fire suppression, we projected the influence of development patterns on fire management using the county's Fire Plan and its maps of defensible wildfire-containment areas. Comparing the two scenarios, we found that the easements allowed for fire management on 12,370 hectares (17.5% of undeveloped wildfire-containment areas) that would otherwise be affected by scattered development, which requires more fire suppression and reduces options for prescribed burning. This higher spatial impact was found because large areas can be affected by a single house. Fire planners suggested that with even one house present, they would prioritize fire suppression, while with no houses present they would be more likely to let wildfires burn and would engage in prescribed burns, to the benefit of plant diversity and ecosystem function.

2. Conclusions: Conserve Threatened Landscapes

This research demonstrates that the total amount of rural residential development in a low-threat region is altered only slightly by land acquisitions. Conservation easements may result in only limited reductions of habitat loss, since projected development could shift to unprotected parcels in the region. Conservation easements do appear to cluster development, enabling managers to allow for prescribed fires and unsuppressed wildfires by preserving large unfragmented areas. One important implication of these findings is that it may be more effective to target moderately threatened areas for conservation, striking a balance between threat and the cost of acquisition. It also suggests a note of caution in interpreting claims about the amount of land protected from development. Permanence of conservation restrictions does not necessarily equate to conservation impact.

---

81. *See* R.J. REINER, P.M. HUJIK & J.F. POLLOCK, ASSUMPTIONS USED TO JUSTIFY PRESCRIBED FIRE AS A RESTORATION TOOL IN CALIFORNIA ANNUAL GRASSLANDS (R. Schlising & D. Alexander eds., 2006).

V

WILL CONSERVATION EASEMENTS MINUS PERPETUITY BE AN IMPROVEMENT?

Pointing to a variety of problems with perpetual conservation easements such as the difficulties of adaptive management, scholars have recommended a variety of nonperpetual tools instead.[82] For instance, Owley suggests that renewable-term conservation easements would address some of the numerous flaws with the current system of conservation easements, including the common-law concerns with alienability and notice, privatization and accountability, addressing ecological dynamics, ease of amendment, and lack of enforcement.[83] McLaughlin argues that according to the cy pres doctrine, which provides a process for modifying charitable donations, donated conservation easements should only be amended or terminated with court approval, and not solely through mutual agreement of the landowner and conservation easement holder. In situations where amendment or termination is anticipated, McLaughlin suggests term-terminable easements, which could potentially be terminated through mutual agreement of the landowner and conservation easement holder after a term (such as ninety-nine years) has expired.[84] Fairfax suggests that in some cases renewable ninety-nine-year conservation easements would provide greater equity and flexibility for land-use planning than perpetual conservation easements, and that land trusts should have the option to reconfigure their holdings, perhaps for conservation easements older than fifty years, by supermajority or unanimous vote of the land trust board.[85] In the pursuit of adaptive management, Richardson advocates for a variety of nonperpetual instruments including term and term-terminable conservation easements, green payments, and payments for ecosystem services.[86]

One primary argument for nonperpetual easements is increased flexibility. It is important to differentiate between flexibility and adaptation. Climate-change adaptation, for instance, has been defined as "any adjustment that reduces the risks associated with climate change, or vulnerability to climate change impacts, to a predetermined level, without compromising economic, social, and environmental sustainability."[87] Adaptation of conservation strategies is intended to make those conservation strategies more effective, and less vulnerable, to change over time. Perpetual conservation easements tie up a

82. *See* Julia D. Mahoney, *Perpetual Restrictions on Land and the Problem of the Future*, 88 VA. L. REV. 739 (2002); *see also* Richardson, *supra* note 11, at 54. Some advocate for term-terminable but not term conservation easements. *See* McLaughlin, *supra* note 4.

83. Jessica Owley, *Changing Property in a Changing World: A Call for the End of Perpetual Conservation Easements*, STAN. ENVTL. L.J. (forthcoming 2011).

84. *See* McLaughlin, *supra* note 4.

85. *See* FAIRFAX ET. AL, *supra* note 5, at 269–70.

