35 ELR 10152 3-2005

ELR
NEWS & ANALYSIS

Is Wet Growth Smarter Than Smart Growth?: The Fragmentation and Integration of Land Use and Water

by Craig Anthony (Tony) Arnold

I. Smart Growth and Wet Growth

A. The Environmental Regulation of Land Use

Land use regulation and planning have taken an "environmental turn": a pervasive and inescapable attention to the impact of land use and land development on the natural environment. The literature on the environmental regulation of land use is so vast as to defy summary or citation. Furthermore, specific examples of environmental concerns arising in land use matters—as found in statutes, regulations, cases, local ordinances and codes, planning documents, periodicals, professional publications, websites, and news reports—are even more vast than the scholarly and professional literature. Anyone who is involved in land use law, planning, or regulation is undoubtedly familiar with issues of biodiversity and endangered species, wetlands protections, coastal zone protections, land and open space conservation, brownfields, environmental justice considerations, environmental impact studies, and the impacts of land development on air quality, water quality, ecosystems, and the natural environment generally. Many scholars researching particular aspects of the connections between land use and the environment have contributed to a growing body of knowledge and ideas.[1] More comprehensively, the scope and importance of these issues are illustrated by Prof. Linda Malone's excellent treatise *Environmental Regulation of Land Use*,[2] and the pathbreaking work of Prof. John Nolon on local environmental regulation, published by the Environmental Law Institute (ELI) in a series of books.[3] In addition, Prof. John Randolph, an environmental planner, recently authored a much-needed multidisciplinary book, *Environmental Land Use Planning and Management*.[4] This book is a critical resource for any professional involved in land use to understand and integrate environmental considerations into land use.

B. The Smart Growth Movement

The smart growth movement, in particular, attempts to integrate a broad set of environmental concerns into land use planning, regulation, and development.[5] Smart growth is

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[Editors' Note: This Article will appear, in part, in the book Wet Growth: Should Water Law Control Land Use?*, by Craig Anthony (Tony) Arnold, to be published in 2005 by the Environmental Law Institute (ELI). The book can be ordered by either calling ELI at 800-433-5120 or logging on to the ELI website at http://www.eli.org.]*

1. *See, e.g.*, Robert W. Adler, *Addressing Barriers to Watershed Protection*, 25 Envtl. L. 973 (1995); David L. Callies, *The Quiet Revolution Revisited: A Quarter Century of Progress*, 26 Urb. Law. 197 (1994); Holly Doremus, *Patching the Ark: Improving Legal Protection of Biodiversity*, 18 Ecology L.Q. 265 (1991); Eric T. Freyfogle, *The Owning and Takings of Sensitive Lands*, 43 UCLA L. Rev. 77 (1995); Eileen Gauna, *Major Sources of Criteria Pollutants in Nonattainment Areas: Balancing the Goals of Clean Air, Environmental Justice, and Industrial Development*, 3 Hastings W.-Nw. J. Envtl. L. & Pol'y 379 (1996); Janet C. Neuman, *Adaptive Management: How Water Law Needs to Change*, 31 ELR 11432 (Dec. 2001); A. Dan Tarlock, *Local Government Protection of Biodiversity: What Is Its Niche?*, 60 U. Chi. L. Rev. 555 (1993); Barton H. Thompson Jr., *Providing Biodiversity Through Policy Diversity*, 38 Idaho L. Rev. 355 (2002). *See also* Craig Anthony (Tony) Arnold, *Conserving Habitats and Building Habitats: The Emerging Impact of the Endangered Species Act on Land Use Development*, 10 Stan. Envtl. L.J. 1 (1990) [hereinafter Arnold, *Conserving Habitats*]; Craig Anthony (Tony) Arnold, *Planning Milagros: Environmental Justice and Land Use Regulation*, 76 Denv. U. L. Rev. 1 (1998) [hereinafter Arnold, *Planning Milagros*], reprinted in part with additions as *Land Use Regulation and Environmental Justice*, 30 ELR 10395 (June 2000).

2. Linda A. Malone, Environmental Regulation of Land Use (1990 & Supp. 2003).

3. John R. Nolon, Well Grounded: Using Local and Land Use Authority to Achieve Smart Growth (Envtl. L. Inst. 2001) [hereinafter Nolon, Well Grounded]; John R. Nolon, Open Ground: Effective Local Strategies for Protecting Natural Resources (Envtl. L. Inst. 2002); John R. Nolon, New Ground: The Advent of Local Environmental Law (Envtl. L. Inst. 2002). *See also* John R. Nolon, *In Praise of Parochialism: The Advent of Local Environmental Law*, 26 Harv. Envtl. L. Rev. 363 (2002) [hereinafter Nolon, *Parochialism*].

