

# Regulatory Spillover: How Regulatory Programs Influence Voluntary Efforts to Adopt Best Management Practices to Manage Non-Point Source Pollution

*Anne G. Short\* and Timothy P. Duane\*\**

I. INTRODUCTION .....	40
II. GOVERNANCE EVOLUTION AND THE INCREASING ROLE OF VOLUNTARY PROGRAMS .....	41
A. A Framework for Understanding the Governance of Human-Environmental Problems.....	41
B. Evolution of Environmental Governance Regimes.....	43
C. Participation in Voluntary Programs and Adoption of Best Management Practices .....	46
III. CASE STUDY SETTING, RESEARCH DESIGN, AND METHODS .....	48
A. Land Use and Physical Geography of the North Coastal Basin.....	48
B. Sediment Pollution and Roads in the North Coastal Basin.....	50
C. Research Design and Methods.....	53
IV. THE GOVERNANCE SETTING FOR RURAL SEDIMENT NPS .....	54
A. Prevention and Control of Nonpoint Source Pollution .....	54
B. NPS Policy Tools.....	55
V. REGULATING ROAD-RELATED SEDIMENT .....	57

---

\* Assistant Professor, Geography and Environment, Boston University (agshort@bu.edu). B.S., Mathematics, Harvey Mudd College, 2002; M.S., Energy and Resources, University of California, Berkeley, 2005; Ph.D., Energy and Resources, University of California, Berkeley, 2010. We are grateful to the many people throughout the North Coastal basin who shared their time and experiences. The manuscript benefited from the insights of the editors at *Environ*, Louise Fortmann, Richard Norgaard, and Nathan Sayre. We thank Josh Donabedian for his masterful translation of citations into Bluebook format. The research was funded by a National Science Foundation Graduate Research Fellowship and a National Science Foundation Doctoral Dissertation Research Improvement Grant.

\*\* Associate Professor, Environmental Studies, University of California, Santa Cruz (tpduane@ucsc.edu) and Associate Professor, Vermont Law School. A.B., Human Biology, Stanford University, 1982; M.S., Civil Engineering (Infrastructure Planning and Management), Stanford University, 1983; Ph.D., Civil Engineering (Energy and Environmental Planning), Stanford University, 1989; J.D., University of California, Berkeley (Boalt Hall), 2006.

A.	Regulation of Sediment as a Water Quality Problem: Clean Water Act and the California Porter-Cologne Water Quality Control Act .....	58
1.	Legislation and Regulatory Requirements.....	58
2.	Monitoring, Enforcement, and Sanctions .....	60
B.	Regulation of Sediment Associated with Forest Practices: Z'berg-Nejedly Forest Practice Act and Forest Practice Rules.....	61
1.	Legislation and Regulatory Requirements.....	61
2.	Monitoring, Enforcement, and Sanctions .....	62
C.	Other Sediment Regulations .....	63
VI.	NON-REGULATORY PROGRAMS AND TOOLS TO MANAGE SEDIMENT ON PRIVATE LANDS .....	65
VII.	MANAGEMENT PRACTICES AND THE REGULATORY AND NON-REGULATORY MECHANISMS OF INFLUENCE.....	66
A.	Conceptual Framework: Factors Influencing Road Management Decisions.....	67
B.	Regulatory Mechanisms .....	69
1.	Creating Regulatory Necessity Through Monitoring and Enforcement .....	69
a.	Lacking Necessity: Weak Regulations and Enforcement .....	70
b.	Generating Necessity: Strong Regulations and Enforcement on Timberlands .....	72
VIII.	REGULATORY SPILLOVER: HOW REGULATORY PROGRAMS AFFECT VOLUNTARY BMP ADOPTION .....	76
A.	Regulatory Spillover (I): Education and Access to Resources through Regulatory Process .....	76
B.	Regulatory Spillover (II): Regulatory Learning and Knowledge Networks .....	80
C.	Regulatory Spillover (III): Threats of Future Regulation and BMP Implementation.....	81
IX.	NON-REGULATORY MECHANISMS AND MOTIVATIONS .....	83
A.	Utilization and Effects of Non-Regulatory Resources .....	83
B.	Factors Motivating Landowners to Seek Technical and Financial Assistance .....	84
C.	Benefits and Limitations of Non-Regulatory Approaches .....	88
D.	Technical and Financial Assistance .....	89
E.	Direct Project Implementation.....	90
X.	LINKAGES BETWEEN AND COMMONALITIES IN REGULATORY AND NON-REGULATORY PROGRAMS.....	92
A.	Interdependency of Regulatory and Non-Regulatory Policy Tools in the Age of New Environmental Governance .....	92

2011]	<i>Regulatory Spillover</i>	39
	B. Commonalities in Regulatory and Non-Regulatory Mechanisms .....	96
XI.	CONCLUSION .....	98

## I. INTRODUCTION

A central question in environmental, land use, and natural resources law and policy is the relative efficacy of regulatory versus voluntary approaches to the achievement of performance outcomes.<sup>1</sup> This Article addresses this debate by examining the governance of non-point source (“NPS”) pollution on private lands. It specifically focuses on the prevention and control of sediment — a common NPS pollutant — from private lands in the rural North Coastal Basin of California and examines how regulations, non-regulatory programs, and other factors promote and impede the adoption of pollution control measures on private lands. This research utilizes an institutional analysis approach and employs a combination of qualitative and quantitative methods applied at the watershed and regional scale.

In the North Coastal Basin, a variety of regulatory and non-regulatory programs require or promote the use of pollution control measures, known as best management practices (“BMPs”), to reduce sediment pollution from private lands within the basin. The challenges of governing and managing sediment pollution in the North Coastal Basin mirror challenges associated with the governance of many complex and evolving human-environmental problems. This Article focuses on the social and institutional aspects of governance and management of these problems. In doing so, it draws attention to the ways that formal and informal social interactions influence landowners’ management decisions, highlights the linkages between regulatory and non-regulatory actions, and adds insight into the design of regulatory and non-regulatory programs that recognize and capitalize on the social factors that affect management decisions on private lands.

In particular, this study demonstrates that there is “regulatory spillover” from regulatory programs to non-regulatory programs and voluntary actions. By requiring some landowners to retain independent technical professionals, the regulation of timber harvests has generated increased knowledge about BMPs among landowners. This then translates into increased utilization of non-regulatory resources and the adoption of BMPs on private lands that are not subject to strict regulatory monitoring or enforcement. Both regulations and

---

<sup>1</sup> See DEWITT JOHN, *CIVIC ENVIRONMENTALISM: ALTERNATIVES TO REGULATION IN STATES AND COMMUNITIES* (CQ Press 1994); TOMAS M. KOONTZ ET AL., *COLLABORATIVE ENVIRONMENTAL MANAGEMENT: WHAT ROLES FOR GOVERNMENT?* (Tomas M. Koontz ed., Resources for the Future 2004); JUDITH A. LAYZER, *NATURAL EXPERIMENTS: ECOSYSTEM-BASED MANAGEMENT AND THE ENVIRONMENT* (MIT Press 2008); Jody Freeman, *Collaborative Governance in the Administrative State*, 45 *UCLA L. REV.* 1 (1997); Judith E. Innes, *Consensus Building: Clarifications for the Critics*, 3 *PLAN. THEORY* 5 (2004) [hereinafter Innes, *Consensus Building*]; Orly Lobel, *The Renew Deal: The Fall of Regulation and the Rise of Governance in Contemporary Legal Thought*, 89 *MINN. L. REV.* 342 (2004); Martin Nie, *The Underappreciated Role of Regulatory Enforcement in Natural Resource Conservation*, 41 *POL’Y SCI.* 139 (2008).

non-regulatory programs influence landowners' knowledge and actions, but they do so in different ways. Most importantly, regulations and non-regulatory programs often work in tandem and their combined influence extends beyond the reach of either one operating independently. It is shown here that interactions between landowners and professionals and amongst multiple landowners can also lead to increased knowledge about and adoption of BMPs. This study illustrates that informal social networks and high quality interactions between landowners and professionals, such as private consultants, regulators, and staff at non-profit organizations, can extend the reach and impact of both regulatory and non-regulatory programs.

The structure of the Article is as follows: Part II discusses the evolution of governance institutions and the increasing role of voluntary programs; Part III describes the case study setting, research design, and methods; Part IV outlines the governance setting for rural sediment NPS; Part V discusses the regulatory regime for road-related sediment; Part VI summarizes non-regulatory programs and tools to manage sediment on private lands; Part VII describes how regulatory and non-regulatory mechanisms influence the adoption of BMPs; Part VIII describes how "regulatory spillover" causes regulatory programs to affect voluntary BMP adoption; Part IX addresses non-regulatory mechanisms and motivations for BMP adoption; and Part X highlights the linkages between and commonalities in regulatory and non-regulatory programs.

## II. GOVERNANCE EVOLUTION AND THE INCREASING ROLE OF VOLUNTARY PROGRAMS

### A. *A Framework for Understanding the Governance of Human-Environmental Problems*

Humans affect the environment directly and indirectly through land use, land management, and the institutions that influence patterns of land use and management.<sup>2</sup> *Land use* is "the purpose to which land is put by humans" — e.g., agriculture, forestry, urban development — and *land management* refers specifically to the "way a given land use is administered by humans" — e.g., till versus no-till agriculture, clear-cut versus selective timber harvesting.<sup>3</sup> *Institutions* are the conventions, norms, and rules of a society.<sup>4</sup> These include

---

<sup>2</sup> Virginia Dale et al. note that humans affect the environment through land use, land management, and "policy decisions regarding natural resources." V.H. Dale et al., *Ecological Impacts and Mitigation Strategies for Rural Land Management*, 15 *ECOLOGICAL APPLICATIONS* 1879 (2005). We have altered their claim to reflect the institutional perspective that human actions are influenced by all types of institutions rather than only by policies.

<sup>3</sup> V.H. Dale et al., *Ecological Principles and Guidelines for Managing the Use of Land*, 10 *ECOLOGICAL APPLICATIONS* 639, 642 (2000).

<sup>4</sup> ARILD VATN, *INSTITUTIONS AND THE ENVIRONMENT* 6, 6-7 (Arild Vatn ed., Edward Elgar

formal laws and regulations as well as the informal norms and conventions that govern behavior.

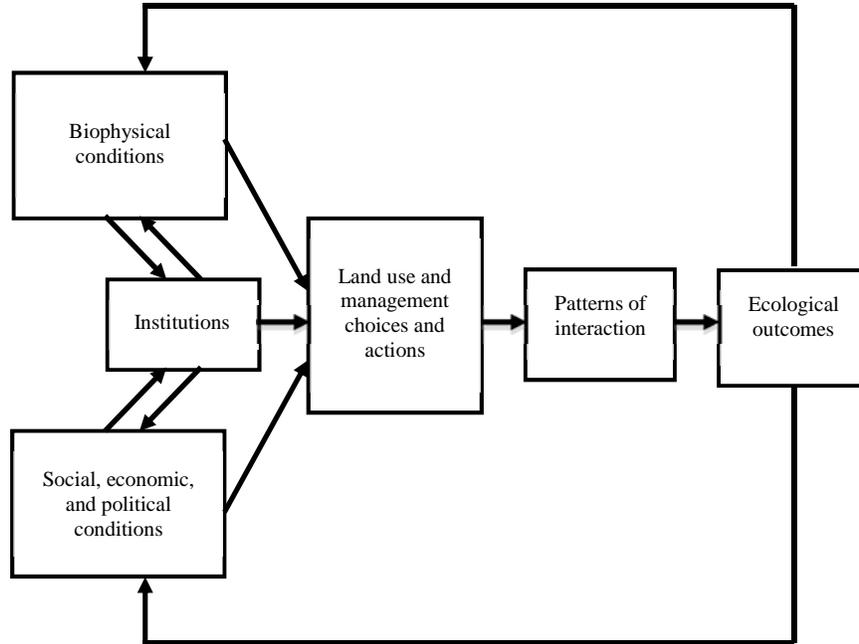
The collective land use and management decisions of humans directly influence ecological conditions. Institutions indirectly affect the environment by shaping the patterns of land use and management practices. Institutions are widely recognized as driving forces of land use change and as arenas for intervention and action to address human-environmental problems.<sup>5</sup> Land use, management, and institutions are interrelated with each other, and are shaped by and shape the biophysical and social, economic, and political context in which they exist (Figure 1). Addressing complex human-environmental problems thus requires an integrated understanding of the interrelations of land use, management, and institutions, and how they shape and are shaped by both the biophysical and social context in which they exist.

---

Publishing 2005); Sue E.S. Crawford & Elinor Ostrom, *A Grammar of Institutions*, 89 AM. POL. SCI. REV. 582 (1995).

<sup>5</sup> There is a rich history of investigation into the importance of institutions for the environment in the study of common property theory, e.g., ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (Cambridge University Press 1990) [hereinafter Ostrom, *Governing the Commons*], and global environmental change, e.g., PAUL C. STERN ET AL., GLOBAL ENVIRONMENTAL CHANGE: UNDERSTANDING THE HUMAN DIMENSIONS (Paul C. Stern et al. ed., National Academies Press 1992); ORAN R. YOUNG, THE INSTITUTIONAL DIMENSIONS OF ENVIRONMENTAL CHANGE: FIT, INTERPLAY, AND SCALE (MIT Press 2002). Early work highlighting the importance of institutions and the environment was centered in the common property literature. This work challenged the dominance of the Garrett Hardin's notion of the "tragedy of the commons" and demonstrated that local shared management can be a successful alternative to state or market intervention in the commons (e.g. Ostrom, *Governing the Commons*). More recent work has established that no single institutional arrangement has a monopoly on good or bad management of natural resources, and that legitimacy, social cohesion, and authority are important factors in the success of institutions. See ORAN R. YOUNG, THE INSTITUTIONAL DIMENSIONS OF ENVIRONMENTAL CHANGE: FIT, INTERPLAY, AND SCALE (MIT Press 2002); Mark T. Imperial & Tracy Yandle, *Taking Institutions Seriously: Using the IAD Framework to Analyze Fisheries Policy*, 18 SOC'Y & NAT. RESOURCES 493 (2005); Elinor Ostrom et al., *Revisiting the Commons: Local Lesson, Global Challenges*, 284 SCIENCE 278 (1999) [hereinafter Ostrom, *Revisiting the Commons*]; Elinor Ostrom & Harini Nagendra, *Insights on Linking Forests, Trees, and People from the Ground, and in the Laboratory*, 103 PROC. NAT'L ACAD. SCI. 19,224 (2006); Paul Robbins, *Authority and Environment: Institutional Landscapes in Rajasthan, India*, 88 ANNALS ASS'N AM. GEOGRAPHERS 410 (1998).

**Figure 1: Conceptual Framework for Understanding the Governance of Human-Environmental Problems<sup>6</sup>**



### B. Evolution of Environmental Governance Regimes

The late 1960s and early 1970s brought a deluge of federal pollution control policies in the United States that shifted the role of the federal government in pollution control. Prior to this time, most of the regulatory power and responsibility for setting environmental and public health standards resided with the states.<sup>7</sup> As the public developed a new awareness of environmental problems and public opinion shifted to support a stronger federal role in pollution control, the federal government assumed the role of the central coordinator of environmental standards.<sup>8</sup> Under this new design, the federal government established uniform national standards for environmental and public

<sup>6</sup> Figure adapted from Ostrom. Ostrom, *Governing the Commons*, *supra* note 5.

<sup>7</sup> J. CLARENCE DAVIES & JAN MAZUREK, *POLLUTION CONTROL IN THE UNITED STATES: EVALUATING THE SYSTEM* (Resources for the Future 1998). See MICHAEL E. KRAFT, *ENVIRONMENTAL POLICY AND POLITICS* 81-101 (Pearson/Longman 5th ed. 2010).

<sup>8</sup> RICHARD N.L. ANDREWS, *MANAGING THE ENVIRONMENT, MANAGING OURSELVES: A HISTORY OF ENVIRONMENTAL POLICY* (Yale University Press 2d ed. 2006) (1999); DAVIES & MAZUREK, *supra* note 7; JOHN, *supra* note 1; KRAFT, *supra* note 7; LINDA A. MALONE, *ENVIRONMENTAL REGULATION OF LAND USE* (C. Boardman 1990).

health protection, but left the power and responsibility of implementation largely to the states.<sup>9</sup> The majority of federal pollution control regulations promulgated during the 1970s took a ‘command and control’ approach to regulation in which the government sets standards and/or issues permits to polluters who are required to reduce their pollution to meet the standards or permits.<sup>10</sup>

Federal pollution control regulations have made progress in improving air quality, decreasing levels of toxic contaminants, and reducing point source pollution in U.S. waterways.<sup>11</sup> However, this same system of federal regulation has been widely criticized and is undergoing significant changes. From an economic perspective, it has been criticized as overly costly<sup>12</sup> and for not providing incentives for innovation.<sup>13</sup> A second set of critiques focuses on the decision-making process and characterizes the standard-based regulations as rigid,<sup>14</sup> adversarial,<sup>15</sup> and undemocratic.<sup>16</sup> Critics argue that these deficiencies and a reliance on top-down ‘expert’ decision-making processes leave the environmental protection system incapable of dealing with complex problems such as NPS pollution, integrated ecosystem management, and restoration.<sup>17</sup>

Scholars and practitioners have called for and observed the emergence of new approaches to pollution control and environmental management that are more flexible, integrative, and collaborative.<sup>18</sup> Initiatives led by state and local

---

<sup>9</sup> DAVIES & MAZUREK, *supra* note 7; JOHN, *supra* note 1; KRAFT, *supra* note 7; DENISE SCHEBERLE, *FEDERALISM AND ENVIRONMENTAL POLICY: TRUST AND THE POLITICS OF IMPLEMENTATION* (Georgetown University Press 2d rev. ed. 2004).

<sup>10</sup> DAVIES & MAZUREK, *supra* note 7; A. Myrick Freeman III, *Economics, Incentives, and Environmental Regulation*, in ENVIRONMENTAL POLICY 201 (Norman J. Vig & Michael E. Kraft eds., CQ Press 2000); Robert N. Stavins, *Market-Based Environmental Policies*, in PUBLIC POLICIES FOR ENVIRONMENTAL PROTECTION 31 (Paul R. Portney & Robert N. Stavins eds., Resources for the Future 2d ed. 2000).

<sup>11</sup> DAVIES & MAZUREK, *supra* note 7; KRAFT, *supra* note 7; Stavins, *supra* note 10; Norman J. Vig & Michael E. Kraft, *Environmental Policy from the 1970s to 2000: An Overview*, in ENVIRONMENTAL POLICY 1 (Norman J. Vig & Michael E. Kraft eds., CQ Press 2000).

<sup>12</sup> DAVIES & MAZUREK, *supra* note 7; KRAFT, *supra* note 7; Stavins, *supra* note 10; Vig & Kraft, *supra* note 11.

<sup>13</sup> Freeman III, *supra* note 10; Stavins, *supra* note 10.

<sup>14</sup> Freeman, *supra* note 1.

<sup>15</sup> William R. Lowry, *Natural Resource Policies in the Twenty-First Century*, in ENVIRONMENTAL POLICY 308 (Norman J. Vig & Michael E. Kraft eds., CQ Press 2000); Walter A. Rosenbaum, *Escaping the “Battered Agency Syndrome”: EPA’s Gamble with Regulatory Review*, in ENVIRONMENTAL POLICY 172 (Norman J. Vig & Michael E. Kraft eds., CQ Press 2000).

<sup>16</sup> Freeman, *supra* note 1, at 3.

<sup>17</sup> DAVIES & MAZUREK, *supra* note 7; JOHN, *supra* note 1; Freeman, *supra* note 1; Lettie McSpadden, *Environmental Policy in the Courts*, in ENVIRONMENTAL POLICY 145 (Norman J. Vig & Michael E. Kraft eds., CQ Press 2000). See Innes, *Consensus Building*, *supra* note 1.