86. *See* Richardson, *supra* note 11.

87. Miguel de Franca Doria, Emily Boyd, Emma L. Tompkins & W. Neil Adger, *Using Expert Elicitation to Define Successful Adaptation to Climate Change.* 12 ENVTL. SCI. & POL'Y 810, 810 (2009).

conservation investment in one property, perhaps longer than is optimal or beneficial. Short-term agreements provide more-frequent opportunities for renegotiation. But they also provide more opportunities to convert the property to a nonconservation use. From the perspective of achieving conservation goals, this is not successful adaptation.

Short-term conservation agreements are already widely used, providing lessons for the debate over perpetual conservation easements. Numerous federal, state, local, and nonprofit land-conservation programs rely on ten-to-thirty-year conservation easements and ten-to-fifty-year property-tax-incentive programs.[88] Short-term agreements appeal to a larger number of landowners and cost less initially than perpetual agreements, but the transaction costs associated with renewals are higher. The lands most threatened with development are likely to be those whose landowners are least likely to renew short-term agreements. In contrast, perpetual property rights are relatively durable and fluctuate less with changing market demands for development, agricultural intensification, and other land uses.

For instance, the U.S. Department of Agriculture's Conservation Reserve Program (CRP), the largest private-land-conservation program in the United States, consists of ten-to-fifteen-year agreements that set aside land from agricultural production to protect water quality and provide wildlife benefits. CRP assists farmers in converting highly erodible or environmentally sensitive cropland to vegetative cover. As of September 2010, over thirty-one million acres were enrolled in the CRP, including two million acres of conservation buffers and two million acres of wetland restorations.[89] As crop prices and time since initial enrollment increased, some landowners decided not to reenroll in the program when their contracts expired.[90] Contract expirations increased nationally from 278,000 acres in 2003 to 2,785,271 acres in 2009.[91] Since high corn prices have elevated the economic value of marginal agricultural lands, ten-to-fifteen-year agreements are increasingly subject to expiration without renewal. This poses a threat to wetlands and grasslands enrolled in the program. The probability of reenrollment is likely to be lowest where agricultural productivity and the economic benefits of intensive agriculture are highest. Because these places are more threatened, they are also where conservation

88. Examples include the Wetlands Reserve Program, California's Williamson Act, and Wisconsin's Managed Forest Law program. *See* 16 U.S.C. § 3837 (Supp. 2010) (Wetlands Reserve Program); California Land Conservation Act of 1965, CAL. GOVT. CODE § 51200–51207 (2010) (California's Williamson Act); WIS. STAT. ANN. § 77.82 (2010) (Wisconsin's Managed Forest Law).

89. USDA FARM SERV. AGENCY, CONSERVATION RESERVE PROGRAM MONTHLY SUMMARY—SEPTEMBER 2010, *available at* http://www.fsa.usda.gov/Internet/FSA_File/sep2010crpstat.pdf (last visited Nov. 10, 2010).

90. V. H. DALE, ET AL., BIOFUELS: IMPLICATIONS FOR LAND USE AND BIODIVERSITY, Biofuels and Sustainability Reports, Ecological Society of America (ESA) 1 (2010), *available at* http://www.esa.org/biofuelsreports.

91. USDA FARM SERV. AGENCY, CRP CONTRACT EXPIRATIONS FROM 2005 TO 2009, *accessed online* Nov. 10, 2010 http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=rns-css.

programs create greater gains over the counterfactual scenario. At the other end of the market value spectrum, some of the low-value agricultural lands enrolled in the program would have been less expensive to purchase outright than to enroll in several successive CRP contracts.[92] The conservation benefits of some short-term property tax incentives are also unclear. For instance, California's Williamson Act contracts are ten-year renewable agreements that reduce property taxes on agricultural land. However, some observers suggest that ten years is the approximate development horizon, making it a suitable tax shelter while the owner obtains permits, and then withdraws from the program to develop the property.[93] Wisconsin's Managed Forest Law program is one of the largest state property tax incentives for sustainable forest management on private land. Its longer twenty-five-to-fifty year agreements and substantial penalties for early withdrawal have provided more consistency so far, although greater administrative costs are on the horizon when the agreements begin expiring in 2012.[94]