4. John Randolph, Environmental Land Use Planning and Management (2004).

5. The literature on "smart growth" and its antithesis—"sprawl"—is vast. *See, e.g.*, Sprawl City: Race, Politics, and Planning in Atlanta (Robert D. Bullard et al. eds., 2000) [hereinafter Sprawl City]; Bank of America & Greenbelt Alliance, Beyond Sprawl: New Patterns of Growth to Fit the New California (1995); Timothy Beatley & Kristy Manning, The Ecology of Place: Planning for Environment, Economy, and Community (1997); Andres Duany et al., Suburban Nation: The Rise of Sprawl and the Decline of the American Dream (2000); Robert H. Freilich, From Sprawl to Smart Growth: Successful Legal, Planning, and Environmental Systems (1999); Ed Bolen et al., *Smart Growth: A Review of Programs State*

primarily a reaction to its antithesis: "sprawl."[6] The term "sprawl" refers to "dispersed, low-density, metropolitan area form, where the metropolitan area's growth occurs principally on the urban periphery and encompasses a multiplicity of local governments. Sprawling urban forms typically are car dependent and include dispersed single-family homes and substantial distances between residential, business, and retail areas and alternative transportation options."[7]

According to sprawl critics, one of the primary problems with sprawl is its conversion of farmland and open space to developed land with structures and impervious cover.[8] In many parts of the United States there is a relentless drive to replace farms, rangeland, forests, wetlands, and other open, undeveloped lands with housing subdivisions, shopping malls, streets, highways and freeways, parking lots, restaurants, small retail centers and stand-alone businesses, industrial parks, office parks, and other sprawling development.

Another major problem is that the development is low-density.[9] This low-density growth overconsumes and underutilizes developable land, often at a much higher rate than the actual population growth of the region.[10] For example, between 1980 and 2000, Florida's Tampa Bay metropolitan area experienced a 33% increase in population but a 50% increase in developed acreage.[11] Low-density development also tends to skew housing production toward higher cost housing for higher income suburban and exurban homeowners—and away from higher density affordable housing like apartments, condominiums, and affordable home-ownership developments in which homes are clustered and share common areas. Sprawl can hinder economic growth and activity because it creates a jobs-housing imbalance: too few homes that are affordable for the jobs that exist or are being created in the region.[12] Where do low- and moderate-wage workers live when large stretches of a region—where employment opportunities are located—are occupied by above-median-cost housing? In addition, development oriented toward the typical large-lot suburban home with its automatic garage door opener, fenced yards, lack of sidewalks, and great distances from places of public gathering, tends to discourage the formation of community. Some experts have commented on the social and psychological costs from sprawl's loss of community.[13]

A related concern is that sprawl segregates the suburbs and exurbs from the central cities, creating segregation by race and ethnicity, by class, and by tax contribution.[14] Central cities lose needed revenues to serve the local residents and the entire region, while separately incorporated cities on the outer rings of metropolitan areas compete to attract fiscal resources, e.g., tax revenues, commercial and industrial development that will sustain the economy, and simultaneously to deter adverse impacts on suburban amenities, e.g., increased traffic, interference with open space and scenic vistas, and higher density housing for large families with below-median incomes but above-median numbers of school-age children. This system of geographic segregation and fragmentation reinforces and facilitates disparities in power, wealth, and opportunity according to race and class.[15]

Yet another related point is that sprawl imposes burdensome infrastructure costs on localities for: transportation infrastructure, i.e., not only freeways, highways, roads, and streets, but also traffic lights/signals, traffic signs, street lighting, traffic calming mechanisms, and traffic pattern analysis; schools; flood control; stormwater, sewer, and water system improvements; parks, libraries, and other public facilities; and the like.[16] Finally and frequently, sprawl critics observe that the automobile-dependent nature of sprawl poses tremendous costs for society in traffic gridlock, increased automotive air emissions and degraded air quality, and dependence on petroleum.[17] The problem of petroleum