<sup>18</sup> JOHN, *supra* note 1; Freeman, *supra* note 1; Daniel Press & Daniel Mazmanian, *Understanding the Transition to a Sustainable Economy*, in ENVIRONMENTAL POLICY 275 (Norman J. Vig & Michael E. Kraft eds., CQ Press 2000); Barry G. Rabe, *Power to the States: The Promise and Pitfalls of Decentralization*, in ENVIRONMENTAL POLICY 32 (Norman J. Vig & Michael E. Kraft eds., CQ Press 2000); Charles Sabel et al., *Beyond Backyard Environmentalism: How Communities*

government are being explored as promising locations for the next generation of environmental protection policies. John documents bottom-up environmental innovations at the state and local level — initiatives he has termed “civic environmentalism.”<sup>19</sup> According to John, “the central idea animating civic environmentalism is that in some cases, communities and states will organize on their own to protect the environment, without being forced to do so by the federal government. [ . . . ] Civic environmentalism is fundamentally a bottom-up approach to environmental protection.”<sup>20</sup> John argues that states and local governments are responding to the failures of federal environmental policies and that they have a comparative advantage in the use of non-regulatory and collaborative governance tools that are well suited to addressing complex environmental problems.<sup>21</sup>

In addition to innovations in governmental programs, grass-roots environmental initiatives have developed outside of traditional policy institutions.<sup>22</sup> Sabel et al. documents “backyard environmentalism” or partnerships between local citizen groups and government officials where local groups provide information to government programs charged with enforcing environmental programs.<sup>23</sup> These efforts create a regulatory system that has “collaborative and mutual accountability of center to parts, parts to center, parts to other parts, and all to the whole enterprise — and to the public generally.”<sup>24</sup> Edward Weber documents the emergence of the “grass-roots ecosystem management (GREM)” movement since the 1980s.<sup>25</sup> Organizations using GREM work more autonomously than ‘backyard groups,’ relying on “decentralization, collaboration, and citizen participation, and [ ] adopting a holistic worldview that seeks to meld ecology with economics and the needs of community in pursuit of symbiotic sustainability.”<sup>26</sup> They challenge the “fundamental premises of environmental, natural resources, and public lands institutions” and place land management in local control.<sup>27</sup>

The emergence of new arrangements centered away from the federal government is part of a global shift from ‘government’ to ‘governance’ that has

---

are *Quietly Refashioning Environmental Regulation*, 25 BOSTON REV. 1 (2000). See Innes, *Consensus Building*, *supra* note 1.

<sup>19</sup> JOHN, *supra* note 1.

<sup>20</sup> *Id.* at 7.

<sup>21</sup> *Id.*

<sup>22</sup> Sabel et al., *supra* note 18; Edward P. Weber, *A New Vanguard for the Environment: Grass-roots Ecosystem Management as a New Environmental Movement*, 13 SOC’Y & NAT. RESOURCES 237 (2000).

<sup>23</sup> Sabel et al., *supra* note 18.

<sup>24</sup> *Id.* at 3.

<sup>25</sup> Weber, *supra* note 22.

<sup>26</sup> *Id.* at 238.

<sup>27</sup> *Id.* at 237.

important ramifications for how environmental regulation is constructed and implemented.<sup>28</sup> As Adger and Jordan explain, “governance is now widely used as a shorthand phrase which encapsulates the changing form and function of the state in contemporary industrialized societies, specifically its diminishing size and its increasing tendency to deploy less coercive policy instruments.”<sup>29</sup> In general, this trend is characterized by the devolution of power away from centralized governments; reliance on more flexible and collaborative decision-making and management processes; and broad shifts in the balance of the state, market, and civil society involvement in environmental protection and natural resource management.<sup>30</sup>

While proponents of alternative governance arrangements note these approaches can increase flexibility and reduce conflict, and argue that they are better suited for addressing complex problems,<sup>31</sup> many also warn there is danger in viewing these as replacements for strong federal regulations. John stresses that civic environmentalism complements rather than substitutes for federal regulation and that national regulatory standards remain an important component of pollution control.<sup>32</sup> Others note that the federal government often plays an important role in collaborative and grassroots approaches providing financial support and technical assistance necessary to sustain many state and local initiatives.<sup>33</sup> Nie documents an emerging debate regarding the appropriate integration of traditional regulatory and alternative approaches and argues that traditional regulations often play a role in strengthening alternative approaches.<sup>34</sup>

### C. *Participation in Voluntary Programs and Adoption of Best Management Practices*

A separate set of research focuses on the factors that lead landowners to participate in voluntary land management programs or to adopt BMPs for pollution control or conservation. This work addresses participation and BMP adoption associated with NPS pollution as well as other conservation, pollution control, and restoration practices.

---

<sup>28</sup> Lobel, *supra* note 1.

<sup>29</sup> W.N. Adger & A. Jordan, *Sustainability: Exploring the Processes and Outcomes of Governance*, in *GOVERNING SUSTAINABILITY* 11 (W.N. Adger & A. Jordan eds., Cambridge University Press 2009).

<sup>30</sup> Maria C. Lemos & Arun Agrawal, *Environmental Governance*, 31 *ANN. REV. ENV'T & RESOURCES* 297 (2006).

<sup>31</sup> E.g., Judith E. Innes & David E. Booher, *Collaborative Policymaking: Governance Through Dialogue*, in *DELIBERATIVE POLICY ANALYSIS: UNDERSTANDING GOVERNANCE IN THE NETWORK SOCIETY* 33 (Maarten A. Hajer & Hendrik Wagenaar eds., Cambridge University Press 2003).

<sup>32</sup> JOHN, *supra* note 1.

<sup>33</sup> JOHN, *supra* note 1; KOONTZ ET AL., *supra* note 1; Rabe, *supra* note 18.

<sup>34</sup> Nie, *supra* note 1.

A large body of research examines the factors that drive traditional agricultural landowners to participate in conservation programs and to adopt BMPs for soil and water conservation.<sup>35</sup> This work typically uses logistical regression models to identify variables that correlate with participation in or adoption of BMPs. The variables commonly investigated include characteristics of the farmer and farm household (such as age, education, attitudes, and social networks), biophysical characteristics of the farm (such as parcel size, area planted, slope, and soil characteristics), financial and management characteristics (such as tenure, farm profitability, and equipment availability), and other external factors (such as prices, membership in organizations, and use of technical assistance).<sup>36</sup> Individual studies frequently find significant relationships for particular variables. However, in a review of thirty-one published analyses on farmers' adoption of BMPs, Knowler and Bradshaw find that few if any of these variables universally explain BMP adoption across the body of reviewed studies.<sup>37</sup> Despite the inconclusive results, the whole body of work does point to the influence of non-economic factors as well as economic constraints.

Several studies have also examined non-industrial private forest-landowners' motivations for adopting particular management strategies and participating in formal management programs.<sup>38</sup> These studies clearly document the diversity in demographic characteristics and motivations of forest-landowners<sup>39</sup> and linked a variety of socioeconomic, demographic, and lifestyle characteristics to particular management practices. Similar to research on farmers' motivations, the relationships with specific variables are not direct or universal,<sup>40</sup> but there is general agreement that non-economic factors, such as aesthetic considerations,

---

<sup>35</sup> E.g., Duncan Knowler & Ben Bradshaw, *Farmers' Adoption of Conservation Agriculture: A Review and Synthesis of Recent Research*, 32 FOOD POL'Y 25 (2007); Robert Ryan et al., *Farmers' Motivations for Adopting Conservation Practices Along Riparian Zones in a Mid-western Agricultural Watershed*, 46 J. ENVTL. PLAN. & MGMT. 19 (2003).

<sup>36</sup> Knowler & Bradshaw, *supra* note 35.

<sup>37</sup> *Id.* Variables investigated in multiple studies were significant in some, but not in others. Many even had statistically significant effects in opposite directions in different studies. The variables that were always significant in the same direction were only investigated in a small number of studies and cannot yet be considered universal. *Id.*

<sup>38</sup> E.g., Daniel D. Dutcher et al., *Landowner Perceptions of Protecting and Establishing Riparian Forests: A Qualitative Analysis*, 17 SOC'Y & NAT. RESOURCES 319 (2004); Donna L. Erickson et al., *Woodlots in the Rural Landscape: Landowner Motivations and Management Attitudes in a Michigan (USA) Case Study*, 58 LANDSCAPE & URB. PLAN. 101 (2002); Angelina Kendra & R. Bruce Hill, *Motivations and Behaviors of New Forest Owners in Virginia*, 51 FOREST SCI. 142 (2005); Michael A. Kilgore et al., *Family Forest Stewardship: Do Owners Need a Financial Incentive?*, 106 J. FORESTRY 357 (2008); Thomas H. Stevens et al., *Factors Affecting NIPF Landowner Participation in Management Programs: A Massachusetts Case Study*, 8 J. FOREST ECON. 169 (2002).

<sup>39</sup> Erickson et al., *supra* note 38; Kendra & Hill, *supra* note 38.

<sup>40</sup> Erickson et al., *supra* note 38.

attitudes, and lifestyle concerns, provide important influences on management practices.

Overall, these two bodies of work point to the strong influence of social, non-economic factors on landowners' management practices and participation in voluntary programs. However, the scope of this work is limited by the focus on formal government-led programs for a single type of landowner.<sup>41</sup> More attention needs to be paid to the investigation of (a) participation in collaborative initiatives or programs led by non-governmental organizations, such as watershed groups or regional non-profit organizations, and (b) to the ways in which informal social relations such as landowners' interactions with family, friends, and neighbors can influence decision-making.

### III. CASE STUDY SETTING, RESEARCH DESIGN, AND METHODS

#### A. *Land Use and Physical Geography of the North Coastal Basin*

Located along the northern coast of California, the North Coastal Basin covers an area of 5.5 million acres (2.2 million hectares) and is dissected by six major rivers and many smaller streams that drain into the Pacific Ocean (Figure 2). The basin is ecologically diverse and provides habitat for several keystone, threatened, and endangered species including the spotted owl, marbled murrelet, pacific salmon, steelhead, and is home to redwood forests. The entire basin receives heavy rainfall during the wet season but can be divided into two distinct temperate zones: the coastal zone, which is the southernmost extension of the Pacific temperate rain forest and is characterized by a foggy and mild climate, and the inland region, which experiences more intense seasonal variation in temperature.<sup>42</sup> The steep terrain of the basin is geologically composed of Franciscan Assemblage and is highly unstable and erodible.<sup>43</sup>

Land uses in the region are primarily rural with the majority of urban activity concentrated in two urban centers, Santa Rosa in the south and the Eureka/Arcata area in the north. The economy is dominated by tourism and recreation; timber production; commercial and sport fishing; mining; ranching, vineyards and other agricultural activities; and the legal and illegal cultivation of

---

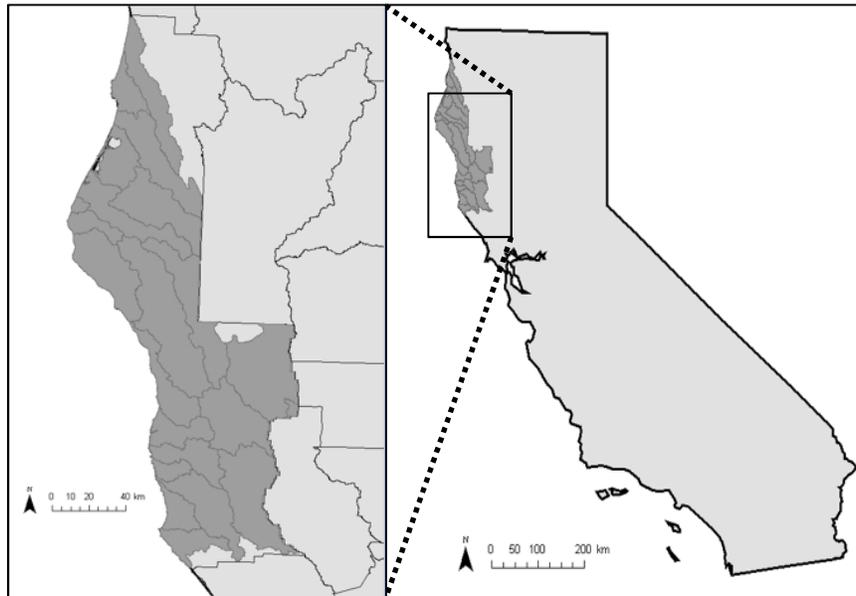
<sup>41</sup> Stacy Rosenberg & Richard Margerum, *Landowner Motivations for Watershed Restoration: Lessons from Five Watersheds*, 51 J. ENVTL. PLAN. & MGMT. 477 (2008).

<sup>42</sup> STATE OF CAL. N. COAST REG'L WATER QUALITY CONTROL BD. [HEREINAFTER NCRWQCB], DESIRED SALMONID FRESHWATER HABITAT CONDITIONS FOR SEDIMENT-RELATED INDICES (2006).

<sup>43</sup> NCRWQCB, *supra* note 42; Sharon H. Kramer et al., *Timber Harvest and Sediment Loads in Nine Northern California Watersheds Based on Recent Total Maximum Daily Load (TMDL) Studies*, 10 WATERSHED MGMT. COUNCIL NETWORKER 17 (2001); Kenwyn B. Suttle et al., *How Fine Sediment in Riverbeds Impairs Growth and Survival of Juvenile Salmonids*, 14 ECOLOGICAL APPLICATIONS 969 (2004).

marijuana. Much of the land is currently held in large tracts of land owned by industrial timber companies or public agencies. Similar to other forested landscapes across the nation, there is a slow but noticeable pressure to sell large forested parcels and convert them to residential development.<sup>44</sup> Between 1990 and 2001, the housing stock of the region increased by approximately ten percent, which is approximately the same rate as the state overall.<sup>45</sup> The development pressure is highest in the coastal areas and on the fringe of existing towns and urban areas.<sup>46</sup>

**Figure 2: Study Region: North Coastal Basin of California**



*Source:* Maps created by Anita Milman and Anne Short.

*Note:* The study basin is highlighted dark grey. The dividing lines within the basin show the boundaries of the watersheds included in this study.

<sup>44</sup> RICHARD R. HARRIS & SUSAN D. KOCHER, UNIV. OF CAL., DAVIS, CTR. FOR WATER AND WILDLAND RES., EFFECTS OF COUNTY LAND USE REGULATIONS AND MANAGEMENT ON ANADROMOUS SALMONIDS AND THEIR HABITATS: HUMBOLDT, DEL NORTE, MENDOCINO, SISKIYOU AND TRINITY COUNTIES, CALIFORNIA (1998); Juliet Eilperin, *Conservationists Vie to Buy Forest Habitat: Timber Firms' Sell-Off Worries Groups*, WASHINGTON POST, Mar. 21, 2006, available at <http://www.washingtonpost.com/wp-dyn/content/article/2006/03/20/AR2006032001595.html>.

<sup>45</sup> Changes in housing stock were calculated using data available from the California Department of Finance, CAL. DEPT. OF FIN., CALIFORNIA COUNTY PROFILES: A COMPANION TO THE 2001 CALIFORNIA STATISTICAL ABSTRACT 4, 27, 49 (2002).

<sup>46</sup> HARRIS & KOCHER, *supra* note 44; NCRWQCB, *supra* note 42.

*B. Sediment Pollution and Roads in the North Coastal Basin*

Excess sediment, or sediment pollution, is the most common water quality problem in the North Coastal Basin.<sup>47</sup> Sedimentation is a natural process through which soil erosion enters a stream channel. However, human activities — e.g., agriculture, construction activities, dams, grazing, resource extraction, road construction and use — can change the rate of sedimentation in a watercourse, which can have detrimental environmental and economic impacts. Excess sediment can degrade habitat for fish and other aquatic organisms,<sup>48</sup> alter channel patterns, fill in reservoirs and harbors, and degrade drinking water.<sup>49</sup>

Approximately eighty-five percent of the land area in the North Coastal Basin drains into a watercourse impaired by excess sediment.<sup>50</sup> Sediment pollution is a particularly important problem because it is a primary factor in the degradation of habitat of threatened and endangered salmonids in the region, and the steep terrain and geology of the North Coastal Basin make rivers in the region particularly susceptible to sedimentation.<sup>51</sup>

Dirt and gravel roads have been identified as one of the major sources of sediment pollution in the North Coastal basin.<sup>52</sup> According to sediment source analyses conducted in impaired watersheds, roads and skid trails contributed between twenty-one to ninety-eight percent of the human-induced sediment loads in impaired watersheds in the basin (Figure 3).<sup>53</sup>

---

<sup>47</sup> Per the requirements of section 303(d) of the federal Clean Water Act (“CWA”), the State Water Resources Control Board maintains a list of impaired or degraded watercourses throughout the state known as the 303(d) list. Clean Water Act, 33 U.S.C. § 1313 (2006). In 2008, 34 of the 60 (57%) North Coastal river segments on the 303(d) list were listed due to degradation by sediment, sediment/siltation or turbidity making sediment pollution the most common cause of impairment. NCRWQCB FINAL LIST OF IMPAIRED WATERBODIES (INTEGRATED REPORT CATEGORIES 4A AND 5) – THE 2008 303(D) LIST (May 18, 2009).

<sup>48</sup> THOMAS F. WATERS, *SEDIMENT IN STREAMS: SOURCES, BIOLOGICAL EFFECTS, AND CONTROL* (American Fisheries Society 1995); Suttle et al., *supra* note 43. In particular, excess sediment degrades aquatic habitat by choking spawning gravels, filling in rearing pools that normally provide cover from prey and refuge from warmer waters, impairing food sources, clouding waters, which makes it difficult to find prey, reducing habitat complexity, and at very high levels, clogging gills. U.S. ENVTL. PROT. AGENCY, OFFICE OF WATER, EPA 841-B-99-004, *PROTOCOL FOR DEVELOPING SEDIMENT TMDLS* [hereinafter *TMDL PROTOCOL*] (1999).

<sup>49</sup> U.S. EPA, *TMDL PROTOCOL*, *supra* note 48; Dan Binkley & Thomas C. Brown, *Forest Practices as Nonpoint Sources of Pollution in North America*, 29 *WATER RESOURCES BULL.* 729, 734 (1993).

<sup>50</sup> This figure was calculated by summing the area of watersheds listed on the 2008 303(d) list as impaired by sediment, sediment/siltation, or turbidity list and dividing by the total area of the basin.

<sup>51</sup> Suttle et al., *supra* note 43.

<sup>52</sup> Cal. Bd. of Forestry and Fire Prot., *Initial Statement of Reasons: Road Management Plan*, CAL. CODE REGS. tit. 14 (2006); NCRWQCB, *supra* note 42; U.S. EPA, *TMDL PROTOCOL*, *supra* note 48; Kramer et al., *supra* note 43.

<sup>53</sup> The sources of sediment loading are compiled from the sediment source analysis included in the Total Maximum Daily Load (“TMDL”) document for each impaired watershed. The sediment

Roads and stream crossings influence the hydrology and geomorphology of the region, which in turn impact the amount of sediment that enters streams and the quality of aquatic habitat. Roads are associated with both chronic, low-level contributions of fine sediment during small storms<sup>54</sup> and catastrophic landslides and mass failures of road fill during large storms.<sup>55</sup>

[Continued on next page]

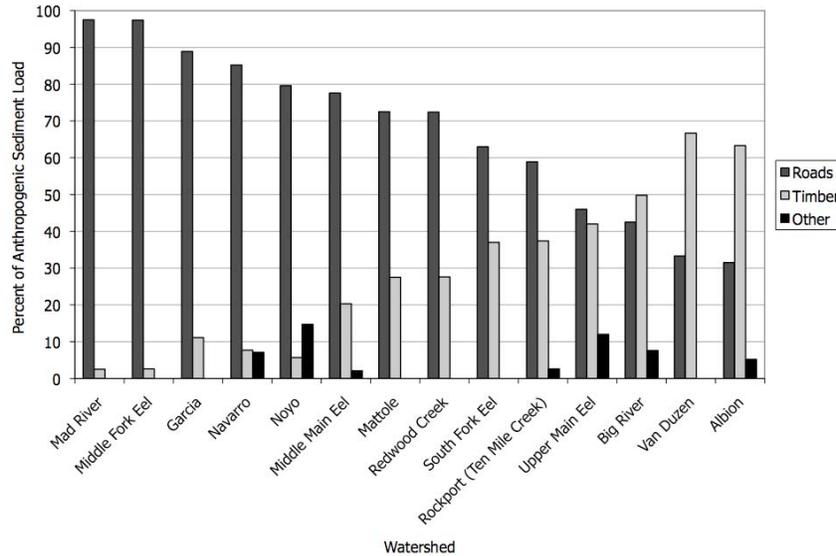
---

source analyses use empirical data, aerial photography, and sediment models to estimate sediment loads from anthropogenic and background sources. The methods and models, as well as the assumptions and data underlying the models, differ between source analyses, so direct comparisons of loadings between watersheds should not be made. Despite this limitation, the estimates give a sense of the degree to which sediment from roads dominates the anthropogenic loading in impaired streams.