Payments for ecosystem services have become a popular proposed solution for paying to obtain improved land use and ecosystem benefits from landowners and local communities.[95] Concerns with payments for ecosystem-service programs include slippage, meaning that payments might prevent deforestation in one place while shifting the threat to areas nearby where landowners are not compensated for conservation.[96] The problem of slippage is common to many site-specific conservation approaches and has been documented for CRP.[97] Another concern with payments for ecosystem services is that the payment could provide the economic means for people to engage in more-intensive extractive activities. Experience with a five-year payment program in Mexico

92. Shawn Bucholtz, Presentation at the Resources for the Future Seminar: Keeping the C in the CRP: How Well Does the Conservation Reserve Program Work? (Oct. 6, 2010).

93. K.A. McGurty, *The State of Agricultural Land Preservation in California in 1997: Will the Agricultural Land Stewardship Program Solve the Problems Inherent in the Williamson Act?*, 7 SAN JOAQUIN AGRIC. L. REV. 135 (1997).

94. Jon Breschak & Mark Rickenbach, *The Managed Forest Law Property Tax Program*, 50 Department of Forest and Wildlife Ecology, Forestry Facts 1, 1–2 (2010), *available at* http://forestandwildlifeecology.wisc.edu/extension/Publications/50.pdf.

95. B.K. Jack et al., *Designing Payments for Ecosystem Services: Lessons from Previous Experience with Incentive-Based Mechanisms*, 105 PROC. NAT'L ACAD. SCI. 9465 (2008); Kelly J. Wendland et al., *Targeting and Implementing Payments for Ecosystem Services: Opportunities for Bundling Biodiversity Conservation with Carbon and Water Services in Madagascar*, 69 ECOLOGICAL ECON. 2093 (2010).

96. *See, e.g.*, Jennifer Alix-Garcia et al., *Lessons Learned from Mexico's Payment for Environmental Services Program*, *in* PAYMENT FOR ENVIRONMENTAL SERVICES IN AGRICULTURAL LANDSCAPES: ECONOMIC POLICIES AND POVERTY REDUCTION IN DEVELOPING COUNTRIES 163 (Randy Stringer David Zilberman, Leslie Lipper & Takumi Sakuyama eds., 2008). Some slippage was evident in Mexico's program, in that deforestation efforts shifted to forests not enrolled in the program. This reduces the overall effect of the program.

97. J.J. Wu, *Slippage Effects of the Conservation Reserve Program*, 82 AM. J. AGRIC. ECON. 979, 979 (2000).

reveals that the short-term nature of the agreement provided short-lived benefits without a long-term plan.[98]

Term-terminable easements with long (fifty to ninety-nine year) initial terms would relieve some problems of term agreements.[99] They would provide the land trust or government agency with the option to modify or terminate the agreement under certain circumstances. Under these limited circumstances, termination of existing conservation easements may result in improved conservation outcomes through an exchange for lands that provide a greater net conservation benefit. However, as described in detail by McLaughlin, these decisions should be subject to public review and need to be scrutinized carefully to maintain the provision of public benefits, prevent undue private gain, and maintain public confidence.[100] Landowners should be encouraged to perceive term-terminable conservation easements as permanent restrictions without an expiration date to avoid the expectation of the easement dissipating when the term expires.

The critical issue of transparency remains important whether agreements are perpetual or term. Both short-term and perpetual conservation easements run with the land and must be recorded to be valid, which provides a public record of the transaction. Increasingly, national efforts to track and map conservation easements are gaining ground. These efforts include the National Conservation Easement Database.[101] Movement away from transparency is a cause for concern. Payments for ecosystem services, leases, and other agreements that are not recorded with the deed provide even less transparency than conservation easements. CRP is the largest private-land-conservation program in the United States, but access to data on CRP programs has been restricted. Spatial data on locations of farms enrolled in CRP was briefly available to the public in 2007 and then restricted by 2008 federal legislation.[102] These spatial data are no longer available even to state and local governments, causing considerable difficulty for those implementing and analyzing the program.[103]

Problems with organizational capacity, monitoring, and enforcement are not likely to be improved by reducing the contract, easement, or agreement length. Monitoring and enforcement rely on organizational capacity and commitment to a conservation mission. They require the resources to engage in graduated dispute resolution, which could culminate in lawsuits against private landowners for violating the terms of the agreement. It may be difficult to justify engaging

98. *See* Alix-Garcia et al., *supra* note 96.