by State, 8 Hastings W.-Nw. J. Envtl. L. & Pol'y 145 (2002); Robert W. Burchell & Naveed A. Shad, *The Evolution of the Sprawl Debate in the United States*, 5 Hastings W.-Nw. J. Envtl. L. & Pol'y 137 (1999); William W. Buzbee, *Urban Sprawl, Federalism, and the Problem of Institutional Capacity*, 68 Fordham L. Rev. 57 (1999); William W. Buzbee, *Sprawl's Dynamics: A Comparative Institutional Analysis and Critique*, 35 Wake Forest L. Rev. 509 (2000) [hereinafter Buzbee, *Sprawl's Dynamics*]; Robert H. Freilich & Bruce G. Peshoff, *The Social Costs of Sprawl*, 29 Urb. Law. 183 (1997); Patrick Gallagher, *The Environmental, Social, and Cultural Impacts of Sprawl*, Nat. Resources & Env't, Spring 2001, at 219; Daniel J. Hutch, *The Rationale for Including Disadvantaged Communities in the Smart Growth Metropolitan Development Framework*, 20 Yale L. & Pol'y Rev. 353 (2002); Rose A. Kob, *Riding the Momentum of Smart Growth: The Promise of Eco-Development and Environmental Democracy*, 14 Tul. Envtl. L.J. 139 (2000); James A. Kushner, *Smart Growth: Urban Growth Management and Land Use Regulation Law in America*, 32 Urb. Law. 211 (2000); James A. Kushner, *Smart Growth, New Urbanism, and Diversity: Progressive Planning Movements in America and Their Impact on Poor and Minority Ethnic Populations*, 21 UCLA J. Envtl. L. & Pol'y 45 (2002/2003) [hereinafter Kushner, *Diversity*]; Manan M. Yajnik, *Challenges to "Smart Growth": State Legislative Approaches to Comprehensive Growth Planning and the Local Government Issue*, 2004 Wis. L. Rev. 229; Edward H. Ziegler, *Urban Sprawl, Growth Management, and Sustainable Development in the United States: Thoughts on the Sentimental Quest for a New Middle Landscape*, 11 Va. J. Soc. Pol'y & L. 26 (2003).

6. Patricia E. Salkin, *Land Use*, *in* Stumbling Toward Sustainability 369, 371 (John C. Dernbach ed., 2002). *See also* Ziegler, *supra* note 5, at 27; Buzbee, *Sprawl's Dynamics*, *supra* note 5, at 510.
7. Buzbee, *Sprawl's Dynamics*, *supra* note 5, at 510.
8. Beatley & Manning, *supra* note 5, at 6; Norris Hundley Jr., The Great Thirst: Californians and Water: A History 519 (rev. ed. 2001); Salkin, *supra* note 6, at 371; Gallagher, *supra* note 5, at 220-22.
9. Beatley & Manning, *supra* note 5, at 6, 40-53; Duany et al., *supra* note 5, at 4; Ziegler, *supra* note 5, at 29.
10. Holly Jo Franz et al., *An Insatiable Thirst: The Impact of Water Law on Sprawl in the West*, Nat. Resources & Env't, Spring 2001, at 228; Monica G. Turner et al., *Land Use*, *in* Status and Trends of the Nation's Biological Resources (U.S. Geological Survey ed., 1998); Salkin, *supra* note 6, at 371; Freilich & Peshoff, *supra* note 5, at 184.
11. Gil Klein, *Sprawling South Top U.S. Water Waster, Study Says*, Tampa Trib., Aug. 29, 2002, at 10.
12. Bank of America & Greenbelt Alliance, *supra* note 5. *See also* Freilich & Peshoff, *supra* note 5, at 184.
13. Beatley & Manning, *supra* note 5, at 8-9; Duany et al., *supra* note 5, at 115-33; Gallagher, *supra* note 5, at 219, 222-23.
14. Sprawl City, *supra* note 5; Duany et al., *supra* note 5, at 39-57, 129-33; Gallagher, *supra* note 5, at 222-23; Freilich & Peshoff, *supra* note 5, at 184. *See generally* Sheryll Cashin, The Failures of Integration: How Race and Class Are Undermining the American Dream (2004).
15. Sprawl City, *supra* note 5; Residential Apartheid: The American Legacy (Robert D. Bullard et al. eds., 1994); Cashin, *supra* note 14; Duany et al., *supra* note 5, at 39-57, 129-33; Gerald Frug, City Making: Building Communities Without Building Walls (1999); Douglas S. Massey & Nancy A. Denton, American Apartheid: Segregation and the Making of the Underclass (1993).
16. Beatley & Manning, *supra* note 5, at 6, 10-11; Gallagher, *supra* note 5, at 219; Freilich & Peshoff, *supra* note 5, at 184.
17. Beatley & Manning, *supra* note 5, at 6; Ziegler, *supra* note 5, at 29; Gallagher, *supra* note 5, at 219-20; Freilich & Peshoff, *supra* note 5, at 184.