<sup>54</sup> HERMANN GUCINSKI ET AL., U.S. DEPT. OF AGRIC., FOREST SERV., FOREST ROADS: A SYNTHESIS OF SCIENTIFIC INFORMATION (2001); Richard T.T. Forman & Lauren E. Alexander, *Roads and Their Major Ecological Effects*, 29 ANN. REV. ECOLOGICAL SYS. 207 (1998); Julia A. Jones et al., *Effects of Roads on Hydrology, Geomorphology, and Disturbance Patches in Stream Networks*, 14 CONSERVATION BIOLOGY 76 (2000); Charles H. Luce, *Hydrological Processes and Pathways Affected by Forest Roads: What Do We Still Need to Learn?*, 16 HYDROLOGICAL PROCESSES 2901 (2002); W.F. Megahan & W.J. Kidd, *Effects of Logging and Logging Roads on Erosion and Sediment Deposition from Steep Terrain*, 70 J. FORESTRY 136, 140-41 (1972); Leslie M. Reid & Thomas Dunne, *Sediment Production from Forest Road Surfaces*, 20 WATER RESOURCES RES. 1753 (1984).

<sup>55</sup> MICHAEL J. FURNISS ET AL., U.S. DEPT. OF AGRIC., FOREST SERV., RESPONSE OF ROAD-STREAM CROSSINGS TO LARGE FLOOD EVENTS IN WASHINGTON, OREGON, AND NORTHERN CALIFORNIA (1998); GUCINSKI, *supra* note 54; Forman & Alexander, *supra* note 54; Richard R. Harris et al., *Changes in Stream Channel Morphology Caused by Replacing Road-Stream Crossings on Timber Harvesting Plans in Northwestern California*, 23 W. J. APPLIED FORESTRY 69 (2008); Jones et al., *supra* note 54; Charles H. Luce & Thomas A. Black, *Sediment Production from Forest Roads in Western Oregon*, 35 WATER RESOURCES RES. 2561 (1999); Mary Ann Madej, *Erosion and Sediment Delivery Following Removal of Forest Roads*, 26 EARTH SURFACE PROCESSES & LANDFORMS 175 (2001); John D. McCashion & Raymond M. Rice, *Erosion on Logging Roads in Northwestern California: How Much Is Avoidable?*, 81 J. FORESTRY 23 (1983); David R. Montgomery, *Roads Surface Drainage, Channel Initiation, and Slope Instability*, 30 WATER RESOURCES RES. 1925 (1994); Reid & Dunne, *supra* note 54.

**Figure 3: Anthropogenic Sediment Loads in Watersheds Impaired by Sediment in the North Coastal Basin**



*Source:* Compiled from data in the Total Maximum Daily Load Sediment Source Analysis documentation for each impaired watershed.<sup>56</sup>

*Note:* The 'Roads' category includes loading from roads and skid trails across all land uses. The 'Timber' category includes activities associated with timber harvest, except roads and skid trails, which are accounted for in the previous category. The 'Other' category includes a variety of other sources — e.g., grazing, homestead, railroad, vineyard.

<sup>56</sup> U.S. EPA, REGION IX, ALBION RIVER TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT (2001); BIG RIVER TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT (2001); GARCIA RIVER SEDIMENT TOTAL MAXIMUM DAILY LOAD (1998); MAD RIVER TOTAL MAXIMUM DAILY LOADS FOR SEDIMENT AND TURBIDITY (2007); MATTOLE RIVER TOTAL MAXIMUM DAILY LOADS FOR SEDIMENT AND TEMPERATURE (2003); MIDDLE FORK EEL RIVER TOTAL MAXIMUM DAILY LOADS FOR TEMPERATURE AND SEDIMENT (2003); MIDDLE MAIN EEL RIVER AND TRIBUTARIES TOTAL MAXIMUM DAILY LOADS FOR TEMPERATURE AND SEDIMENT (2005); NAVARRO RIVER TOTAL MAXIMUM DAILY LOADS FOR TEMPERATURE AND SEDIMENT (2000); NOYO RIVER TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT (1999); REDWOOD CREEK SEDIMENT TOTAL MAXIMUM DAILY LOAD (1998); SOUTH FORK EEL RIVER TOTAL MAXIMUM DAILY LOADS FOR SEDIMENT AND TEMPERATURE (1999); TEN MILE RIVER TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT (2000); UPPER MAIN EEL RIVER AND TRIBUTARIES TOTAL MAXIMUM DAILY LOADS FOR TEMPERATURE AND SEDIMENT (2004); VAN DUZEN RIVER AND YAGER CREEK TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT (1999).

The site conditions as well as the design, use, and management of dirt and gravel roads affect the risk of sediment delivery from a particular road segment. Some of the controls on surface erosion include soil texture and depth,<sup>57</sup> weather,<sup>58</sup> the slope of the road,<sup>59</sup> the location or configuration of the road on the hill slope,<sup>60</sup> the design of ditches and drainage systems,<sup>61</sup> traffic patterns,<sup>62</sup> and weather patterns following construction and maintenance.<sup>63</sup> Though not all road-related erosion is preventable,<sup>64</sup> the use of BMPs in the design, construction, use, maintenance, and closure of roads can reduce the risk of sediment delivery associated with rural roads.

### C. *Research Design and Methods*

This research design is based on an institutional analysis approach<sup>65</sup> and employs a mix of qualitative and quantitative methods at the watershed and regional scale. An institutional analysis approach to the study of human-environmental issues explicitly acknowledges that the ‘rules in form,’ the formal, legal regulations and policies, often differ from the ‘rules in use,’ the conventions, norms, and rules of society that are in operation on the ground.<sup>66</sup> Institutional analysis places emphasis on understanding the outcomes associated with the ‘rules in use’<sup>67</sup> as well as the authority that influences whether ‘rules in form’ are “enforced, respected, resisted, or subverted.”<sup>68</sup> This approach conceptualizes an effort to (1) uncover the differences between the formal institutions that govern sediment and the actual management practices employed by landowners, (2) identify the mechanisms through which governing programs as well as other social, political, and cultural forces affect landowners’ management practices, and (3) determine how these shape and are shaped by the sediment pollution problem in the region.

The primary research activities for this study were completed between 2006

---

<sup>57</sup> Beverley C. Wemple & Julia A. Jones, *Runoff Production on Forest Roads in a Steep, Mountain Catchment*, 29 WATER RESOURCES RES. 1, 8 (2003); Luce & Black, *supra* note 55.

<sup>58</sup> Charles H. Luce & Beverley C. Wemple, *Introduction to Special Issue on Hydrologic and Geomorphic Effects on Forest Roads*, 26 EARTH SURFACE PROCESSES & LANDFORMS 111 (2001).

<sup>59</sup> Luce & Black, *supra* note 55.

<sup>60</sup> Jones et al., *supra* note 54; Wemple & Jones, *supra* note 57; Beverley C. Wemple et al., *Forest Roads and Geomorphic Process Interactions, Cascade Range, Oregon*, 26 EARTH SURFACE PROCESSES & LANDFORMS 191 (2001).

<sup>61</sup> Luce & Wemple, *supra* note 58.

<sup>62</sup> Reid & Dunne, *supra* note 54.

<sup>63</sup> Luce & Black, *supra* note 55.

<sup>64</sup> McCashion & Rice, *supra* note 55.

<sup>65</sup> Ostrom, *Governing the Commons*, *supra* note 5.

<sup>66</sup> *Id.*

<sup>67</sup> Imperial & Yandle, *supra* note 5.

<sup>68</sup> Robbins, *supra* note 5, at 410-12.

and 2008. During that time, several trips to the study region were taken for stays that ranged from a few days to seven months. The research was an iterative and adaptive process, with each step shaping the ones that followed. The methods included a mail survey of 459 private landowners in the basin with a thirty-seven percent response rate; semi-structured interviews with eighty-six landowners, staff at natural resource agencies and other government organizations, members and staff at non-profit organizations, and private consultants; participant observation; and document review.

#### IV. THE GOVERNANCE SETTING FOR RURAL SEDIMENT NPS

##### A. *Prevention and Control of Nonpoint Source Pollution*

Nonpoint source (“NPS”) pollutants are the primary cause of water quality impairments in the United States.<sup>69</sup> Unlike point source pollution that comes from a “discernible, confined and discrete conveyance,” such as a wastewater pipe at a factory, a storm sewer, or a vessel that discharges pollutants, NPS pollution comes from diffuse sources.<sup>70</sup> Some common NPS pollutants include fertilizers and pesticides from agricultural fields and lawns; bacteria and nutrients from faulty or leaking septic systems; oil and toxins from urban sources that are not carried through sewer systems; and sediment associated with construction sites, roads, and forestry practices. NPS pollutants are picked up by runoff from rain or snowmelt and carried over or through the ground into lakes, rivers, or other bodies of water, or enter waterways through atmospheric deposition.

The diffuse nature of the pollutant creates challenges for the prevention and control of NPS pollution with traditional regulatory tools.<sup>71</sup> The sources are numerous, unevenly dispersed, and may come from past as well as current land uses. Pulses of pollution occur sporadically and the pathways from the source to the site of pollution are difficult to trace. These characteristics make the monitoring, enforcement, and evaluation of any regulatory strategy logistically challenging and costly.

In addition, there are political challenges to federal regulation of nonpoint sources. NPS pollution associated with agriculture is the leading cause of

---

<sup>69</sup> U.S. ENVTL. PROT. AGENCY, EPA 841-F-96-004A, POINTER NO. 1: NONPOINT SOURCE POLLUTION: THE NATION’S LARGEST WATER QUALITY PROBLEM (2008).

<sup>70</sup> Clean Water Act, 33 U.S.C. § 1362(14) (2006).

<sup>71</sup> Francois Cochard et al., *Efficiency of Nonpoint Source Pollution Instruments: An Experimental Study*, 30 ENVTL. & RESOURCE ECON. 393 (2005); Richard D. Horan & Marc O. Ribaud, *Policy Objectives and Economic Incentives for Controlling Agricultural Sources of Nonpoint Pollution*, 35 J. AM. WATER RESOURCES ASS’N 1023 (1999); Kathleen Segerson & JunJie Wu, *Nonpoint Pollution Control: Inducing First-Best Outcomes Through the Use of Threats*, 51 J. ENVTL. ECON. & MGMT. 165 (2006).

impairment in surveyed waters in the U.S.<sup>72</sup> However, federal environmental agencies historically have not interfered with agricultural practices.<sup>73</sup> NPS pollution associated with changes in land use and development is also politically hard to control as land use planning and regulation are traditionally in the domain of local governments.

Since the enactment of the Clean Water Act (“CWA”) in 1972, federal pollution control regulations have achieved significant reductions in the levels of point source pollution in U.S. waterways.<sup>74</sup> However, these regulations are recognized as largely ineffectual for protecting surface and groundwater from NPS.<sup>75</sup> In response to these challenges, a wide variety of government agencies and non-governmental organizations around the nation have initiated non-regulatory programs to prevent and control NPS pollution.<sup>76</sup>

### B. NPS Policy Tools

The NPS policy literature relies primarily on rational-choice based models to determine the most cost-effective policy tools for NPS pollution control.<sup>77</sup> NPS policy studies generally compare the effectiveness of two policy approaches, performance and design standards, and three broad classes of policy tools, conventional regulations, economic tools, and an assortment of voluntary measures.<sup>78</sup>

Performance standards limit total amounts of allowable pollution discharges from a particular source and are traditionally implemented through regulatory standards and permitting processes. While performance standards have been

---

<sup>72</sup> U.S. EPA, OFFICE OF WATER, NATIONAL WATER QUALITY INVENTORY: REPORT TO CONGRESS 2004 REPORTING CYCLE (2009).

<sup>73</sup> KOONTZ ET AL., *supra* note 1. For example, the CWA explicitly exempts agriculture from regulation as a point source, noting that the “term [point source] does not include agricultural stormwater discharges and return flows from irrigated agriculture.” 33 U.S.C. § 1362(14) (2006).

<sup>74</sup> DAVIES & MAZUREK, *supra* note 7; KRAFT, *supra* note 7; Stavins, *supra* note 10; Vig & Kraft, *supra* note 11.

<sup>75</sup> DAVIES & MAZUREK, *supra* note 7; JOHN, *supra* note 1; Robert Howarth et al., *Nutrient Pollution of Coastal Rivers, Bays, and Seas*, 7 ISSUES IN ECOLOGY 1 (2000); Vig & Kraft, *supra* note 11.

<sup>76</sup> Scott D. Hardy & Tomas M. Koontz, *Reducing Nonpoint Source Pollution Through Collaboration: Policies and Programs Across the U.S. States*, 41 ENVTL. MGMT. 301 (2008).

<sup>77</sup> See, e.g., Cochard et al., *supra* note 71; Marc O. Ribaudo & Richard D. Horan, *The Role of Education in Nonpoint Source Pollution Control Policy*, 21 REV. AGRIC. ECON. 331 (1999); Segerson & Wu, *supra* note 71; JunJie Wu & Bruce A. Babcock, *The Relative Efficiency of Voluntary Versus Mandatory Environmental Regulations*, 38 J. ENVTL. ECON. & MGMT. 158 (1999).

<sup>78</sup> Two additional policy options that may apply to NPS pollution control but are not covered in this review are liability rules and research and development. MARC O. RIBAUDO ET AL., U.S. DEPT. OF AGRIC., ECON. RESEARCH SERV., ECONOMICS OF WATER QUALITY PROTECTION FROM NONPOINT SOURCES: THEORY AND PRACTICE (1999), *available at* <http://www.ers.usda.gov/publications/aer782/aer782.pdf>. These categories are not covered in this review because they only affect landowners indirectly.

successfully used to control point sources, the difficulty in measuring and monitoring discharges of NPS pollution limits their effectiveness for NPS pollution problems.<sup>79</sup> Design standards, which require dischargers to adopt particular pollution control management measures, are more commonly used to limit NPS pollution.<sup>80</sup> Design standards can be mandated through regulatory requirements, encouraged through economic tools or voluntary programs, or recommended through any combination of these tools.

Neither design nor performance-based regulatory standards receive much attention in the NPS policy literature, even though the effectiveness of regulatory standards has been discussed in the literature on point source pollution.<sup>81</sup> Where they are discussed, performance standards and design standards have been criticized. Performance standards are critiqued generally for their lack of flexibility and because they do not provide any incentive for dischargers to reduce pollution levels beyond the standard.<sup>82</sup> For NPS pollution, the difficulty and cost of linking pollutants with their source makes it nearly impossible to monitor and enforce discharge limits specified by performance standards. The effectiveness of design standards depends on appropriate implementation.<sup>83</sup> These design standard approaches have been criticized because it can be costly to ensure proper implementation and difficult to link implementation to desired environmental outcomes.<sup>84</sup>

In the NPS policy literature and more generally, economic tools are widely promoted as more flexible and cost-effective alternatives to standard-based regulatory approaches.<sup>85</sup> These tools include taxes on pollution, taxes or subsidies on inputs associated with pollution, financial incentives from the government, and market-based incentives such as trading programs. The majority of research on economic policy tools uses models to evaluate a

---

<sup>79</sup> Cochard et al., *supra* note 71; Segerson & Wu, *supra* note 71; James S. Shortle & Richard D. Horan, *The Economics of Nonpoint Source Pollution Control*, in *ISSUES IN ENVIRONMENTAL ECONOMICS* 5 (Nick Hanley & Colin J. Roberts eds., Blackwell Publishers 2002). Despite this limitation, the primary regulatory tool for the prevention and control of NPS pollution relies on performance standards. The Total Maximum Daily Load (“TMDL”) requirements under CWA section 303(d) require states to allocate pollutant loads among dischargers for waterways impaired by NPS pollution. However, the CWA does not provide a legislative mandate to implement these standards and states generally do not use a conventional performance-based standard approach when addressing NPS pollution.

<sup>80</sup> Brian M. Dowd et al., *Agricultural Nonpoint Source Water Pollution Policy: The Case of California's Central Coast*, 128 *AGRIC., ECOSYSTEMS, & ENV'T* 151 (2008); RIBAUDO ET AL., *supra* note 80.

<sup>81</sup> Dowd et al., *supra* note 80.

<sup>82</sup> DAVIES & MAZUREK, *supra* note 7.

<sup>83</sup> Dowd et al., *supra* note 80.

<sup>84</sup> *Id.*

<sup>85</sup> *E.g.*, DAVIES & MAZUREK, *supra* note 7; Horan & Ribaud, *supra* note 71.

particular economic tool,<sup>86</sup> compare the cost-effectiveness of multiple economic approaches,<sup>87</sup> or compare the cost-effectiveness of economic approaches to standard-based regulatory or voluntary approaches.<sup>88</sup>

Voluntary programs to reduce NPS pollution include a wide range of efforts such as financial assistance, education and training programs, and certification programs where participation is not required. Regulators and dischargers generally favor voluntary programs due to their low cost and lower levels of oversight,<sup>89</sup> and most NPS reduction programs in the agricultural sector fall in this category.<sup>90</sup> Alberini and Segerson<sup>91</sup> identified three primary incentives for participation: environmental stewardship, market incentives or economic benefits, such as decreased bottom line, and government incentives for participation. As with all policy tools, the success of these programs depends on the level of participation and the effectiveness of the pollution control measures implemented through these programs.

Dowd et al.<sup>92</sup> observe that the study of NPS policy is primarily model-driven and that few studies offer empirical examinations of existing programs to reduce NPS pollution. While model-based studies provide useful observations to inform policy design, without empirical studies, we lack an understanding of the social and political context that influences how NPS pollution policy decisions are made and how these programs are implemented on the ground. Our research directly addresses this gap by examining the implementation of regulatory and non-regulatory sediment control programs throughout the North Coastal Basin. As is shown throughout this Article, this empirical work draws attention to the importance of the social and political dimensions of environmental policy, demonstrates the links between regulatory and non-regulatory approaches, and provides practitioners and policy-makers with useful insights into the mechanisms that increase the effectiveness of these programs.

## V. REGULATING ROAD-RELATED SEDIMENT

The regulation of sediment pollution associated with private roads falls within the scope of multiple environmental and land use laws and ordinances. As such, multiple agencies at all levels of government are involved in the administration

---

<sup>86</sup> E.g., Eric A. DeVuyst & Viju Ipe C., *A Group Incentive Contract to Promote Adoption of Best Management Practices*, 24 J. AGRIC. & RESOURCE ECON. 367 (1999).

<sup>87</sup> E.g., Cochard et al., *supra* note 71.

<sup>88</sup> E.g., Wu & Babcock, *supra* note 77.

<sup>89</sup> Dowd et al., *supra* note 80.

<sup>90</sup> Horan & Ribaud, *supra* note 71.

<sup>91</sup> Anna Alberini & Kathleen Segerson, *Assessing Voluntary Programs to Improve Environmental Quality*, 22 ENVTL. & RESOURCE ECON. 157 (2002).

<sup>92</sup> Dowd et al., *supra* note 80.

of sediment control regulations.<sup>93</sup> The environmental goals that underlie each agency's programs are specific to the agency's authorizing legislation and include concerns associated with water quality, habitat for aquatic species, timber harvests, and local land use planning.