99. *See* McLaughlin, *supra* note 4, at 707–11.

100. *See id.* at 700–01.

101. Amy W. Morris & Adena R. Rissman, *Public Access to Information on Private Land Conservation: Tracking Conservation Easements*, 2009 WIS. L. REV. 1237 (2009).

102. *See* 7 U.S.C. § 8791(b)(2)(B) (Supp. 2010) (codifying § 1619(b) of the Farm Bill Act of 2008).

103. *See, e.g.*, Mike Strand, *No Freedom of Information*, SALINA JOURNAL, Jan. 11, 2009, *available at* http://www.salina.com/news/story/crp-stuff.

in protracted dispute-resolution processes for agreements that last for only one, five, or ten years.

VI

CONCLUSIONS

Conservation easements are emblematic of a shift toward privately negotiated environmental policy.[104] As described in the TNC Lassen Foothills case study, conservation easements allow for learning and adaptation from one negotiation to the next, but each conservation easement has relatively fixed terms, with limited mechanisms for updating over time. The studies summarized in this paper reveal the potential and the limitations of conservation easements for attaining desired behavioral outcomes and environmental impacts. Adaptive management presents particular challenges for the conservation easement tool, which relies on restrictions that are intended to be permanent. Mechanisms for adaptation are needed to enhance conservation purposes and safeguard public investments, while providing flexibility for social and ecological change. However, systems that allow for adaptation may also subject the conservation easement holder to demands from landowners to modify easement terms to the detriment of conservation purposes. By improving conservation easement terms (outputs) and their effects on landowner behavior (outcomes) and environmental conditions (impacts), conservation easements can become a more effective tool. Conservation easements also have important limitations that speak to the need for a diverse approach involving multiple tools and strategies.[105] Removing perpetuity from the conservation easement tool will not by itself improve the practice of conservation. Improvements will require a shift toward landscape-scale planning and action that induces conservation-oriented changes in human behavior and produces benefits over the counterfactual scenario.

A. Improve Outputs: Draft Conservation Easements with Clear Purposes, Rights, Restrictions, and a Process for Adaptive Land Management

Conservation easements should be drafted with clear conservation purposes, land-use restrictions, holder rights, and a process for conservation-oriented adaptive land management. Conservation easements are not ideally suited for adaptive land management. Their basic assumption that removing landowner-use rights results in improved conservation outcomes is insufficient. Conservation easements can retain perpetual restrictions on development while allowing for adaptive land management of forestry, grazing, agriculture, and other land uses. Flexibility for land management can be attained through

104. Alejandro E. Camacho, *Can Regulation Evolve? Lessons from a Study in Maladaptive Management*, 55 UCLA L. REV. 293 (2007).

105. Holly Doremus, *A Policy Portfolio Approach to Biodiversity Protection on Private Lands*, 6 ENVTL. SCI. & POL'Y 217, 217 (2003).

discretionary-consent clauses, adaptive terms, management plans, and amendment policies. For conservation easements that aim to conserve natural landscape features, species, and ecological communities, these purposes should be spelled out in the conservation easement, monitoring should go beyond compliance to more comprehensive evaluation of ecological trends, and conservation scientists should be involved in drafting and updating conservation easements over time. Commitment to a more comprehensive and adaptive approach may require substantial increases in land trust and government stewardship budgets.