dependence leads to public pressures to exploit and harm ecosystems that may contain oil and gas so as to maintain an abundant supply of cheap gasoline to support an automobile-dependent lifestyle.

In response to the tragedy of sprawl, proposals for smart growth have emerged. Although smart growth means different things to different people,[18] the most common aspects of the smart growth agenda—arguably its core—are: (1) high-density development, instead of low-density development; (2) growth in or immediately contiguous to already developed areas; (3) design of new development and redevelopment to promote pedestrian patterns and discourage the number and length of vehicular trips per person per day; and (4) clustering of housing units and mixing of uses so as to minimize impacts on the natural environment and open space and maximize a sense of community.[19] Prof. Patricia Salkin contends that the smart growth movement is part of a global movement of sustainable development.[20] Indeed, the vision of a smart growth society seems focused on environmental, social, and economic sustainability, at least conceptually.

Furthermore, the smart growth movement has considerable support from political leaders, planning and environmental professionals, segments of the business and land development community, and the public.[21] A sizeable number of states and localities have enacted smart growth policies of varying types.[22]

At the same time, housing consumers—the same members of the public who recognize the costs of sprawl and are worried about it—continue overwhelmingly to prefer large-lot homes in low-density suburban communities among natural landscapes.[23] Interestingly, Prof. Edward Ziegler has shown that many growth control policies at the local level actually contribute to sprawl by limiting local growth in favor of open space and scenic vista preservation, without allowing for high-density development in the core of these communities, thus encouraging developers, businesses, and housing consumers to develop even further away from these low-density, growth-limited communities in undeveloped areas.[24] In addition, we must consider sprawl-facilitating politics, private property rights protections, federal policies favoring automobile-dependent transportation and single-family home ownership, and the fragmentation of land use controls and local authority among many competing municipalities, counties, and special local districts.[25] Finally, while some would contend that sprawl hurts low-income people of color,[26] others would contend that smart growth policies also can hurt low-income people of color.[27] One expert has called the effort to achieve smart growth land use policies "an uphill battle," despite the overwhelming attention that is given to the need for these policies.[28]

C. The Emerging Wet Growth Concept

Water quality and water supply issues, though, have received very little attention in the smart growth literature, with a few exceptions.[29] Smart growth has focused on the density, form, pattern, and location of land development as it relates primarily to issues of open space, traffic and pedestrian circulation, air quality, wildlife habitat conservation, aesthetics, integration of public and private infrastructure, development of community, and quality of life in the built environment. There is a need for a concept of "wet growth": integration of concerns about water quality and the availability of water supply into the density, form, pattern, and location of land development. This "wet growth idea"—that growth and land use should be sustainable with respect to aquatic ecosystems and water resources—may simply be an aspect of a broad smart growth agenda (or an even broader sustainability agenda) or may carve out its own identity as a planning and regulatory concept.

Nonetheless, the interrelationship of water resources and land use is one of the hottest topics in land use today, despite the lack of comprehensive and formal attention to water in the smart growth literature. In February 2003, ELI and the Center for Land Resources at Chapman University School of Law co-hosted a national conference entitled, *Wet Growth: Should Water Law Control Land Use?*, at Chapman University in Orange, California.[30] The conference featured presentations of papers by eight nationally regarded scholars, an overview of the topic by me, and two panels of distinguished lawyers, urban planners, and environmental experts, one on water supply and land use and the other on water quality and land use. ELI is publishing a book of the papers from the conference, as well as introductory and concluding chapters and an appendix of papers by some of the panelists. The book carries the same title as the conference, *Wet Growth: Should Water Law Control Land*

18. *See, e.g.*, Burchell & Shad, *supra* note 5.

19. Beatley & Manning, *supra* note 5, at 40-85; Salkin, *supra* note 6, at 373-81; Ziegler, *supra* note 5, at 56. *See generally* Duany et al., *supra* note 5.