The activities that are regulated and standards that apply vary across the regulatory programs. The regulations may prescribe BMPs for the design, construction, maintenance, and use of roads, and/or require a review and permitting process for specific activities. Due to overlapping jurisdiction, a single project may require permits from a variety of agencies. Since some regulations are limited to a particular political or geographic area, or targeted at a certain land use, activities that are regulated in one area may not be regulated in another.

The following sections describe the regulation of sediment as a water quality issue and as an issue associated with timber harvests, and provide an overview of the other regulations that apply to roads and sediment.

A. *Regulation of Sediment as a Water Quality Problem: Clean Water Act and the California Porter-Cologne Water Quality Control Act*

1. *Legislation and Regulatory Requirements*

Sediment pollution and other nonpoint source pollutants in California are regulated under the Federal Water Pollution Control Act Amendments of 1972 and 1987, known as the Clean Water Act ("CWA"), and the California Porter-Cologne Water Quality Control Act ("Porter-Cologne Act").<sup>94</sup>

CWA requirements for addressing NPS pollutants are contained in section 303(d) of the CWA and section 319 of the 1987 CWA Amendments. Section 303(d) requires all states, including California, to identify water bodies impaired by NPS pollutants, create a priority-ranking list of the impaired water bodies (the "303(d) list"), and develop a total maximum daily load ("TMDL") for each impaired water body. A TMDL is a calculation of how much pollutant can assimilate and still meet water quality standards.<sup>95</sup> Section 319 of the 1987

---

<sup>93</sup> The agencies and government offices involved in the regulation of sediment include county governments, California Board of Forestry and Fire Protection ("BOF"), California Department of Fish and Game ("CDFG"), California Department of Forestry and Fire Protection ("CAL FIRE" formerly known as "CDF"), North Coast Regional Water Quality Control Board ("NCRWQCB"), National Oceanic and Atmospheric Administration National Marine Fisheries Service ("NOAA NMFS"), State Water Resources Control Board ("SWRCB"), U.S. Army Corps of Engineers ("COE"), U.S. Environmental Protection Agency ("EPA"), and U.S. Fish and Wildlife Services ("USFWS").

<sup>94</sup> Clean Water Act, 33 U.S.C. § 1251 (2006); CAL. WATER CODE § 13000 (West 2011).

<sup>95</sup> A TMDL must also contain an assessment of how much current inputs of pollution need to be reduced to meet the targets and an allocation of the responsibility for reducing pollutant loads among contributors. However, the CWA does not explicitly require States to develop plans to

CWA Amendments requires states to assess NPS pollution problems and develop an NPS management program.<sup>96</sup>

The quality of California's surface waters, groundwater, and wetlands is further protected by the state Porter-Cologne Act. The Porter-Cologne Act requires the preparation of a water quality control plan (known as a "Basin Plan") for every basin in the state. Basin Plans establish water quality standards for point and NPS pollutants in each watercourse in the basin and describe the measures, including prohibitions, action plans, and policies, to achieve or maintain those standards.<sup>97</sup> In addition, the Porter-Cologne Act requires the development of implementation plans for TMDLs, which can be contained within the appropriate Basin Plan.

In California, the State Water Resources Control Board ("SWRCB") and nine Regional Water Quality Control Boards ("RWQCBs") are responsible for implementing most of the CWA<sup>98</sup> and the Porter-Cologne Act.<sup>99</sup> The North Coast Regional Water Quality Control Board ("NCRWQCB") is the regional board with oversight in the North Coastal Basin. The NCRWQCB uses a multi-faceted approach to control sediment and other NPS pollution that includes voluntary and incentive measures and regulatory approaches.<sup>100</sup> The primary regulatory approaches are the TMDL program, which includes implementation plans enacted through the Basin Plan, and administrative permitting tools entailing Waste Discharge Requirements ("WDRs"), waiver of WDRs, and basin plan prohibitions.<sup>101</sup>

Seventeen watersheds contain water segments that have been designated as impaired by sediment pollution in the North Coastal Basin. At the time of this study (2007), sediment TMDLs had been completed for fifteen of these impaired watersheds. Of these, only the Garcia watershed had a sediment-TMDL implementation plan, *The Action Plan for the Garcia River Watershed Sediment TMDL* (known as the "Garcia Action Plan" or "GAP"). The GAP contains a general prohibition of the discharge of controllable sediment directly or indirectly into any water body in the Garcia watershed.<sup>102</sup> Landowners in the

---

implement the allocated loads of a TMDL. As is discussed below, the Porter-Cologne Act does require the development of implementation plans for TMDLs.

<sup>96</sup> The CWA also contains several non-regulatory provisions/programs to reduce NPS pollution.

<sup>97</sup> NCRWQCB, *supra* note 42 .

<sup>98</sup> The EPA maintains oversight authority for the CWA.

<sup>99</sup> In the discussion that follows, the specific provisions of the CWA and Porter-Cologne Act are not distinguished.

<sup>100</sup> NCRWQCB, WATER QUALITY CONTROL PLAN FOR THE NORTH COAST REGION (2007).

<sup>101</sup> STATE WATER RES. CONTROL BD. & CAL. EPA, POLICY FOR IMPLEMENTATION AND ENFORCEMENT OF THE NONPOINT SOURCE POLLUTION CONTROL PROGRAM (2004).

<sup>102</sup> Controllable sediment discharges are defined as "those discharges resulting from human activities that can influence the quality of the water of the State and that can be reasonably controlled

Garcia watershed must either comply with the general prohibition, or comply with an approved Erosion Control Plan and a management plan.<sup>103</sup>

Regulatory controls on sediment pollution in the rest of the basin are limited to discharges from timber operations, construction, and associated activities.<sup>104</sup> The NPS pollution management plan outlined in the Basin Plan prohibits the direct or indirect discharge of sediment into watercourses “in quantities deleterious to fish, wildlife, or other beneficial uses” from logging, construction, and associated activities.<sup>105</sup> The sediment discharge prohibition of the Basin Plan provides mechanisms for enforcement, but does not mandate the use of particular management practices. Timber operations must also comply with the WDR permitting process, which requires general or site-specific BMPs to minimize and prevent sediment discharge.

## 2. Monitoring, Enforcement, and Sanctions

The NCRWQCB has two full time enforcement staff, two part time retired annuitants who work on enforcement issues, and several technical staff members who engage in various enforcement activities — e.g., oversee permit compliance, follow up on complaints — in addition to their other duties. NCRWQCB staff may conduct inspections of regulated areas, investigate complaints regarding potential violations, and require regulated dischargers — e.g., timber companies — to self-monitor and submit periodic reports.<sup>106</sup> Though they work on violations of sediment regulations, the dedicated

---

through prevention, mitigation or restoration.” NCRWQCB, WATER QUALITY CONTROL PLAN FOR THE NORTH COAST REGION, *supra* note 100, at 4-38.00. The discharge prohibitions of the Garcia Action Plan replace and apply more broadly than the region-wide prohibitions for logging, construction, and associated activities, which are discussed below. *Id.*

<sup>103</sup> The Erosion Control Plan contains an inventory of sediment delivery sites and a ten or twenty-year plan to reduce the volume of deliverable sediment. Compliance with the management plan can be satisfied through compliance with either the Garcia River Management Plan or a Site Specific Management Plan. The Garcia River Management Plan specifies land management measures that must be applied to roads, watercourse crossings, unstable areas, and riparian zones to prevent the creation of sediment delivery sites. The Site Specific Management Plan also contains measures that will be used to prevent the creation of future sediment delivery sites, but is prepared by the landowner and tailored to the specific activities and conditions of his or her land. The Site Specific Management Plan does not specify BMPs for road management but requires landowners to develop a long-term road management plan and to address all sediment delivery from roads.

<sup>104</sup> Sediment discharges associated with construction are also regulated through the NPDES Stormwater Construction permit process. Construction projects affecting more than five acres must obtain an NPDES Stormwater permit, which entails the preparation and compliance with a Stormwater Pollution Prevention Plan. *NPDES Stormwater*, NCRWQCB, [http://www.swrcb.ca.gov/northcoast/water\\_issues/programs/npdes\\_storm\\_water.shtml](http://www.swrcb.ca.gov/northcoast/water_issues/programs/npdes_storm_water.shtml) (last visited Oct. 13, 2011). This permitting process is not discussed in detail here as it does not focus on road-related sediment and does not mandate a set of BMPs.

<sup>105</sup> NCRWQCB, *supra* note 42, at 4-26.

<sup>106</sup> REED SATO, STATE WATER RES. CONTROL BD., *DECONSTRUCTING ENFORCEMENT: A PRIMER ON WATER QUALITY ENFORCEMENT* (2009).

enforcement staff spend majority of their time addressing violations associated with discharge from regulated facilities, primarily wastewater collection and treatment systems.<sup>107</sup>

The NCRWQCB uses a “progressive enforcement” strategy that includes both informal and formal enforcement actions.<sup>108</sup> For an informal enforcement action, an agency staff person discusses the violation with the discharger, recommends actions to correct the problem, and may follow up to confirm compliance with the recommendations. Formal enforcement actions include written notification followed by the potential of civil penalties, fees, and court-ordered injunctions.

*B. Regulation of Sediment Associated with Forest Practices: Z’berg-Nejedly Forest Practice Act and Forest Practice Rules*

1. Legislation and Regulatory Requirements

The state Z’berg-Nejedly Forest Practice Act (“FPA”) of 1973 provides guidelines for the regulation of the harvest of timber products in California in order to ensure that logging is done in a holistic manner with the goal of preserving and protecting fish, forests, wildlife, and streams.<sup>109</sup> The FPA outlines the intent behind the regulation of timber harvests and provides a regulatory framework for the submission and review of harvest permits that is implemented through Forest Practice Rules (“FPR”). The FPA designates responsibility for developing, amending, and adopting the FPR to the Board of Forestry (“BOF”), a nine-member, Governor-appointed body that oversees the California Department of Forestry and Fire Protection (“CAL FIRE”; formerly referred to as CDF), and charges CAL FIRE with the responsibility to enforce the FPR.<sup>110</sup>

Under the FPA, individuals or organizations harvesting timber for commercial purposes must have an approved Timber Harvest Plan (“THP”) or Nonindustrial Timber Management Plan (“NTMP”).<sup>111</sup> The THP or NTMP must contain a

---

<sup>107</sup> Personal communication with anonymous NCRWQCB staff (Mar. 15, 2010).

<sup>108</sup> *Id.*; SATO, *supra* note 106.

<sup>109</sup> See Z’berg-Nejedly Forest Practice Act of 1973, CAL. PUB. RES. CODE §§ 4511- 4628 (West 2011).

<sup>110</sup> SHARON DUGGAN & TARA MUELLER, GUIDE TO THE CALIFORNIA FOREST PRACTICE ACT AND RELATED LAWS (Solano Press Books 2005) [hereafter DUGGAN & MUELLER].

<sup>111</sup> The THP is the standard harvest plan and permitting procedure. The NTMP is an alternative option available to nonindustrial landowners with less than 2500 acres. The NTMP streamlines the review process for harvests. The plan must be prepared by a Registered Professional Forester (“RPF”) and the initial plan submission follows the same review process as a THP, except there are some additional requirements for documenting stands and the site conditions and some restrictions on harvesting techniques. However, the NTMP is valid in perpetuity, locking in the FPR at the time of submission, whereas the THP is initially valid for three years and can only be extended for two

physical description of the area where timber operations will take place, details of planned harvest operations, identification and description of sensitive areas (e.g., watercourses, habitat for protected species, archaeological and historical resources), evaluation and mitigation of environmental effects, and a list of pending permits in the plan area. The THP or NTMP must also explicitly address road-related sediment and ensure compliance with a range of BMPs for the location, construction, maintenance, and use of logging roads and landings since roads are thought to be the greatest sediment source associated with timber operations.<sup>112</sup>

The THP or NTMP must be prepared by a Registered Professional Forester (“RPF”) and is reviewed by a multi-agency and multi-disciplinary team.<sup>113</sup> The review team is led by CAL FIRE and contains representatives from the California Department of Fish and Game (“CDFG”), the appropriate Regional Board, and the Department of Conservation California Geological Survey (also known as the Division of Mines and Geology). The California Coastal Commission (“CCC”) joins the review team for plans in the Coastal Zone and the California Department of Parks and Recreation (“DPR”) is included when the plan affects park resources. Additionally, representatives from county government and other federal, state, or county agencies may also be included when requested by CAL FIRE or the interested agency.<sup>114</sup> All harvest plan documents are available for public review and comment, and review meetings are open to the public.

## 2. Monitoring, Enforcement, and Sanctions

Monitoring and inspection of forest practices may occur throughout the plan review process as well as during or following timber operations. On-site inspections by CAL FIRE and other agencies are required or recommended in four situations: (1) during review of the plan, (2) during timber operations, (3) following completion of timber operations and work in the place, and (4) following completion of stocking. During the review of the plan, the review

---

additional years. When a landowner intends to harvest, he or she simply files a notice of timber operations signed by an RPF certifying that the harvest does not deviate from the NTMP. Approval of the notice of timber operations is ministerial, meaning it is automatically approved as long as it is consistent with the NTMP. The BMP’s requirements for roads under a NTMP are given by the FPR in place when the NTMP was approved.

<sup>112</sup> Cal. Bd. of Forestry and Fire Prot., *supra* note 52.

<sup>113</sup> DUGGAN & MUELLER offers the most comprehensive overview of the regulation of timber harvesting on private lands in California. The THP process is described in detail in DUGGAN & MUELLER, *supra* note 110, at 73-147, the substantive standards that a THP must meet to comply with the FRP are then described in DUGGAN & MUELLER, *supra* note 110, at 149-251, and the NTMP process is described in DUGGAN & MUELLER, *supra* note 110, at 343-351.

<sup>114</sup> In the Tahoe Basin, a representative of the California Tahoe Regional Planning agency may also join the review team.

team may conduct a pre-harvest inspection (“PHI”). In a PHI, the review team, RPF and the plan submitter inspect the site to allow the review team to make recommendations based on the specific physical conditions of the site. PHIs are not legally required for all sites but they “occur more often than not.”<sup>115</sup> To ensure that operations proceed in accordance with the plan, CAL FIRE, CDFG, the appropriate Regional Board, or the SWRCB may conduct on-site inspections during or directly following completion of the timber harvest operations. Additionally, the FPA requires CAL FIRE to conduct on-site post-harvest inspections within six months of receiving the work completion report and the stocking report from the plan submitter or RPF. CAL FIRE must take corrective action if timber operations, including environmental mitigation measures, or stocking were not completed according to the plan.

CAL FIRE and the BOF have the primary responsibility for enforcing the FPA and FPR. Enforcement actions can include administrative actions such as stop orders, corrective action notices, and administrative civil penalties; judicial remedies including civil and criminal penalties and injunctive relief; and administrative penalty orders.<sup>116</sup> Monitoring for compliance is conducted through the system of post-harvest inspections mandated in the FPA. When CAL FIRE inspectors find violations of any provision of the FPA or FPR they can take informal actions, such as verbally request correction of the violation, or make a recommendation for more formal enforcement actions. The choice of enforcement action typically depends on the severity of the violation. More serious cases can be addressed through civil penalties (up to \$10,000 for each unintentional violation), misdemeanor criminal penalties (up to \$1,000 or imprisonment for up to six months for each willful violation), injunctive relief, and suspension of licenses where appropriate.

Private citizens also have some enforcement power. Private citizens can sue CAL FIRE, BOF and other agencies for violating nondiscretionary duties or abusing discretionary duties, and can also sue these agencies for injunctive relief.<sup>117</sup> Several watershed-based and regional environmental groups in the North Coastal Basin, like the Environmental Protection Information Center, act as watchdogs on the timber industry and exercise this enforcement power.

### *C. Other Sediment Regulations*

Road construction or maintenance activities also fall under the regulatory purview of several other laws and local ordinances, including legislation to protect endangered species, programs to conserve fish and wildlife habitat, and county land use ordinances.

---

<sup>115</sup> DUGGAN & MUELLER, *supra* note 110, at 142.

<sup>116</sup> DUGGAN & MUELLER, *supra* note 110.

<sup>117</sup> *Id.*

The federal Endangered Species Act (“ESA”) and the California Endangered Species Act (“CESA”) prohibit the “take” of any species listed as endangered or threatened. Each provides a permitting process to allow “incidental takes” associated with otherwise lawful activities.<sup>118</sup> Due to potential effects on listed species of salmon and steelhead trout, a wide range of road construction and management activities in the North Coastal Basin are subject to the take prohibition and require a permit in areas adjacent to habitat for listed species.<sup>119</sup>

Under the California Lake and Streambed Alteration Agreement program, the installation, alteration, or replacement of stream-crossings, such as bridges and culverts, require approval of project plans by the California Department of Fish and Game (“CDFG”). The project plans must include a description of the project and an assurance that no unmitigated harm to water quality or fish will result from the project.<sup>120</sup> Through the review process, CDFG inspectors may require the use of particular BMPs.

In Humboldt County, landowners constructing new roads or engaging in certain activities in or near streams must comply with the local ordinances for Grading, Erosion Control, and Streamside Management Areas. These ordinances require landowners to comply with specific BMPs, submit project plans for approval to the county, and obtain a permit for these activities.<sup>121</sup> No equivalent countywide controls exist in Mendocino County.

---

<sup>118</sup> Under the federal ESA implementing regulations, *take* is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” 16 U.S.C. § 1532(19) (2006). One of the implementing agencies, the National Marine Fisheries Service, explicitly defines the term *harm* as “any act which actually kills or injures fish or wildlife,” and concludes that “habitat modification or degradation that may harm listed species and, therefore, constitutes a take under the ESA.” 64 Fed. Reg. 60,727. The relevant regulations adopted by the Fish and Wildlife Service (“FWS”) are at 50 C.F.R. § 17.3. This statutory construction by the FWS was upheld in *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687, 708 (1995). The “take” of a threatened species may be permitted, however, if specifically authorized in regulation. Section 10 of the ESA allows for the issuance of Incidental Take Permits (“ITPs”) as long as such take meets several requirements, including that the take will not “appreciably reduce the likelihood of the survival and recovery of the species in the wild.” 16 U.S.C. § 1539 (2006). Under the CESA, *take* is defined as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” CAL. FISH & GAME CODE § 86 (West 2011). This definition is more narrow than that of the ESA and it is unresolved whether its meaning includes habitat modification that could indirectly harm an endangered species. DUGGAN & MUELLER, *supra* note 110.

<sup>119</sup> See 64 Fed. Reg. 60,727, 60,730 (November 8, 1999).

<sup>120</sup> CAL. FISH & GAME CODE §§ 1600-1616 (West 2011).

<sup>121</sup> County of Humboldt Departments of Community Development Services and Public Works, Grading, Erosion Control, Geological Hazards, Streamside Management Areas, and Related Ordinance Revisions (June 2002). Landowners constructing new roads for use in a state-approved timber harvest plan are exempt from these requirements as they are already regulated through the FPA.

## VI. NON-REGULATORY PROGRAMS AND TOOLS TO MANAGE SEDIMENT ON PRIVATE LANDS

A wide variety of government, non-profit, and private actors are involved in formal and informal non-regulatory programs to reduce sediment pollution from private lands in the North Coastal Basin.<sup>122</sup> Government actors come from all levels of government and include regulatory agencies that also administer, or are involved in, non-regulatory programs, as well as non-regulatory agencies and organizations. Non-profit organizations include grassroots or community-based watershed groups, and non-profits operating at the county, basin, or state level. Private actors include private consultants specializing in road management and sediment control (e.g., Pacific Watershed Associates (“PWA”), the most widely recognized private consulting firm working on sediment reduction and roads in the North Coastal Basin), road and neighborhood associations, and private citizens.

These actors work independently and in tandem to provide incentives or knowledge to encourage private landowners to implement sediment control BMPs on their roads. To do so, they use a range of informal and formal actions and tools. Informal actions include unfunded and grassroots activities like road association workdays. Formal non-regulatory approaches can be grouped into four categories: technical assistance, financial assistance, project implementation, and other activist actions.