B. Improve Outcomes: Invest in Social Relations and Capacity for Monitoring and Enforcement

By strengthening social relations with private landowners, land trusts and government agencies may influence the human behavioral outcomes that produce desired environmental and social conditions. As the Lassen Foothills case demonstrates, social relations can extend beyond the terms of the conservation easement itself. In that case, a network of conservation organizations and landowners increasingly shared information and resources. To obtain desired behavioral change, it is important to expect and emphasize landowner stewardship duties and obligations, both through formal legal relations and informal social norms.

Organizational capacity and political will are critical to ensure that land trusts and government agencies monitor and enforce conservation easements and protect other conservation investments. Lack of capacity is a current barrier to monitoring and enforcement for some organizations.[106] Watchful neighbors and third-party monitoring and enforcement would be beneficial in these situations.[107] More-comprehensive monitoring of ecological systems is also needed. Adaptive management requires additional resources to engage in ongoing negotiations, ecological monitoring, experimentation, and active land management to achieve conservation goals.

C. Improve Impacts: Target Threatened Landscapes and Integrate Conservation Science

Moderately threatened landscapes are more expensive to acquire than low-threat landscapes, but also create a larger return on conservation investments. Term easements and other short-term agreements may be less effective at preventing significant threats from development and other economically attractive land uses, since landowners are least likely to reenroll when the opportunity costs of conservation are highest. A conservation portfolio including both perpetual and limited-term conservation agreements may be

106. *See* Rissman & Butsic, *supra* note 16.

107. Lippmann, *supra* note 48, at 341; *see also* King & Fairfax, *supra* note 16.

most effective. Involving conservation planners and scientists in prioritizing new acquisitions can help improve their effectiveness.

D. Improve Evaluation: Provide for Increased Transparency, Public Accountability, and Science

Transparency, accountability, and program evaluation are critical for ensuring and improving conservation easement effectiveness. Individually negotiated agreements and the increasing role of nongovernment organizations remove some mechanisms for public accountability that are in place for public-land conservation and management. Increasing the transparency and accountability of conservation easements should encompass property selection, drafting, monitoring, and enforcement. A public process for updating, amending, or terminating conservation easements could provide mechanisms for adaptation while ensuring that organizations fulfill their conservation obligations.

Pressure on government agencies and land trusts to enforce conservation easement restrictions on private landowners may originate from legislative directives, the IRS, professional standards, organizational missions and culture, land-trust boards of directors, funders, members, donors, watchful neighbors, the media, and academia. Attending to transparency, organizational capacity, and public participation will be necessary in designing and evaluating a system for updating and enforcing conservation easements over time.

E. Toward Integrated Conservation Strategies

The conservation easement is one of many tools for conservation of private lands. A variety of conservation approaches should be integrated in regional conservation strategies, including land-use planning and zoning, acquisition of land and conservation easements, education, and market-based approaches such as forest certification. Conservation tools should be tailored to the dynamics of complex landscapes, recognizing the many relationships among social and environmental conditions. Importantly, a regulatory floor is needed for landscape-scale planning, with incentives provided for activities such as restoration that exceed minimum standards. As demonstrated by the studies discussed here, conservation interventions can have both direct and indirect effects on social relations and behavioral outcomes.

Furthermore, the source of environmental threats should be addressed directly. For instance, discouraging exurban living in sensitive landscapes might be more effective than acquiring conservation easements on dispersed parcels. Removing subsidies and incentives for the markets that drive undesirable land-use practices is an option for achieving conservation across large landscapes. Addressing the drivers of land-use change is politically challenging, but would be considerably more efficient than piecemeal, parcel-by-parcel acquisitions of conservation easements.

Enhancing social and ecological conservation sciences to improve conservation planning, adaptive management, and evaluation is also critical. Interaction with and support from land-grant universities, agricultural extension, and other researchers should be enhanced to improve the practice and evaluation of conservation programs. Anticipating and adapting to future change is a central challenge of environmental policy, law, and administration. Systems for accountability that examine outputs, outcomes, and impacts are needed to enhance conservation efforts. Building on the outputs–outcomes–impacts framework presented here will facilitate the development of effective conservation strategies in dynamic social and ecological landscapes.