20. Salkin, *supra* note 6, at 369-70. *See also* Ziegler, *supra* note 5, at 27.

21. Gallagher, *supra* note 5, at 219; Bank of America & Greenbelt Alliance, *supra* note 5.

22. Salkin, *supra* note 6, at 373-81; Gallagher, *supra* note 5, at 219; Bolen et al., *supra* note 5.

23. Salkin, *supra* note 6, at 371; Gallagher, *supra* note 5, at 219.

24. Ziegler, *supra* note 5, at 27-28; 56-57.

25. Beatley & Manning, *supra* note 5, at 40-42; Salkin, *supra* note 6, at 371, 382-84; William Buzbee, *Urban Sprawl and Legal Reform*, *in* Sprawl City, *supra* note 5, at 161-86 [hereinafter Buzbee, *Legal Reform*].

26. *See, e.g.*, Sprawl City, *supra* note 5; Gallagher, *supra* note 5, at 222.

27. *See, e.g.*, Hutch, *supra* note 5; Kushner, *Diversity*, *supra* note 5.

28. Buzbee, *Legal Reform*, *supra* note 25, at 177.

29. For examples of smart growth ideas that address water resources, see, e.g., Nolon, Well Grounded, *supra* note 3; Gallagher, *supra* note 5; Caryn Ernst, *Smart Growth, Land Conservation, and Clean Water*, Smart Growth (reprinted by The Trust for Public Land July 23, 2001), *available at* http://tpl.org/tier3_cd.cfm?content_item_id=14105&folder_id=1885 (last visited Aug. 27, 2004); 1000 Friends of New Mexico et al., Land & Water: Making the Connection (2002). For examples of slow growth advocates using water supply issues to attempt to stop or restrict new development (albeit with limited success), see, e.g., Dale Kasler, *Private Water Sales Are Paving Way for Growth in California*, Sacramento Bee, Sept. 22, 2002, *available at* 2002 WL 101153728. *But see* Hundley, *supra* note 8, at 519 (stating that attempts to control growth through limited water supply have not been successful).

30. The financial and non-financial sponsors of the Wet Growth conference were Unocal Corporation; Jackson, DeMarco & Peckenpaugh; Rutan & Tucker; Latham & Watkins; the American Planning Association and its Planning and Law Division; the Chapman University School of Law Student Bar Association and Land Resources Society; the Mono Lake Committee; the California Chapter of the Association of Environmental Professionals; American Rivers; the Surfrider Foundation; and the National Association of Environmental Law Societies.

Use?.[31] This Article is an edited combination of parts of the introductory and concluding chapters of the book.[32]

The Wet Growth conference received an overwhelming outpouring of interest from all regions of the United States and from virtually every profession that is involved in land use or water issues: lawyers, planners, environmental scientists, water engineers, government officials, land development and real estate industry professionals, corporate executives, environmental activists, geographers, conservation biologists, professors, and students. Over 200 people participated on-site or via live Web broadcast, and countless others have contacted ELI or me about the conference proceedings.

And Wet Growth participants are not the only people exploring the land-water interface in planning, regulation, and development. In recent years, experts in planning, water resources, and law have begun writing about the need to integrate land planning and regulation with water planning and regulation.[33] Conferences have focused attention on these issues.[34] Moreover, despite the many levels of fragmentation in American society that disconnect land and water and facilitate environmentally unsustainable land use practices, there are also many good examples of integrated land and water planning, management, and regulation. These wet growth innovations are relatively new and continually emerging. They are diverse. Some are comprehensive or at least multifaceted efforts at watershed management, but many focus on specific points of connection between land and water or discrete types of decisions. Most of these innovations arise out of local land use regulation, state legislation, or ad hoc multistakeholder watershed planning processes that involve a multitude of private parties and government agencies of varying levels and missions that share interests in a particular watershed and its problems. However, environmental groups, environmentally attentive land developers, members of the public, and federal agencies have also contributed new approaches to sustain-

31. WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? (Craig Anthony (Tony) Arnold ed., Envtl. L. Inst. 2005) [hereinafter WET GROWTH].

32. Craig Anthony (Tony) Arnold, *Introduction: The Fragmentation and Integration of Land Use and Water*, *in* WET GROWTH, *supra* note 31; Craig Anthony (Tony) Arnold, *Polycentric Wet Growth: Policy Diversity and Local Land Use Regulation in Integrating Land and Water*, *in* WET GROWTH, *supra* note 31.