The technical assistance category encompasses all efforts to disseminate information about the sediment pollution problem and BMPs that can address the problem, including active education campaigns as well as making staff available for consultation or advice. The goal is to provide landowners with the knowledge needed to implement improved road management practices. In the North Coastal Basin, government, non-profit organizations, and private consultants provide a variety of technical assistance, including guidance documents, management guides, workshops and courses, and off- and on-site consultations.

Financial assistance programs include grant and cost-share programs that provide funding for planning and watershed assessment projects, education and outreach, and implementation of BMPs and restoration projects on private lands and roads in the region. The majority of these programs are publicly funded through sources authorized by federal environmental legislation (e.g., CWA § 319(h), the Nonpoint Source Implementation Grant Program), California Senate Bills (e.g., SB 271, which created the Salmon and Steelhead Trout Restoration Account), and state voter-approved propositions (e.g., Proposition 50, which

---

<sup>122</sup> There are also non-regulatory programs that address sediment pollution on public lands. However, this review is limited to programs and tools that target private landowners and sediment pollution associated with private land uses.

created the Integrated Regional Water Management Grant). Depending on the program stipulations, the funds may be distributed directly to private landowners or indirectly via other government organizations, non-profit groups, or road or homeowners associations that receive the funding. For example, the Natural Resource Conservation Service (“NRCS”)-sponsored Environmental Quality Incentives Program (“EQIP”) and the CAL FIRE-administered California Forest Improvement Program (“CFIP”) can provide cost-share funds directly to private landowners, but funding from the CDFG Fisheries Restoration Program is limited to public agencies, non-profit organizations, and Native American Tribes.

Project implementation is a subset of the financial assistance category that encompasses programs that conduct sediment source assessments or directly implement BMPs and restoration projects on private property. In other words, while the financial assistance category contains projects where the private landowner may or may not be actively involved in the design and implementation of the program, the project implementation category is limited to programs where the landowner simply provides access to their land (though the landowner may have responsibility for maintenance following completion of the project following).<sup>123</sup> The project design, acquisition of funding, and implementation are completed entirely by a non-profit organization, government agency or organization, or another individual or road association. Project implementation is common through road associations and sometimes practiced by non-profit organizations.

The final category of non-regulatory programs includes other advocacy and activist actions such as watchdog activities that may lead to complaints or litigation regarding regulatory violations, reviewing and commenting on regulatory processes, and lobbying for more stringent regulations. A wide variety of watershed-based, regional, state, and national non-profit organizations are involved in these activities. As is discussed below, much of their attention focuses on the enforcement and strengthening of environmental regulations associated with timberlands.

## VII. MANAGEMENT PRACTICES AND THE REGULATORY AND NON-REGULATORY MECHANISMS OF INFLUENCE

Among landowners in the Basin, there is widespread familiarity with sediment pollution as an issue and a wide range of knowledge about BMPs and BMP adoption rates.<sup>124</sup> More specifically, this research shows that landowners’

---

<sup>123</sup> We distinguish between these two categories because the direct or indirect involvement of landowners is associated with different benefits and constraints.

<sup>124</sup> Anne Short, *Governing Change: An Institutional Geography of Rural Land Use, Environmental Management, and Change in the North Coastal Basin of California* (2010)

degree of knowledge and adoption of BMPs is correlated with their permitting and regulatory history, past utilization of professional technical and financial assistance, and land use practices. Prior experience with a regulatory process, technical assistance, and financial assistance are each associated with greater knowledge and adoption of BMPs. In addition, timber and non-timber ranching landowners generally have more knowledge about the relationship between roads and sediment pollution and more actively use BMPs to guide the use, maintenance, and construction of their roads than landowners using their land for residential, amenity, and other purposes.

These relationships prompt the motivating question for this section: What are the mechanisms through which experiences with regulatory and non-regulatory programs lead to the development of knowledge about BMPs and the adoption of BMPs?

This section first lays out a conceptual framework for understanding the factors that affect landowners' road management decisions. Using this framework, the section proceeds to examine the specific conditions and mechanisms through which regulatory and non-regulatory programs influence road management decisions.

#### A. *Conceptual Framework: Factors Influencing Road Management Decisions*

Research on the prevention of NPS pollution and farmers' adoption of BMPs for conservation has failed to establish universal relationships between demographics or parcel characteristics and the adoption of BMPs.<sup>125</sup> However, the factors that are most commonly found to affect land management decisions and BMP adoption can be usefully categorized into three groups: (1) desires or needs that motivate BMP adoption,<sup>126</sup> (2) knowledge about the effects of land management practices and BMPs,<sup>127</sup> and (3) access to resources to implement BMPs.<sup>128</sup> This study finds that each of these factors comes into play in the North Coastal Basin:

(1) **Motivating necessity and/or desire:** The implementation of BMPs can be motivated by a problem with an existing road that requires the landowner to take action to address the problem, the desire to preserve the function of the road, and/or a commitment to environmental protection and restoration. A small number of interviewed landowners described how landslides, failed culverts, or other problems with their roads led them to

---

(unpublished Ph.D. dissertation, Univ. of Cal. Berk.) (on file with author).

<sup>125</sup> See Knowler & Bradshaw, *supra* note 35.

<sup>126</sup> E.g., Erickson et al., *supra* note 38; Rosenberg & Margerum, *supra* note 41; Ryan et al., *supra* note 35.

<sup>127</sup> E.g., Dutcher et al., *supra* note 38.

<sup>128</sup> E.g., Rosenberg & Margerum, *supra* note 41.

implement BMPs. One landowner described a common situation where his commitment and concern for preserving the functionality of the road leads him to use BMPs for the maintenance of his road. His neighbors do not participate in road maintenance, which he attributes to their lack of concern. Another landowner explained that the use of BMPs in the major reconstruction and decommissioning of his roads is associated with his desire to manage and restore his land more sustainably.

(2) **Knowledge:** Implementation of BMPs depends on knowledge about the effects of land management practices and familiarity with the recommended BMPs. Proper implementation of more technical BMPs — e.g., installation of critical dips — depends on specialized knowledge and experience. Lack of knowledge about BMPs, how to obtain information about BMPs, and/or how to find a skilled contractor to properly install BMPs are common barriers to implementation.

(3) **Resource availability:** The use of BMPs for road maintenance, construction, re-construction, or decommissioning requires an investment of resources — e.g., capital, time, materials, and equipment. While some of the BMPs for road inspection and maintenance are inexpensive or free to implement, BMPs for re-construction, upgrades and restoration can be very costly. The cost and other resource requirements affect many road management decisions in the North Coastal Basin. Nearly half of the interviewed landowners discussed the availability of resources as a factor that affects their road management decisions.

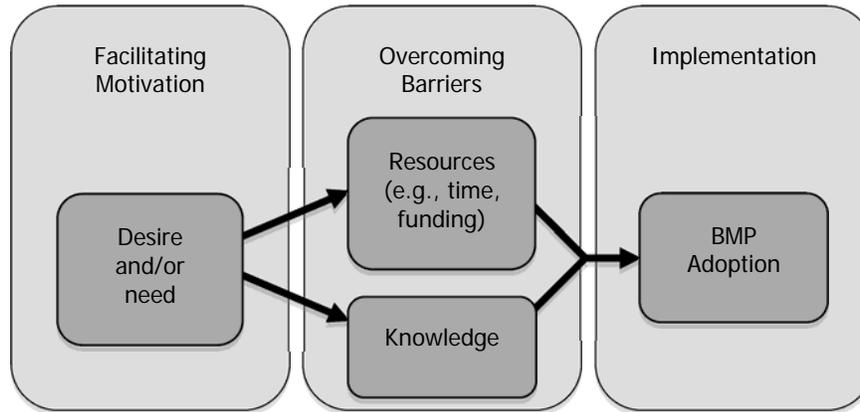
In their discussion of landowners' motivations for participating in watershed restoration programs, Rosenberg and Margerum<sup>129</sup> distinguish between values and beliefs that *facilitate* or motivate participation in restoration programs — e.g., desire to preserve property for future generations — and factors that are *barriers* to participation — e.g., finances, time, and knowledge. Similarly, it is useful to categorize these basic factors as those that facilitate adoption of BMPs and those that are barriers. The motivation provided by desire and/or necessity *facilitates* BMP adoption. The other two categories, resource availability and knowledge, are *barriers* that need to be overcome in order to implement BMPs. This categorization suggests a standard model for how these factors affect BMP adoption: the desire or need to reduce sediment or re-construct roads can facilitate BMP adoption by motivating landowners to overcome the common barriers by seeking advice and/or obtaining extra resources (Figure 3).

The remainder of the section explores the mechanisms that affect landowners' desire or need to adopt BMPs and enable landowners to overcome the resource and knowledge barriers.

---

<sup>129</sup> *Id.*

**Figure 4: Conceptual Framework to Understand Factors that Affect BMP Adoption**



Source: Anne Short, *Governing Change: An Institutional Geography of Rural Land Use, Environmental Management, and Change in the North Coastal Basin of California* (2010) (unpublished Ph.D. dissertation, Univ. of Cal. Berk.) (on file with author).

### B. Regulatory Mechanisms

#### 1. Creating Regulatory Necessity Through Monitoring and Enforcement

Regulations can create the ‘necessity’ for the use of particular BMPs prescribed by the regulation. This study finds that a particular regulation only creates this need when the level of monitoring and enforcement is high enough to create the perception that regulatory compliance is mandatory. In this way, this research supports the well-documented finding that regulatory compliance is associated with monitoring and enforcement of the regulation and sanctions for non-compliance.<sup>130</sup> It also finds that effective regulations can lead to the adoption of prescribed BMPs beyond the regulated area and that third-party professional consultants facilitate this process. The sections that follow demonstrate the mechanisms through which effective regulations and interaction

<sup>130</sup> An extensive and varied literature on monitoring (or inspection), enforcement, sanctions, and compliance addresses this topic from many angles. See, e.g., Raymond J. Burby & Robert G. Patterson, *Improving Compliance with State Environmental Regulations*, 12 J. POL’Y ANALYSIS & MGMT. 753 (1993); Wesley A. Magat & Kip Viscusi, *Effectiveness of the EPA’s Regulatory Enforcement: The Case of Industrial Effluent Standards*, 33 J.L. & ECON. 331 (1990); Jonas Tallberg, *Paths to Compliance: Enforcement, Management, and the European Union*, 56 INT’L ORG. 609 (2002).

with third-party consultants can stimulate a ‘need’ as well as a ‘desire’ to implement BMPs, and can facilitate access to the knowledge and resources that enable landowners to implement BMPs beyond the regulated areas of their property.

a. Lacking Necessity: Weak Regulations and Enforcement

As discussed in detail in Part V, several regulations at the federal, state, and local level prescribe the use of particular BMPs for the construction, reconstruction, use, and maintenance of roads in the North Coastal Basin. These regulations differ by the number and types of BMPs required, the capacity to monitor and enforce compliance with the regulation, and the land use category to which they apply.

Regulations that are monitored and enforced create the ‘necessity’ or perceived necessity for implementing BMPs on the regulated areas of the land. In general, there is no single structure required for monitoring and enforcement. Effective monitoring and enforcement of rules and regulations can take the form of formal programs led by agency staff, informal citizen monitoring and enforcement, or some hybrid of the two.<sup>131</sup> With the exception of the Forest Practice Act (“FPA”) and Forest Practice Rules (“FPR”) that apply to timber harvest sites, little formal or informal monitoring and enforcement of sediment-control regulations exists in the North Coastal Basin.

Resource agencies lack the staff, resources, and access to property necessary to monitor and enforce regulations other than the FPR. Landowners in the North Coast “do not really see regulators unless we invite them.”<sup>132</sup> Enforcement of the Humboldt County grading ordinance, the CA Lake and Streambed Alteration Agreement, and other non-timber regulations is primarily complaint driven rather than proactively handled as a response to inspection and monitoring by agency staff. Enforcement of most regulations thus lies primarily in the hands of citizens or non-profit watchdog groups. Although, citizen monitoring and enforcement is also relatively weak for lands not in timber production.

Due to the steep and challenging terrain and low population density, much of the North Coastal Basin is very remote and difficult for regulators or citizens to access. In a comment that represents the situation of many rural landowners, one interview respondent explained that he did not worry about regulatory enforcement from staff or citizens due to the relative remoteness of his property.

The basic logistical challenge of monitoring and enforcement in this remote region is exacerbated by landowners’ reluctance to interfere in each other’s management practices, their unwillingness to report regulatory violations (unless the problem is directly affecting the reporting landowner), and their general

---

<sup>131</sup> See Elinor Ostrom, *Revisiting the Commons*, *supra* note 5.

<sup>132</sup> Interview with Landowner #11928 (Oct. 14, 2008).

protection of a culture of privacy and independence. Interview respondents expressed strong reluctance to report regulatory violations on neighboring property, and some explained that even if they see a solvable problem on someone else's property they generally do not offer unsolicited advice.<sup>133</sup> Their reluctance to interfere in other's affairs is associated with regional beliefs about the primacy of private property rights (in particular, the right to use one's property without interference from others), as well as paranoia and desire for secrecy associated with the cultivation of marijuana in the region.<sup>134</sup>

This stated reluctance to report violations can be seen through the experiences of the Humboldt County Code Enforcement Unit ("CEU"). The CEU has relied primarily on public complaints to identify possible violations of county codes, but in late 2007 and early 2008, the CEU proactively monitored several rural areas in search of code violations. Jeff Conner, Humboldt County's full time staff person in the CEU, reports that during this time of active monitoring, he focused on violations of the grading ordinance and building codes and identified many unpermitted roads. He explained that some of these unpermitted roads were essentially built to code but some had reflected "no attempt at any kind of erosion control."<sup>135</sup> Outside of this brief period of proactive rural enforcement, the enforcement process has been complaint-driven. Conner explained that he rarely addresses violations of the grading ordinance because they are hardly ever reported.

---

<sup>133</sup> This reluctance to interfere with or bring third parties into the management practices of neighbors is consistent with the patterns of conflict resolution in slow growing rural areas predicted by Rudel's framework for understanding social controls on local land use. THOMAS K. RUDEL, *SITUATIONS AND STRATEGIES IN AMERICAN LAND-USE PLANNING* (Cambridge University Press 1989). He argues that a succession relationship exists between places and patterns of control: slow growing rural areas rely on informal bilateral agreements between neighboring landowners because the stability of ownership and low-density lead to the view that regulation is not necessary; as density increases, the changes associated with increased density — neighbors get closer, the population tends to be less stable, and land use disputes become more common — necessitate more formal mechanisms to mediate the conflicts. Shaped another way, Rudel's framework suggests that actors will only pursue outside enforcement or third-party mediation when the benefits of pursuing such a formal path outweigh the social costs, which include strained relationships with neighbors. ROBERT C. ELLICKSON, *ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES* (Harvard University Press 1991), also found that these social costs played an important role in rural residents' approach to trespass issues in Shasta County, an adjoining area of northern California. In the North Coastal Basin, rural landowners generally avoid calling in a third party to enforce regulatory controls, and instead rely either on negotiated agreements with neighbors or, more commonly, simply ignore the problem. In the few stories we heard where landowners reported a violation on a neighboring property, there was always an existing conflict between the neighbors that motivated the extra scrutiny and the landowner that called in the violation was seen as acting outside of the norms for the region. As one landowner put it: "There is no enforcement of regulations. If somebody gets a bug in their butt and rats out their neighbor about something that's going on, then they come down on you and they stop what you're doing." Interview with Landowner #10923 (Aug. 15, 2008). For the most part in this region the social costs of pursuing enforcement outweigh potential benefits.

<sup>134</sup> Short, *supra* note 124.

<sup>135</sup> Interview with Jeff Conner, Humboldt County CEU (Mar. 18, 2010).

Further compounding the lack of monitoring and enforcement actions is a lack of knowledge and misconceptions about permit requirements. Due to the weak nature of the regulations, landowners often erroneously assume that the regulations do not apply to them. In a conversation with one Humboldt County rancher, the rancher mentioned that he had built roads through his property. After being asked if he had obtained a Grading Permit as required by the Humboldt County Grading Ordinance, he replied that, “The grading permits don’t apply to rural landowners.”<sup>136</sup> The mistaken assumptions that regulatory requirements do not apply or that they are irrelevant are common among non-timber landowners in the region.

The limited formal monitoring and enforcement of regulations, the paucity of citizen complaints, the difficulty in viewing management activities in the more remote parts of the region, and the erroneous assumption that regulatory requirements do not apply to certain common practices all create the perception that most sediment control regulations are weak or irrelevant on lands other than timberlands (Figure 5). Thus, for the majority of land uses in the region, existing regulations do not generate a ‘need’ to implement BMPs for most landowners. However, as is discussed below, regulations on timberlands are strongly monitored and enforced and do create the need for the implementation of prescribed BMPs. They can also lead to BMP adoption beyond the regulated areas. The discussion below also highlights how the threat of strong future regulations has created a perceived need, or desire, for some ranchers to implement BMPs before the regulations are in place.

b. **Generating Necessity: Strong Regulations and Enforcement on Timberlands**

Unlike land used for residential or grazing purposes, land with planned timber harvests is subject to scrutiny by agency regulators and, in many cases, by private citizens. This monitoring and enforcement motivates a need to implement BMPs prescribed by the FPR, and the process creates a direct pathway from the regulation to implementation of BMPs on these regulated lands.<sup>137</sup>

As described in Part V, landowners planning to harvest timber must submit a timber harvest plan (“THP”). The THP, or its equivalent, which must be prepared by an RPF, contains details about the harvest and plans for mitigating environmental effects that could be associated with the harvest. This includes information about the road network and the use of the BMPs prescribed by the FPR. The THP undergoes a multi-step review process by regulators from several agencies. The review process includes a pre-harvest inspection on the

---

<sup>136</sup> Interview with Landowner #10584 (July 22, 2008).

<sup>137</sup> The THP or NTMP may not include all of the landowner’s property.

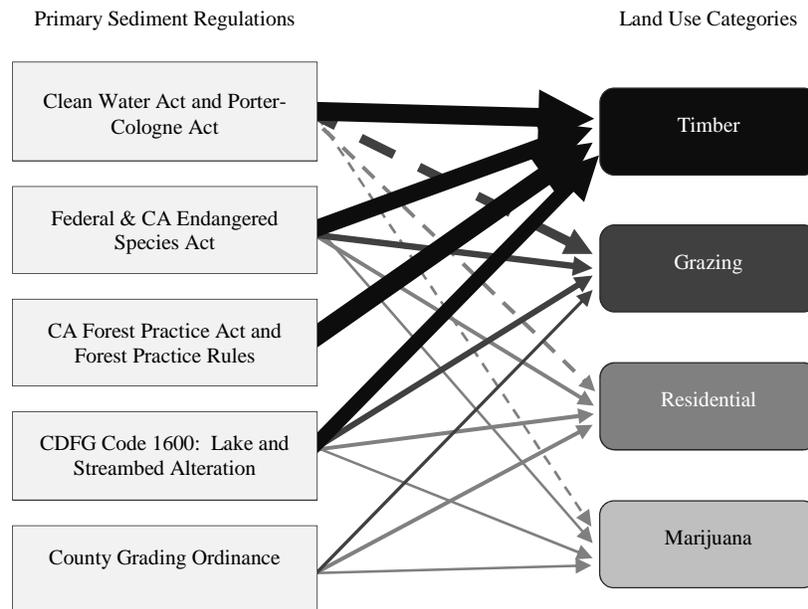
2011]

*Regulatory Spillover*

73

harvest site with the landowner or plan submitter, the RPF, and staff from several resource agencies. Additionally, CAL FIRE is required to conduct an on-site, post-harvest inspection within six months of the completion of the harvest, and any of the involved agencies may also conduct their own post-harvest inspection.

**Figure 5: Application and Perceived Strength of Sediment Regulations by Land Use**



*Source:* Anne Short, *Governing Change: An Institutional Geography of Rural Land Use, Environmental Management, and Change in the North Coastal Basin of California* (2010) (unpublished Ph.D. dissertation, Univ. of Cal. Berk.) (on file with author).

*Note:* The left column contains the major federal, state, and local regulations associated with sediment control and roads. They are listed roughly in order of the stringency with respect to activities covered and the type of BMPs required, with the most stringent regulations at the top and the least stringent at the bottom. The right column contains the primary land uses in the region. The arrows indicate the regulations that apply to each land use as well as how landowners in each land use category perceive the stringency of the regulations as applied to their lands. Solid arrows indicate that a regulation currently applies to a particular land use.

Dashed arrows indicate that a regulation is being developed and is likely to apply to a particular land use in the future. The thickness of the arrows indicates landowners' perception of the strength of each regulation: thicker arrows indicate that landowners are more cognizant of regulation and believe that it applies to them while thin arrows indicate that landowners have little awareness of the regulation and/or they do not believe it applies to them.

In addition to regulatory inspections and monitoring, citizens and non-profit groups also play a role in ensuring that the FPR is upheld. The FPR guarantees public access to information about timber harvests. The review process has a built-in commenting period that allows the public to offer comments on the proposed plan, and all documents associated with the review process and inspections must be available to all interested public parties. The interviews with members of small watershed groups revealed that many of them focus primarily on the timber industry and some review a large portion of THPs in their watershed. Several other non-profit organizations also act as watchdogs on the timber industry, including the Environmental Protection Information Center, a regional environmental non-profit based in Southern Humboldt, and the Bay Area Coalition for Headwaters, a San Francisco based non-profit organization focused on the protection of North Coast redwoods. These organizations and others also review and comment on THPs, do post-project monitoring where possible, and sometimes take legal action when they believe violations are present.

The relatively high levels of government and public monitoring are strongly associated with knowledge and adoption of BMPs. Surveyed and interviewed timber landowners have more experience with regulations than other groups of landowners and demonstrate greater familiarity with and adoption of BMPs. Beyond the study population, the Hillslope Monitoring Program ("HMP") and the Modified Completion Report ("MCR") project, two statewide studies of compliance with the FPR, both found high levels of compliance with the BMPs prescribed by the FPR. The HMP evaluated adherence to FPR and the effectiveness of the prescribed BMPs on a random sample of completed THPs between 1996 and 2001. Based on their evaluation of 300 harvest sites, the HMP found an implementation rate of ninety-four percent for required BMPs related to water quality.<sup>138</sup> A follow-up monitoring effort, the MCR project, evaluated the adequacy of FPR implementation<sup>139</sup> on 281 randomly sampled completed THPs from 2001 to 2004. Building on focal areas identified in the

---

<sup>138</sup> George Ice et al., *Programs Assessing Implementation and Effectiveness of State Forest Practice Rules and BMPs in the West*, 4 WATER, AIR, & SOIL POLLUTION: FOCUS 143, 147 (2004).

<sup>139</sup> The MCR project collected data on the percent compliance with required BMPs as well as a measure of the quality of the implementation of BMPs.

HMP, the MCR project concentrated on BMPs associated with watercourse and lake protection, roads, and watercourse crossings. The MCR project found overall implementation of road-related rules exceeded the standards prescribed in the FPR eighty-two percent of the time, were ‘marginally acceptable’ fourteen percent of time and were not acceptable four percent of the time.<sup>140</sup> With respect to watercourse crossings, the MCR project found that sixty-four percent of crossings had acceptable implementation of FPRs, nineteen percent had marginally acceptable implementation, and seventeen percent had at least one unacceptable feature.<sup>141</sup>

The schedule of government inspections creates two mechanisms that lead to regulatory compliance and the implementation of BMPs. First, the potential for post-harvest inspections creates the motivating need for implementation of prescribed BMPs because it creates the perception that non-compliance could be discovered and is thus subject to a potential sanction. CAL FIRE completes over 7000 inspections annually on about 700 THPs, NTMPs, and other projects overseen by CAL FIRE.<sup>142</sup> Ice et al.<sup>143</sup> report that between 1998 and 2000, inspectors found 975 violations on the 4749 THPs that were open in that period.<sup>144</sup> Violations discovered through inspections or via citizen complaints must be corrected, and CAL FIRE also has the authority to terminate harvest operations and cite or fine RPFs, licensed timber operators (“LTOs”), and/or landowners for the violations.<sup>145</sup>

Second, corrective avenues and sanctions for non-compliance in the monitoring and enforcement programs also allow CAL FIRE to compile information on the most common violations. Synthesis of this information has driven the design of targeted educational workshops to increase knowledge of those responsible for implementing BMPs.<sup>146</sup> Part VIII on regulatory spillover

---

<sup>140</sup> CLAY A. BRANDOW ET AL., CAL. STATE BD. OF FORESTRY AND FIRE PROTECTION, MODIFIED COMPLETION REPORT-MONITORING PROGRAM: MONITORING RESULTS FROM 2001 THROUGH 2004, 68 (2006). The most frequent problems were inadequate spacing between waterbreaks on the road surface and improper size, number, and/or location of drainage structures. Additionally, it was found that sediment problems were most likely to be associated with roads where the BMPs were inadequately implemented, which suggests that BMPs are effective for erosion control when implemented properly.

<sup>141</sup> *Id.* at 69-70. The common problems with watercourse crossings included diversion potential, fill slope erosion, culvert plugging, and scour at the outlet.

<sup>142</sup> Ice et al., *supra* note 138, at 147. See Forest Practice, CAL DEPT. OF FORESTRY AND FIRE PROT., [http://www.fire.ca.gov/resource\\_mgt/resource\\_mgt\\_forestpractice.php](http://www.fire.ca.gov/resource_mgt/resource_mgt_forestpractice.php) (last visited Oct. 14, 2011).

<sup>143</sup> Ice et al., *supra* note 138, at 147.

<sup>144</sup> *Id.* The research broke the violations down into three categories: harvesting practices and erosion control (347 violations), logging roads and landings (320 violations), and watercourse and lake protection (308 violations). However, the research gave no sense of how these are distributed among the THPs.

<sup>145</sup> Forest Practice, *supra* note 142.

<sup>146</sup> Ice et al., *supra* note 138, at 149.

discusses these and other educational components of the regulatory process in more detail.

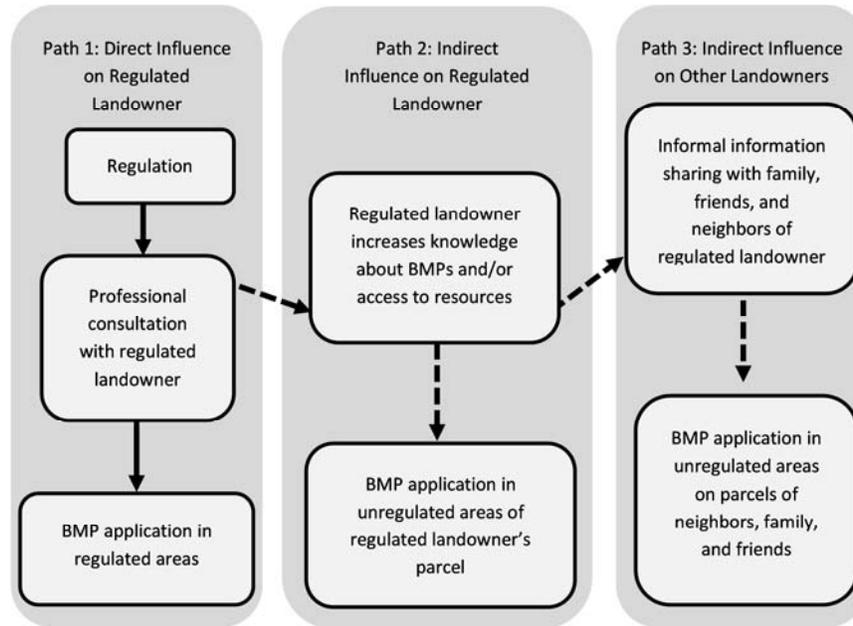
#### VIII. REGULATORY SPILLOVER: HOW REGULATORY PROGRAMS AFFECT VOLUNTARY BMP ADOPTION

As shown above, the monitoring and enforcement of the FPR creates a ‘necessity’ that has driven the adoption of BMPs on regulated areas. This study finds that strongly enforced regulations and the threat of future regulations that are perceived to be strong can indirectly lead to application of BMPs by increasing the motivation to implement BMPs and by minimizing the barriers of knowledge and resources. The following two sections explore two different drivers of “regulatory spillover,” a term defined as the application of BMPs beyond the regulated areas. The sections first take a closer look at the operations of timber regulations and examine how and when this leads to regulatory spillover. Then, a discussion of a grassroots non-profit organization, the Yager/Van Duzen Environmental Stewards (“YES”), is used to illustrate how the perceived threat of future regulations can prompt the adoption of BMPs prior to regulation.

##### A. *Regulatory Spillover (I): Education and Access to Resources through Regulatory Process*

This research reveals that regulations perceived to be strongly enforced can lead to increased knowledge about the BMPs themselves and increased awareness and utilization of non-regulatory technical and funding resources, and that this can lead to the implementation of BMPs beyond the regulated area (Figure 6: Path 2). This process begins with regulated landowners becoming more educated about BMPs as a result of regulation. For timber landowners, the relationship between the landowner and their RPF is a fundamental component of this learning. The RPF acts as a trusted liaison between the regulating agencies and the landowner. Certified by the Board of Forestry (“BOF”) and hired by the landowner, the RPF is accountable to both parties. As is described below, the RPF often acts as a conduit of information about BMPs, helps landowners tailor agency BMP prescriptions to the unique circumstances of their property, and also facilitates the use of non-regulatory resources by their landowning clients.

**Figure 6: Pathways of Influence of Forest Practice Act and Forest Practice Rules on Regulated and Other Landowners**



*Source:* Anne Short, *Governing Change: An Institutional Geography of Rural Land Use, Environmental Management, and Change in the North Coastal Basin of California* (2010) (unpublished Ph.D. dissertation, Univ. of Cal. Berk.) (on file with author).

As one timber landowner explained, “Our foresters have kept us honest.”<sup>147</sup> Though landowners have a range of backgrounds and management experience, many landowners speak of the learning associated with the FPR and their relationship to their RPF. This education and implementation of BMPs via knowledge gained through the forester and due to regulatory requirements is a typical experience described by interviewed timber landowners and is a direct result of the consulting process required by the FPA.

Under the FPA, harvest plans, THP, NTMP, or their equivalent, must be prepared and certified by a RPF who is trained and experienced in several areas of forestry and licensed by the state.<sup>148</sup> Landowners have the freedom to hire,

<sup>147</sup> Interview with Landowner #20838 (June 26, 2009).

<sup>148</sup> Under the Professional Foresters Law (“PFL”) of 1972, CAL. PUB. RES. CODE §§ 769-770 (West 2011), the requirements for becoming licensed as an RPF include:

and fire, their RPF as they see fit. With this power, the RPF is highly accountable to the landowner. This research suggests that landowners trust the recommendations of their chosen forester and assume that their RPF understands the unique conditions of the property and is acting in the best interest of the landowner. This trusting relationship sets the foundation for the exchange of knowledge about agency-recommended BMPs and non-regulatory resources.<sup>149</sup>

RPFs assume responsibility for ensuring that the harvest plan and all management activities associated with the plan are in compliance with the FPR. This regulatory responsibility, the strong system for inspection and monitoring of the FPR, and the potential for disciplinary actions associated with violations of the FPA, or the Professional Foresters Law (“PFL”), combine to make RPFs accountable to CAL FIRE, the BOF, and other natural resource agencies involved in regulating timber harvests. RPFs thus have training in regulatory requirements, including the latest BMPs, and a large incentive to ensure regulatory compliance on the lands where they work, which manifests itself in the application of BMPs on regulated areas of the landscape (Figure 6: Path 1).

The FPA requires RPFs to ensure that their client, the timber landowner, understands his or her responsibilities, “including the timberland owner(s)’ responsibilities for site preparation, stocking, and maintenance of roads, landings and erosion control facilities.”<sup>150</sup> This regulatory stipulation often increases landowners’ familiarity and knowledge about the BMPs that are

- 
- Good moral character and integrity (demonstrated through two references from licensed RPFs who can attest to the professional character of the applicant and three additional references who can attest to the business integrity and personal character of the applicant),
  - Knowledge and experience in the forestry profession (demonstrated completion of seven years of education, training and employment in the field of forestry), and
  - Successful completion (75% or higher) of the California state forester’s examination, which tests knowledge of several areas of forestry (e.g., silviculture, forest ecology, forest economics, forest policy, forest administration).

The PFL was created to “provide for the regulation of persons who practice the profession of forestry and whose activities have an impact upon the ecology of forested landscapes and the quality of the forest environment, and through that regulation to enhance the control of air and water pollution, the preservation of scenic beauty, the protection of watersheds by flood and soil erosion control, the production and increased yield of natural resources, including timber, forage, wildlife, and water, and outdoor recreation, to meet the needs of the people.” *Id.* § 751. In addition to specifying the licensing requirements, it also establishes guidelines for conduct and the criteria and procedures for disciplinary action.

<sup>149</sup> This trusting relationship is in contrast to the typically adversarial or wary attitude timberlandowners have towards unknown agency staff. While landowners typically trust their RPF from the start of their relationship, agency staff and regulators must earn the trust of landowners.

<sup>150</sup> DUGGAN & MUELLER, *supra* note 110, at 55.

required on their land. This pathway for knowledge transfer is strengthened because landowners tend to trust their RPF to explain when and why BMPs are required.

The FPA and FPR also mandate on-the-ground pre-harvest inspections where regulators, the RPF, and often the landowner review how the harvest and, more importantly, the mitigating BMPs will be implemented. The inspection often includes discussion, and sometimes disagreements, about the appropriate mitigating techniques and, in the right conditions, can provide opportunities for learning.<sup>151</sup> The interviews for this study suggest that both regulators and landowners bear responsibility for shaping the dialogue and that the conditions are fertile for learning whenever the discussions are conducted as an exchange of ideas — albeit one where the power to influence the outcome is uneven as the regulators have the ultimate authority — rather than a top-down and adversarial process.<sup>152</sup>

The BMP prescriptions in the FPR are required only in areas used for the timber harvest process, but the knowledge gained through the consultation between the RPF and landowner is often applied beyond the regulated areas. This can happen when the forester suggests the application of BMPs in areas outside of the harvest plan and when landowners themselves determine that BMP application beyond the harvest area would be useful. One timber landowner who learned about road management techniques through the regulatory process and his connections to his RPF explained that many BMPs have become standard practice across his property “whether [he’s] going to be logging the area or not.”<sup>153</sup> At the suggestion of her forester, another timber landowner did a series of road reconstructions and upgrades, which involved several BMPs, some required by the FPR and some not, across her entire property prior to her most recent harvest. A third timber landowner also explained that he implements BMPs beyond the regulated areas of his property because he has found that they increase the quality of his roads in addition to decreasing sediment.

In addition to the knowledge generated by these interactions and the desire to

---

<sup>151</sup> Other permitting requirements for activities typically associated with timber harvests (*see, e.g.,* NCRWQCB Waste Discharge Requirements; CDFG 1600 Agreements for Streambed Alterations; NOAA/USFWS Habitat Conservation Plan or Incidental Take Permitting for activities affecting listed endangered or threatened species) may also involve on-site inspections that can create additional opportunities for learning between landowners and regulators in the right conditions.

<sup>152</sup> The relationship between landowners and regulators is often adversarial and begins without trust. Our interviews suggest that a trusting relationship can grow from repeated interactions, respectful dialogue about regulatory requirements, and, most importantly, the landowner’s perception that the regulator is listening and considering their experience-based knowledge, even if the regulator ultimately disagrees with the landowner’s suggestions.

<sup>153</sup> Interview with Landowner #11846 (Sept. 25, 2008).

implement BMPs associated with the perception that the BMPs improve road quality and/or the desire to reduce road-related sediment, foresters frequently alert landowners to the availability of grant or cost-share funding as well as technical assistance resources — e.g., workshops, contacts for private consultants or recommended contractors — that enable them to further overcome the knowledge and resources barriers to implement BMPs on non-regulated parts of their land. In this way, the requirements of the FPA, particularly the interaction between landowners and their RPF, creates a *necessity* for implementation of BMPs on the regulated areas of the landscape and also provide greater access to the resources, such as funding and knowledge, that can then *facilitate* the application of BMPs beyond the regulated area (Figure 6: Path 2).

*B. Regulatory Spillover (II): Regulatory Learning and Knowledge Networks*

The knowledge gained through regulation of the timber industry also spills over to unregulated lands through informal networks of knowledge sharing and project implementation. A residential landowner in the Mattole watershed said that, “People talk about their roads almost as much as people talk about the weather.”<sup>154</sup> Their reliance on family, friends, and neighbors for advice about road management is typical of North Coast landowners using their land for timber, ranch, residential, or vacation purposes. Approximately thirty-five percent of survey respondents and thirty-seven percent of interview respondents reported that they obtained technical assistance about roads from family, friends, or neighbors.<sup>155</sup> Many of these landowners preferentially seek out advice from family, friends, or neighbors that are involved in the timber industry as foresters or on the road crews at one of the industrial timber companies in the region.

Since work in the timber industry involves road work that is overseen by regulating agencies, many landowners trust that those working in the timber industry have specialized expertise in road design and management. A married couple who work in non-harvesting positions at a timber company and own some ranch land explained: “It’s a good thing we have some logging friends who, you know, they build roads. They know how to do it. We also ask them for advice.”<sup>156</sup>

Such trust in the knowledge of relatives and friends employed in the timber industry and reliance on them was common among interview respondents. Several interview respondents explicitly mentioned the knowledge gained from

---

<sup>154</sup> Interview with Landowner #11411 (Aug. 31, 2008).

<sup>155</sup> No statistically significant difference existed in the degree to which groups of landowners (e.g., timber, ranch [no timber], residential, second home, other) consulted family, friends, and neighbors.

<sup>156</sup> Interview with Landowner #11928, *supra* note 132.

the timber industry and described how relatives who work in the timber industry have recommended and/or implemented road construction, maintenance, or upgrade projects on their property.

Much of the trust in the knowledge of timber employees is well founded. The road crews at industrial timber companies have often been through workshops and other training opportunities, which introduce them to BMPs required by the FPR or recommended by the regulating agencies. One interview respondent who owns 1200 acres of timber and ranchlands and also worked on the road crew for Simpson Timber Company for about thirty years explained that, as part of ongoing training, Simpson sponsored lectures and workshops about new road design, construction, and maintenance techniques.<sup>157</sup>

In many cases, timber company employees transmit the knowledge learned through those experiences to family members, friends and neighbors and/or they implement BMPs on other's land. This interaction with others creates a third pathway through which knowledge and BMP information from regulations leads to implementation on a different set of lands (Figure 6: Path 3). However, it is important to recognize that the knowledge gained through these trainings does not guarantee that the timber employee will necessarily recommend the BMPs prescribed by the regulations. This often happens, but the landowner who worked for Simpson described dissatisfaction with many of the newer BMPs — e.g., rolling dips, outsloping — now recommended by the agencies. His employment in the timber industry therefore did not guarantee a motivating desire to implement the BMPs recommended by the RFP or regulators.<sup>158</sup> Spillover implementation via this third pathway occurs primarily when the employee of the timber industry has had positive experiences with the implementation of BMPs.

### *C. Regulatory Spillover (III): Threats of Future Regulation and BMP Implementation*

The perceived threat of impending regulations can also create a necessity that leads to increased knowledge about and implementation of BMPs on roads that are not yet regulated. This section discusses the links between proposed water quality regulations and the formation and sediment control activities of a community-based non-profit organization, YES. In this case, the threat of future regulations was an important organizing tool that motivated ranchers who are normally resistant to working with government agencies to collaborate with several natural resource agencies to determine the major sediment sources in their watershed, to utilize non-regulatory resources, and to implement BMPs across their ranch roads.

---

<sup>157</sup> Interview with Landowner #10424 (July 23, 2008).

<sup>158</sup> *Id.*

The Van Duzen River is a tributary of the mainstem Eel River in Humboldt County that supports Steelhead trout, Chinook salmon, and Coho salmon. In 1992, the Van Duzen was listed on the California's Clean Water Act ("CWA") 303(d) list of impaired waters due to the degradation of salmonid habitat by excess sediment. Between 1997 and 1999, staff from the EPA Region 9 office worked collaboratively with the newly formed YES to assess the primary sediment sources in the watershed and develop the total maximum daily load ("TMDL").<sup>159</sup> Following the completion of the TMDL, YES received a series of grants to work with a private consultant, Pacific Watershed Associates ("PWA"), to inventory the sediment sources in the Middle Van Duzen, prioritize sites for treatment, and implement BMPs on roads in the watershed.<sup>160</sup>

Dina Moore, a rancher in the region and one of the founding members of YES, described the impetus for the group as follows: "the reality was that [the regulation] was coming, the train was coming; you either got on and led the direction or you took what you got."<sup>161</sup> Moore and neighboring ranchers responded to the threat of impending water quality regulations by organizing YES and working with a key contact at the EPA to become involved in the TMDL process.

Together, YES and EPA embarked on a collaborative assessment of sediment sources in the watershed. Chris Heppe, the key contact at the EPA, said that, "Rather than diving right in, we [the EPA] went to [YES] and asked what they thought." Heppe says that "this got buy-in for the process" from the private landowners, including access to some of their lands to assess ecological conditions.<sup>162</sup> The assessment showed that roads were identified as the primary sediment source in the basin.<sup>163</sup> YES members trusted the results and were convinced that roads are a sediment source. The group used this finding to secure a series of grants to inventory and control sediment sources on roads in their member-landholdings.

The threat of regulation therefore started a process that resulted in YES members obtaining non-regulatory funding and technical assistance and implementing BMPs in and beyond the grant funded project areas (a process similar to pathways 2 and 3 in Figure 6, except that it begins with a proposed regulation rather than an actual regulation). A small number of interviewed

---

<sup>159</sup> Interview with Chris Heppe, Nat'l Park Serv. (Aug. 8, 2007); Interview with Dina Moore, rancher and founding member of YES (Oct. 13, 2008).

<sup>160</sup> Since 2001, YES members have received over \$1.5 million in grant funding from grants administered by CDFG, SWRCB, and NRCS. Specific funding sources include CDFG Fisheries Restoration grants, the federally supported Clean Water Act Section 319(h) fund, and grants available from CA Senate Bill 271 and CA Proposition 50.

<sup>161</sup> Interview with Dina Moore, *supra* note 159.

<sup>162</sup> Interview with Chris Heppe, *supra* note 159.

<sup>163</sup> U.S. EPA, VAN DUZEN RIVER AND YAGER CREEK TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT, *supra* note 56.

landowners with timber and/or ranch lands also described a similar proactive response to the threat of regulation.<sup>164</sup>

When considering how widespread this effect may be, it is important to recognize that landowners will only respond to the threat of regulation when they believe that the regulation will actually affect them. The majority of YES members are ranchers who have either gone through the regulatory process for timber harvests on their own land or have friends or family members who have gone through that process. These experiences have instilled recognition of the regulatory power of agencies. In contrast, residential landowners in other sub-watersheds of the Van Duzen tend to have less experience with regulations and did not respond to the TMDL in a proactive fashion.

#### IX. NON-REGULATORY MECHANISMS AND MOTIVATIONS

The discussion of regulatory mechanisms above previews the important roles of non-regulatory programs, namely the provisions of technical assistance and funding resources that reduce barriers to the application of BMPs. Non-regulatory assistance to landowners can take three different forms: (1) technical assistance (e.g., workshops, guides or manuals, consultations), (2) financial assistance (e.g., grant funding, cost-share), and (3) project implementation. These non-regulatory programs provide the means to overcome the *barriers* to BMP implementation (access to knowledge and resources), but, with a few exceptions, they do not do much to *facilitate* interest in or the desire for the adoption of BMPs. That desire or interest has to come from elsewhere.

The sections that follow focus on when and how non-regulatory programs facilitate the adoption of BMPs. They begin with a general description of the utilization and effects of non-regulatory resources. The sections then analyze how landowners learn about these resources and identify the four major motivations for seeking out non-regulatory assistance. This section ends with a discussion of the benefits and limitations of these non-regulatory approaches.

##### A. *Utilization and Effects of Non-Regulatory Resources*

Technical Assistance: In order to reduce the knowledge barrier to BMP implementation, government agencies and non-profit organizations provide technical assistance through professional consultations by phone or on-site, training programs such as workshops, lectures, and short courses, and the publication of educational materials in print, online, and/or as video/DVDs. Approximately forty-five percent of surveyed landowners have obtained

---

<sup>164</sup> The opposite effect is also possible, where the threat of impending regulation leads landowners to engage in activities that will be prohibited by the regulation in the hope of being grandfathered in when the regulation arrives. We did not see evidence of this in our research.

technical assistance from a professional source, which includes government sources, non-profit organizations, professional or industry associations, and private consultants, and about sixteen percent have obtained assistance from books or the internet. The mail survey and interviews demonstrate that utilization of these resources clearly helps landowners gain knowledge about BMPs and is significantly associated with self-reported adoption of BMPs.<sup>165</sup>

Financial Assistance: Non-regulatory programs can help landowners overcome the resource barrier to implementation of cost-intensive BMPs through the provision of cost-share and grant funding opportunities. Approximately ten percent of survey respondents obtained cost-share or grant funding for road-related sediment prevention work, and the acquisition of grant or cost-share funding is associated with self-reported adoption of BMPs in the survey population and demonstrated knowledge about BMPs in the interview population.

Direct Project Implementation: Direct implementation of BMPs on a landowner's property by a group or individual other than the landowner circumvents the need to find a motivating necessity or desire and overcome the knowledge and resource barriers. In the North Coastal Basin, direct project implementation takes two forms: (1) implementation by a non-profit organization or agency that does not own land in the project region, in which the coordination and implementation of a project is completed by a non-profit organization, and (2) implementation spearheaded by an individual or road association that owns a portion of the land in the project region, in which the project is organized by a key landowner who works with a granting agency and/or a non-profit to implement a project on roads crossing multiple properties. In both of these situations, the motivation for the project, technical expertise, and financial resources are all provided by an outside organization and/or individual(s) who initiates the project, and the project is implemented at little or no cost to landowners.

#### *B. Factors Motivating Landowners to Seek Technical and Financial Assistance*

Few agencies and non-profit organizations in the North Coastal Basin undertake targeted outreach or direct project implementation.<sup>166</sup> Instead, they

---

<sup>165</sup> As described above, utilization of professional technical assistance is significantly associated with greater familiarity with BMPs and self-reported adoption of BMPs, and a similar relationship was demonstrated through interviews. In addition, utilization of book and internet resources is significantly associated with greater self-reported implementation of BMPs ( $p < 0.05$ ).

<sup>166</sup> A notable exception is the Mattole Restoration Council ("MRC"), which initiates and implements road reconstruction and restoration projects throughout the Mattole watershed in Humboldt County. Mattole Restoration Council, *Good Roads, Clear Creeks* (Dec. 20, 2009), <http://drupal.mattole.org/Good-Roads-Clear-Creeks>.

act as resources for landowners who seek out their services. Landowners must take the initiative to identify and obtain financial and technical assistance. Interview respondents who utilized technical and financial resources available through non-regulatory programs learned of these programs through: (1) direct inquiries to non-profit organizations or government agencies; (2) word of mouth via connections with family, friends, neighbors, and their RPF; (3) awareness generated through nearby grant and restoration projects; and (4) chance encounters with people knowledgeable about the programs.

We identified four overlapping factors that motivate landowners to actively seek out non-regulatory assistance to obtain more knowledge or funding to help implement BMPs on their land: (1) environmental concerns, (2) problems with existing roads, (3) belief in the utility of BMPs, and (4) the desire for autonomy.

### ***Motivation 1: Environmental Concern***

Concern for the environment and the desire to minimize the environmental effects of their land management practices lead some landowners to seek out non-regulatory assistance with their road network and other management practices. Environmentally-oriented landowners often seek out technical assistance after purchasing their property in order to gain knowledge about how to take care of the land and their roads. In many cases they learn about grant or cost-share opportunities through their contact with the professional providing technical assistance and obtain grant funding to implement BMPs and restoration projects.

One landowner moved to Humboldt County from the San Francisco Bay Area after becoming very active with the Bay Area Coalition for Headwaters, a San Francisco based environmental group that “encourag[es] grassroots activism to confront and curtail the exploitation of forests and to understand the links between our lives and healthy forests.”<sup>167</sup> He purchased 160 acres for recreation and retreat purposes and subsequently sought out technical assistance and grant funding from the CDFG.<sup>168</sup>

Another landowner provides a clear example of how this motivation can lead to the utilization of grant funding. His stated land management goal was to “restore the land,” and shortly after purchasing the property he consulted with a forester to develop a sustainable land management plan.<sup>169</sup> By working with his forester, he learned about the relationship between roads and sediment as well as the availability of grant funding for restoration projects. His concern for the environment and his need for additional technical assistance and funding

---

<sup>167</sup> Bay Area Coalition for Headwaters, <http://headwaterspreserve.org/> (last visited Oct. 14, 2011).

<sup>168</sup> Interview with Landowner #11572 (Nov. 3, 2008).

<sup>169</sup> Interview with Landowner #21061 (Sept. 10, 2008).

ultimately led him to seek out grant funding.

As is the case with the two landowners described above, many of the landowners with this motivation do not have a long history of land management. Though many of the ranchers whose land has been held by multiple generations express a strong stewardship ethic, their stewardship is associated with confidence in their understanding of their land. While many ranchers implement BMPs, their utilization of non-regulatory resources is rarely motivated strictly by their concern for the environment.

### ***Motivation 2: Problems with the Road Network***

Severe road problems, such as washouts from failed culverts or catastrophic slides that make the road impassible, and other more minor concerns about the quality of the road network are the second motivating factor. A staff person working jointly with a non-regulatory agency and a watershed-based non-profit organization explained that, “[v]ery few of the people that call are motivated by water quality or TMDLs. Very few people are cited for violations so that’s little incentive. Instead, most are motivated by experience with the road.”<sup>170</sup> The staff person further reported that, in the cases where these problems are contributing to sediment pollution, the watershed organization helps the landowner obtain grant funding to assess the entire road network and implement BMPs that address the reported problem and other potential sediment delivery sites.

Only one interviewed landowner described seeking out technical assistance directly in response to a sudden road problem, though others described seeking out technical assistance for other land management problems.<sup>171</sup> Other landowners mentioned seeking out technical assistance for other land management problems. These landowners turned to resource agencies (primarily CDFG) or non-regulatory government programs (e.g., NRCS, RCD) for technical assistance. In some cases, the consultation occurred by phone, and in others an agency staff person made a site visit and provided recommendations about how to remedy the problem.

### ***Motivation 3: Belief in the Utility of BMPs***

The third reason landowners seek out non-regulatory technical or financial assistance is the belief that the use of BMPs improves the quality of their roads and reduces the resources required for long-term maintenance. One timber

---

<sup>170</sup> Interview with Anonymous Staff Person, #M1 (May 29, 2007).

<sup>171</sup> While most interviewed landowners that sought out technical assistance or received grant funding described having a chronic road problem, they did not use the problems themselves as their primary motivation for seeking out the assistance. They explained their motivation in terms of one of the other three factors listed here. However, these categories are not mutually exclusive and the drivability of the road itself did contribute in these other cases.

landowner provides a good example of this. He learned about BMPs through his interactions with his RPF and agency regulators as required through the FPA and the Garcia Action Plan. After being forced to implement several BMPs by these regulations, he determined that these BMPs reduced maintenance, road failures, and long-term expense, and he wanted to implement them across the unregulated areas of his property.<sup>172</sup> In order to obtain the knowledge and resources to further implement BMPs beyond the regulated area, the landowner attended road design and sediment prevention workshops to gain more information about BMPs. He sought out and received significant grant funding from CDFG and EQIP to implement these BMPs.

Like this timber landowner, other landowners in this category are motivated by their belief that BMPs increase the quality of their roads and have long-term management benefits. Though they may also have environmental concerns or a strong stewardship ethic, this motivation is distinct in its focus on the actual resource savings in terms of time and/or cost to the landowner.

#### ***Motivation 4: Desire to Maintain Autonomy***

The final factor motivating landowners to seek out regulatory assistance is the desire to maintain the freedom to make land management decisions when faced with a perceived threat to their autonomy. The threat to their autonomy could come from a variety of sources. As seen in the earlier discussion of the regulatory spillover and threats of regulation, ranchers in the Yager Creek sub-watershed of the Van Duzen collaborated with agencies in a non-regulatory setting, utilized technical assistance resources, and obtained grant funding to upgrade their road networks in order to ensure they had a voice in the formation of future water quality regulations. Ranchers in the Bear River Valley also formed a non-profit group and utilized technical and financial assistance to fight off a threat to their autonomy. However, in this case, the ranchers acted in response to perceived threats stemming from the formation of grassroots groups in a neighboring watershed.

The Bear River Valley is a small watershed adjacent to the Mattole watershed in Humboldt County. Landownership in the valley has been relatively stable over the past 150 years with most land passed down through ranching families with limited migration of new families into the area. The landowners are protective of each other, their lifestyle, and the valley.

The adjacent Mattole watershed also has a history of ranching and timber activities, but the culture of the Mattole began to change with the migration of “back to the land” settlers into the watershed beginning in the late 1960s.<sup>173</sup>

---

<sup>172</sup> Interview with Landowner #21176 (Sept. 5, 2008).

<sup>173</sup> U.S. EPA, MATTOLE RIVER TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT AND TEMPERATURE, *supra* note 56.

Motivated by concern over the declining numbers of salmonids in the river, many of the newer residents of the Mattole began to work together proactively in the late 1970s and early 1980s to restore salmonid habitat.<sup>174</sup> Their efforts resulted in the formation of three non-profit organizations that work together on a variety of in stream and upslope restoration and mitigation projects throughout the Mattole: the Mattole Restoration Council (“MRC”), the Mattole Salmon Group, and Sanctuary Forest.

In the mid-1990s, ranchers and other landowners in the Bear River Valley began to fear that the Mattole groups were trying to extend their programs into the Bear River watershed. Motivated by the concern that this would lead to the loss of their ability to drive land management decisions throughout their watershed, several Bear River ranchers formed their own non-profit group, the Bear River Regional Resources Conservancy (“BRRRC”), in 1998. A BRRRC member and Bear River landowner explained that the origins of the BRRRC were that: “We didn’t want them coming in and trying to run our watershed. We’ll run our watershed.”<sup>175</sup> Between 1998 and 2003, BRRRC obtained grant funding to support planning, organization, and training activities for landowners in the watershed and to hire a consultant to conduct a watershed assessment. Based on the priorities identified in the assessment, individual members obtained further grant funding to implement projects to reduce erosion.

The ranchers and other landowners that organized YES and BRRRC felt threatened by outside interest in the management of their watershed and organized their small non-profit groups to provide a way to maintain decision-making control in their watershed. In each case, the groups utilized both non-regulatory technical and financial assistance to assess the health of the watershed and implement BMPs on roads and other restoration projects.

### *C. Benefits and Limitations of Non-Regulatory Approaches*

Non-regulatory programs have the benefits of increasing knowledge and implementation of BMPs. As voluntary and incentive-based programs, all three non-regulatory approaches have the clear benefit of being less adversarial than regulatory approaches. In some cases, this non-adversarial approach can even change landowners’ negative views towards agencies and reduce some of the common reluctance to work with agencies.

Some spillover effects are also associated with grant, cost-share, and project implementation programs. This study found some evidence that landowners apply knowledge and BMPs learned through participation in these programs in other areas of their lands. For example, members of YES have implemented

---

<sup>174</sup> FREEMAN HOUSE, *TOTEM SALMON: LIFE LESSONS FROM ANOTHER SPECIES* (Beacon Press 1999).

<sup>175</sup> Interview with Landowner #11928, *supra* note 132.

BMPs learned through education programs and grant projects beyond the grant project areas. Another landowner explained that his experience in a grant project changed how he viewed roads and creeks, and he has assessed and addressed excess sediment pollution in other creeks near his home.<sup>176</sup>

In addition, re-construction and restoration projects can generate general awareness and interest in sediment control, BMPs, and the availability of non-regulatory resources. A landowner's positive experiences with funding agencies and organizations may lead friends or neighbors to also seek out funding for projects on their land. Other landowners may learn about the availability of resources simply due to the visibility of a project. A landowner who was involved in a restoration project implemented by a local watershed group in Humboldt County says that he has "seen a big change in the attitude of the ranchers because of this [restoration project]."<sup>177</sup>

In addition to these broad benefits common to all three approaches, there are also some benefits and limitations that are specific to each approach. These are described in the following two sections.

#### *D. Technical and Financial Assistance*

Landowners' consultation with professionals is strongly associated with increased knowledge about the relationship between roads and sediment, and BMPs. The availability of free technical assistance provides the clear benefit of increasing landowners' knowledge about BMPs.

Interviewed landowners, including those who have obtained financial assistance and those who have not, identified several clear benefits associated with these programs. When asked if cost-share and grant programs are a good use of public funds, landowners gave a variety of justifications for supporting the programs: "habitat and salmon habitat";<sup>178</sup> "air quality, water quality, fish, recreational possibilities, the management of the forest and wood";<sup>179</sup> to "improve water quality quite a bit."<sup>180</sup> Several landowners also shared one landowner's sentiment that "it is the public mandating upgrades, so they should be responsible for making the funding available."<sup>181</sup>

As expressed through these quotes and in other interviews, the perceived function and outcomes of grant and cost-share funding include:

- Implementation of projects that landowners would otherwise not be able to afford and the associated environmental benefits,

---

<sup>176</sup> Interview with Landowner #21342 (Aug. 22, 2008).

<sup>177</sup> Interview with Landowner #11211 (Aug. 25, 2008).

<sup>178</sup> Interview with Landowner #11572, *supra* note 168.

<sup>179</sup> Interview with Landowner #21061, *supra* note 169.

<sup>180</sup> Interview with Landowner #11644 (Oct. 21, 2008).

<sup>181</sup> Interview with Landowner #21176 (Sept. 5, 2008).

- Providing public resources to support projects that are implemented by individuals but that benefit and preserve public goods and/or are mandated by regulatory directives,
- Providing public resources to mitigate and restore legacy damages incurred from prior land uses,
- Indirect educational benefits associated with collaborative work between landowner and the funding agency or organization, and
- Additional financial resources that help support the rural lifestyle.

However, the benefits of technical and financial assistance programs are limited by the resource constraints and scope of the programs. Agencies and non-profit organizations face perpetual staffing challenges and budget limitations that constrain their actions, and there are always more problems than resources. As such, few agencies or non-profit organizations in the North Coastal Basin undertake targeted outreach to encourage utilization of their resources. Instead, the resources are primarily only available to those who seek them out. While some prioritization in the distribution of grant and cost-share funds exists, the process is still limited by who chooses to apply. Thus, the reach of these programs is uneven and may not occur in the areas or for the landowners most needing the assistance.<sup>182</sup>

#### *E. Direct Project Implementation*

The direct project implementation approach has the clear benefit of simultaneously addressing the three basic factors affecting BMP adoption — motivation, knowledge, and resources (see Figure 4) — and allowing organizations to target the roads and areas believed to be most critical. Landowners involved in these projects must agree to the project but do not have to contribute time or financial resources. As long as the landowner is not actively obstructing the project, his or her motivations and access to knowledge and resources become irrelevant. Groups using this strategy can implement BMPs on roads where landowners would otherwise lack the interest, knowledge, and/or resources to treat their own roads.

However, there are several challenges and limitations for this approach. One landowner who obtained a grant on behalf of his road association to upgrade their shared-access road explained that while most of the road association members are supportive of his project implementation effort, a few others have actively tried to obstruct the process, making it more difficult to move forward.<sup>183</sup>

The success of direct implementation projects can be threatened or reduced

---

<sup>182</sup> Interview with Anonymous Staff Person, #M1, *supra* note 170.

<sup>183</sup> Interview with Landowner #21061, *supra* note 169.

due to lack of landowner interest and buy-in in the process. Anecdotal evidence suggests that obstruction or sabotage of projects, as described above, does occur but does not appear to be common. As Joel Monschke, director of the MRC's Good Roads, Clear Creeks program, put it, "People don't mind the free road work."<sup>184</sup>

The failure to maintain upgraded roads is a more common challenge with this approach and can reduce the long-term sediment reduction from projects implemented this way. Several landowners living along roads that have been treated described this challenge. A landowner whose access road was upgraded through the MRC's "Good Roads, Clear Creeks" program as well as an additional project funded by a wealthy neighbor described the challenge as follows: "they don't do anything [in terms of maintenance] so it's already rutted."<sup>185</sup> This landowner and several other recipients of direct implementation aid also described a lack of gratitude and unwillingness to alter driving patterns or maintenance practices to preserve the upgrade.

The MRC, the non-profit organization that implemented the project described above that is responsible for the majority of the direct project implementation in the region, addresses this challenge by (1) prioritizing projects that do not require much maintenance, (2) only implementing projects that are supported by most landowners, and (3) trying to educate the contractors and equipment operators who do most of the road work in the region.<sup>186</sup>

Each approach provides resources that help landowners overcome the knowledge and resource barriers to implementation of BMPs. The passive technical and financial assistance approach that is common to agencies and non-profits in the basin has the benefit of providing resources to landowners who are willing to apply them. However, the reliance on landowners to seek out the resources may lead to uneven effects across the landscape. The project implementation approach allows agencies or non-profits to concentrate their resources in high priority areas and to reach landowners that otherwise would not have the desire or perceived need to seek out assistance and implement BMPs. The drawback of this model is that it may not generate sufficient buy-in from landowners to ensure that they will maintain the structures. All three approaches carry the potential for spillover through landowners' information sharing networks or through chance exposure.

---

<sup>184</sup> Interview with Joel Monschke, Program Director, Mattole Restoration Council (Nov. 24, 2008).

<sup>185</sup> Interview with Landowner #11452 (Oct. 22, 2008).

<sup>186</sup> Interview with Joel Monschke, *supra* note 184.

X. LINKAGES BETWEEN AND COMMONALITIES IN REGULATORY AND NON-REGULATORY PROGRAMS

The previous sections considered how governance strategies affect the adoption of BMPs in the North Coastal Basin. Though regulatory and non-regulatory programs were treated separately, this next section discussion argues that this common distinction can be misleading. For NPS pollution control, these mechanisms necessarily work in tandem and share some common characteristics. The remainder of this Article first considers the interdependencies of regulatory and non-regulatory approaches and discusses the importance of these links in the context of work on new environmental governance. It then explores a key feature of the regulatory and non-regulatory programs that can lead to implementation of BMPs beyond the program site: the role of personal relations and open communication between landowners and professional contacts.

A. *Interdependency of Regulatory and Non-Regulatory Policy Tools in the Age of New Environmental Governance*

As noted above, several scholars have documented a trend over the past two decades towards 'new environmental governance' in the United States. New environmental governance involves the decentralization of environmental protection, incorporation of collaborative, participatory, and flexible styles of governance, and an expansion of place-based grassroots environmental initiatives.<sup>187</sup> These strategies are generally less adversarial than traditional command and control regulation and involve more voluntary and non-regulatory approaches. These new forms of governance are viewed as responses to the failure of federal environmental regulations to address the complex environmental problems of NPS pollution, integrated ecosystem-based management, and restoration.<sup>188</sup>

Though some still view state and national regulatory standards as important components of pollution control,<sup>189</sup> the newer less adversarial and often non-regulatory policy tools are often evaluated independently of regulation. The literature on collaborative environmental policy is particularly prone to discussing and evaluating collaborative approaches without considering the role

---

<sup>187</sup> JOHN, *supra* note 1; Freeman, *supra* note 1; Innes, *Consensus Building*, *supra* note 1; Mark Lubell et al., *Watersheds Partnerships and the Emergence of Collective Action Institutions*, 46 AM. J. POL. SCI. 148 (2002); Press & Mazmanian, *supra* note 18; Rabe, *supra* note 18; Sabel et al., *supra* note 18; Weber, *supra* note 22.

<sup>188</sup> ANDREWS, *supra* note 8; JOHN, *supra* note 1; Lowry, *supra* note 15; Lubell et al., *supra* note 187; Rosenbaum, *supra* note 15; Vig & Kraft, *supra* note 11.

<sup>189</sup> JOHN, *supra* note 1; Rabe, *supra* note 18.

of regulation in the process. Koontz et al.<sup>190</sup> begin to address this gap by explicitly examining the multiple roles that government actors play in the collaborative process.<sup>191</sup> Though Koontz et al.<sup>192</sup> implicitly recognize the links between regulation and collaborative processes, they focus more on the role of government actors and institutions rather than the power or role of the regulations themselves. Few studies have explicitly examined the actual linkages and interdependencies between regulatory and non-regulatory policy tools.

In an article that strives to bring this issue to the forefront of the policy studies literature, Nie<sup>193</sup> notes that there is an “emerging debate in the fields of environmental and natural resources law regarding interactions between policy tools,” and especially the degree to which regulatory tools are relevant in this age of new environmental governance.<sup>194</sup> He goes on to highlight recent research showing how regulatory enforcement can lead to the use of non-regulatory or less adversarial strategies — e.g., collaborative agreements, land and resource acquisition — to achieve conservation goals. In each of these cases, it is the threat of regulatory enforcement that drives or contributes to the success of alternative approaches. He argues that weakening the regulatory hammer could also weaken non-regulatory tools and suggests that regulatory enforcement is thus a fundamental component of the environmental policy portfolio. This coercive function of regulation and the need for a multi-pronged policy approach that includes a suite of regulatory and non-regulatory tools is well recognized in the economics literature on NPS policy.<sup>195</sup> The research presented in this article reinforces this argument and shows specific ways that regulatory and non-regulatory programs are linked and highly interdependent.

This article reveals three ways that the linkages between regulations and non-

---

<sup>190</sup> KOONTZ ET AL., *supra* note 1.

<sup>191</sup> Koontz and collaborators have contributed several studies that build on the framework introduced in Koontz et al. (2004) and examine the roles of government actors in non-regulatory processes. *E.g.*, Tomas M. Koontz, *Collaboration for Sustainability? A Framework for Analyzing Government Impacts in Collaborative-Environmental Management*, 2 SUSTAINABLY: SCL, PRAC., & POL. 15 (2006); Sara J.S. Nikolic & Tomas M. Koontz, *Nonprofit Organizations in Environmental Management: A Comparative Analysis of Government Impacts*, 18 J. PUB. ADMIN. RES. & THEORY 441 (2008).

<sup>192</sup> KOONTZ ET AL., *supra* note 1.

<sup>193</sup> Nie, *supra* note 1.

<sup>194</sup> *Id.* at 140.

<sup>195</sup> *See, e.g.*, Alberini & Segerson, *supra* note 91; Ribaldo & Horan, *supra* note 77; Segerson & Wu, *supra* note 71. The economics literature frames the problem a bit differently. Rather than looking generally at the ways in which regulatory and non-regulatory programs may be linked, this work specifically examines the conditions that lead to successful voluntary strategies — e.g., voluntary BMP implementation, education. The specific economic argument that links regulations and non-regulatory programs is that the success of voluntary NPS policies is contingent on a regulatory threat that can be used as a back-up plan should the voluntary program fail. Segerson & Wu, *supra* note 71.

regulatory programs lead to greater regulatory compliance and more widespread use of BMPs for the reduction and control of NPS pollution. First, the threat of impending regulations can lead the would-be-regulated parties to participate in non-regulatory programs that accomplish the regulatory goals. With respect to the implementation of BMPs to prevent sediment pollution in the North Coastal Basin, the perceived threat of future regulations can lead landowners to utilize non-regulatory resources to increase their knowledge about sediment pollution and BMPs, and also to implement BMPs before the regulations arrive. This pathway can be seen through the example of the Yager/Van Duzen Environmental Stewards (“YES”). The formation of YES and subsequent use of cost-share and grant funding to implement BMPs was a direct response to the TMDL regulatory process for the Van Duzen. Participation in these non-regulatory programs increased YES members’ knowledge about BMP implementation and ultimately changed road management practices in and beyond the grant and cost-share project areas, thus accomplishing some of the TMDL goals. Without the regulatory threat, the Yager Creek and Van Duzen ranchers would not have had a strong incentive to form YES, and it is unlikely they would have collaborated with staff at the EPA, learned about BMPs, obtained grant and cost-share funding, and applied BMPs across their properties.

Second, regulations can have an educative component that can lead regulated landowners to utilize non-regulatory resources to bring unregulated areas up to regulatory standards. Regulatory requirements that force the application of BMPs and/or interaction with professionals — e.g., RPF, agency staff — can increase the regulated landowner’s knowledge about both the utility of BMPs and the availability of non-regulatory resources. This can lead to the utilization of non-regulatory resources beyond the regulated areas of the property. That pathway is seen most clearly in the discussion of timber regulations. The FPA and FPR require landowners to consult extensively with an RPF and implement BMPs in harvest areas. This process increases the regulated landowner’s knowledge about BMPs, which may increase their desire to implement them on unregulated areas of their property. In addition, RPFs often make these landowners aware of the availability of non-regulatory resources, including both technical assistance and grant funding, which they then use to implement BMPs in unregulated areas of their property.

Third, participation in non-regulatory programs can lead to greater compliance with regulations. This Article notes that enforcement beyond timberlands tends to be relatively weak as non-timber landowners are often off the enforcement radar. However, participation in a grant-funded or cost-share project brings a particular management activity into the sight of regulating agencies since acquisition of all required permits is a condition of the funding. In some cases, working with agency staff to obtain permits for grant or cost-share projects simply adds an extra layer of bureaucracy to a NPS mitigation

project. In other cases, the process can change participating landowners' awareness about regulatory requirements and their attitudes about regulatory agencies. Working with agency staff in a primarily non-regulatory context reduces some of the fear associated with regulatory agencies, which can facilitate future exchange of knowledge about BMPs.

The first link highlighted through this research parallels the linkages discussed by Nie<sup>196</sup> and briefly mentioned by Koontz et al.<sup>197</sup> in that the threat of a regulatory action compels alternative non-regulatory activities. This coercive model underlies the current NPS policy strategy of the SWRCB and the NCRWQCB. The California NPS Pollution Strategy,<sup>198</sup> which guides the NCRWQCB sediment control policies and the NPS pollution control policies throughout the state, utilizes a "Three-Tiered Approach" that includes:

- Tier 1: Self-Determined Implementation of Management Practices [formerly referred to as "voluntary" implementation],
- Tier 2: Regulatory Based Encouragement of Management Practices, and
- Tier 3: Effluent Limitations and Enforcement Actions.

Staff at the NCRWQCB recognizes the limits of a solely regulatory or non-regulatory approach for addressing NPS pollution and aims to use an approach that uses the regulatory hammer to prompt landowners to utilize non-regulatory incentives.

However, the influence and interdependency of regulatory and non-regulatory efforts need not always be as coercive as this first model. The second model reveals how regulation can have an educative function that motivates landowners to undertake voluntary actions even in the absence of any additional regulatory threat. Such links, which do not depend on regulatory duress, merit additional consideration as they suggest additional governance strategies that have not received much attention. In particular, it is important to consider the characteristics that make this model successful in this case, and if and how this model could be replicated for other problems.

Though a complete answer to these questions reaches beyond this research study, this article suggests that three conditions are fundamental for the successful replication of this model. First, the mandated BMPs have tangible benefits for the landowner and the environment. Regulated landowners who have utilized non-regulatory resources to apply BMPs beyond the regulated

---

<sup>196</sup> Nie, *supra* note 1.

<sup>197</sup> KOONTZ ET AL., *supra* note 1.

<sup>198</sup> STATE WATER RES. CONTROL BD. & CAL. EPA, POLICY FOR IMPLEMENTATION AND ENFORCEMENT OF THE NONPOINT SOURCE POLLUTION CONTROL PROGRAM (2004).

areas of their land may do so because of concern for the environment; more often, however, they do so because the BMPs reduce long-term maintenance costs and thus bring them tangible benefits. Second, non-regulatory resources must be readily available. This is particularly important when the costs of implementing BMPs are high. Finally, this model relies on the presence of a trusted knowledge broker who can effectively act as a liaison between the landowner and the regulating agency. This liaison is built into the regulatory process for timber harvests through the requirement for using a RPF. For regulations that do not require a third-party consultation, this research suggests that in the right conditions a trusted agency staff person could also serve this role. The next section examines the qualities of an effective liaison or knowledge broker in more detail.

### B. Commonalities in Regulatory and Non-Regulatory Mechanisms

Landowners' involvement or association with regulatory and non-regulatory programs can lead to increased knowledge about BMPs and spillover implementation of BMPs beyond the regulated or grant project area. These spillover effects were found most frequently with landowners who harvest timber, though evidence of this process on other land uses was also encountered. These observations led to the consideration: What are the key factors that contribute to the most frequent spillover effects? And, why is the effect more common on timberlands?

Answering these questions leads back to a key finding from this research; namely, that the utilization of professional technical assistance is highly correlated with increased familiarity and knowledge of BMPs as well as self-reported rates of implementation. Landowners encounter and interact with professionals — from regulatory and non-regulatory agencies, non-profits and private consultancies — through the regulatory process, grant or cost-share programs, utilization of professional technical assistance, and chance encounters. Only some of these interactions lead to a significant exchange of knowledge or to further implementation of BMPs. Through interviews with landowners as well as agency staff and other professionals, this study identifies three key characteristics of the interactions between landowners and professionals that facilitate spillover effects: (1) the interaction must be an *exchange* of knowledge, where the professional respectfully listens and considers landowners' ideas, (2) the professional must have local experience and an understanding of the community, and (3) the professional must also use "common sense" and tailor recommendations to fit local conditions.

The interviewees highlight the importance of *how* information is presented and the tone of the interaction. Agency and non-profit staff persons discussed the importance of not imposing solutions from above. Many of the multi-generational landowners in the ranching community pride themselves on being

good stewards of the land and for their knowledge of the land. Professionals who acknowledge and respect this long-term experience have more positive interactions with landowners. For example, a timber landowner described his positive experience with the CDFG inspector who listened to his suggestions, even if the inspector did not always incorporate them. This research has led to the belief that these positive interactions translate into greater exchange of knowledge and willingness on the part of the landowner to experiment with new road management techniques. Top-down and heavy-handed recommendations and requirements result in resentment, which can lead landowners to discount the knowledge of professionals.

The importance placed on local experience in establishing positive interactions also cannot be overstated. This comes to play in the second and third characteristics. Local experience establishes contacts and credibility in the community — a credibility that comes from understanding the goals, needs, and experiences of the landowner. As one landowner put it, “If they have a background similar to landowners, they usually know what the property owner or the citizen is going through, which I think is very important.”<sup>199</sup> Local experience is also associated with better understanding of site-specific conditions, the need to tailor BMPs to match these conditions, and what many landowners termed “common sense.” In contrast to the positive experiences described above, many landowners expressed tremendous frustration at dealing with bureaucrats or environmentalists who recommend BMPs based on “books” without visiting or understanding the field. Professionals who demonstrate attention to site-specific conditions garner trust from the landowners and are also more likely to recommend BMPs that will be successful in the local conditions, which can lead to more widespread use of BMPs.

While the interviews cannot be used to directly link these interactions to the spillover effects, the frequency with which landowners and agencies described these characteristics, the importance placed on them, and the quantitative links between professional interaction and BMP knowledge and implementation from the survey combine to suggest that they are the driving forces behind successful information exchange and learning.

Furthermore, it is important to note that such trusting, respectful, and reciprocal relationships between landowners and professionals can be established even when the parties involved are normally in conflict with one another. In each of the conversations highlighted above, the interactions discussed were between groups that are usually portrayed as in conflict with each other: regulators with landowners, and ‘environmental’ residential landowners with multi-generational ranchers. The stereotyped conflicts are not as rigid as they seem and, in particular, the fieldwork presented here suggests

---

<sup>199</sup> Interview with Landowner #10443 (Aug. 25, 2008).

there is a softening of ranchers' attitudes towards both agency staff and newer landowners.

Understanding these particular characteristics of professional-landowner relationships that facilitate the exchange of knowledge also helps to explain the second question of why spillover appears to be more common with landowners involved in the timber industry. The structure of the regulatory process associated with timber harvests forces landowners to interact with a RPF, or to transfer some decision-making power to the RPF. The RPF is an ideal knowledge broker and liaison, easily satisfying the conditions of good relationships described above. Since the landowner has the power to select and fire the RPF, the RPF is accountable to the landowner and timber landowners tend to trust the RPF whole-heartedly. Though RPFs may receive their forestry training outside of the region, they usually live locally and have substantial experience with crafting management plans appropriate for local conditions. During the preparation of the harvest plan, the RPF surveys the land extensively, often taking many trips across the property to flag trees for the harvest and to understand the site conditions. Some interviewed landowners explained that they accompany their RPF on these surveys, offering suggestions based on their own experiences and listening to the RPF explain the requirements of the FPR and also new management techniques. In these conversations, landowners and RPFs can freely and candidly discuss the BMPs required by the FPR and associated regulations, and consider which they believe would be useful to implement elsewhere on the property.

In this consideration of the factors that facilitate the exchange of knowledge and more widespread implementation of BMPs, this study focuses on openness and respect on the part of the professional, who is often an agency staff-person. Though this adds additional evidence supporting the value of non-adversarial governance approaches, it also avoids the trap of suggesting that voluntary and collaborative approaches are the only and necessarily best approaches to the situation. More heavy-handed regulatory approaches play an important role in mandating the interaction between landowners and RPF and providing incentives for engagement with agencies, as in the case of the Yager/Van Duzen Environmental Stewards. Even beyond that important role of regulations, the "bad cop" can play an important role in imposing sanctions or mandating BMPs for landowners who remain resistant to engagement with professionals.

## XI. CONCLUSION

This Article examines the mechanisms through which regulatory and non-regulatory programs lead to the development of knowledge about BMPs and adoption of BMPs. To do so, it develops a conceptual framework that helps to explore the factors that *facilitate* the need or desire to utilize BMPs as well as those that help motivated landowners to overcome the knowledge and resource

*barriers* to BMP implementation.

This study finds that regulations or the threat of regulations that are perceived to be strong can create a regulatory necessity that facilitates learning about and implementation of BMPs on and beyond the regulated areas. Environmental concern, belief in the economic utility of BMPs, and serious problems with the road network are also motivating factors that facilitate learning about and adoption of BMPs. Non-regulatory programs are most effective in helping motivated landowners overcome the barriers to BMP implementation. These findings clearly demonstrate the interdependencies of regulatory and non-regulatory programs. Regulatory and non-regulatory programs in the North Coastal Basin work in tandem, with regulatory programs facilitating motivation and non-regulatory programs helping to overcome the barriers to BMP implementation.

This analysis also highlights the important, but often unnoticed, role key professionals can play in facilitating the exchange of knowledge between landowners and agencies, and demonstrates that the particular style of interaction used by professionals affects landowners' management practices, and thus shapes environmental outcomes.

This Article stated at the outset that "a central question in environmental, land use, and natural resources law and policy is the relative efficacy of regulatory versus voluntary approaches to the achievement of performance outcomes." The answer to that question, as demonstrated, is that the relative efficacy of both regulatory and voluntary approaches to the achievement of performance outcomes depends on the synergistic effects associated with the presence and effective operation of the other: *neither* regulatory *nor* voluntary approaches are sufficient; *both* are necessary for successful NPS management. "Regulatory spillover" helps to explain how each approach can be made more effective.