33. *See, e.g.*, CHARLES F. WILKINSON, CROSSING THE NEXT MERIDIAN: LAND, WATER, AND THE FUTURE OF THE WEST (1992); Mary Jane Angelo, *Integrating Water Management and Land Use Planning: Uncovering the Missing Link in the Protection of Florida's Water Resources?*, 12 U. FLA. J.L. & PUB. POL'Y 223 (2001); Paul D. Barker, *The Chesapeake Bay Preservation Act: The Problem With State Land Regulation of Interstate Resources*, 31 WM. & MARY L. REV. 735 (1990); James C. Buresh, *State and Federal Land Use Regulation: An Application to Groundwater and Nonpoint Source Pollution Control*, 95 YALE L.J. 1433 (1986); Holly Doremus, *Water, Population Growth, and Endangered Species in the West*, 72 U. COLO. L. REV. 361 (2001); Ernst, *supra* note 29; Alan W. Flenner, *Municipal Riparian Buffer Regulations in Pennsylvania—Confronting the Regulatory Takings Doctrine*, 7 DICK. J. ENVTL. L. & POL'Y 207 (1998); Franz et al., *supra* note 10; Larry C. Frarey et al., *Conservation Districts as the Foundation for Watershed-Based Programs to Prevent and Abate Polluted Agricultural Runoff*, 18 HAMLINE L. REV. 151 (1994); Barbara J.B. Green & Jon B. Alby, *Watershed Planning*, 1 U. DENV. WATER L. REV. 75 (1997); Dennis J. Herman, *Sometimes There's Nothing Left to Give: The Justification for Denying Water Service to New Consumers to Control Growth*, 44 STAN. L. REV. 429 (1992); David P. Hutchinson, *A Setback for the Rivers of Massachusetts?: An Application of Regulatory Takings Doctrine to the Watershed Protection Act and the Massachusetts River Protection Act*, 73 B.U. L. REV. 237 (1993); Paul S. Kibel & Barry H. Epstein, *Sprawl and "Paper Water": A Reality Check From the California Courts*, CAL. REAL PROP. J., Winter/Spring 2002, at 20; Tracy J. Kuckenski, *Wisconsin's Shoreland Management Plan: An Assessment With Implications for Effective Natural Resources Management and Protection*, 1999 WIS. L. REV. 273; Paula J. Lebowitz, *Land Use, Land Abuse, and Land Re-Use: A Framework for the Implementation of TMDLs for Nonpoint Source Polluted Waterbodies*, 19 PACE ENVTL. L. REV. 97 (2001); Lora Lucero & A. Dan Tarlock, *Water Supply and Urban Growth in New Mexico: Same Old, Same Old, or a New Era?*, 43 NAT. RESOURCES J. 803 (2003); Linda A. Malone, *The Necessary Interrelationship Between Land Use and Preservation of Groundwater Resources*, 9 UCLA J. ENVTL. L. & POL'Y 1 (1990); Daniel R. Mandelker, *Controlling Nonpoint Source Water Pollution: Can It Be Done?*, 65 CHI.-KENT L. REV. 479 (1989); Matthew McKinney, *Linking Growth and Land Use to Water Supply*, LAND LINES, Apr. 2003, at 4-6 (referring to Wet Growth conference as "evidence of the growing need to link growth and land use with water supply," *id.* at 4); Sarah J. Meyland, *Land Use and the Protection of Drinking Water Supplies*, 10 PACE ENVTL. L. REV. 563 (1993); James P. Morris, *Who Controls the Waters?: Incorporating Environmental and Social Values in Water Resources Planning*, 6 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 117 (2000); Kevin M. O'Brien & Barbara Markham, *Tale of Two Coasts: How Two States Link Water and Land Use Planning*, NAT. RESOURCES & ENV'T, Fall 1996, at 2; Jose A. Rivera, *Irrigation Communities of the Upper Rio Grande Bioregion: Sustainable Resource Use in the Global Context*, 36 NAT. RESOURCES J. 491 (1996); Adam Strachan, *Concurrency Laws: Water as a Land Use Regulation*, 21 J. LAND, RESOURCES & ENVTL. L. 435 (2001); Philip S. Sussler, *Trends in Water Quality Regulation: The Greening of Land Use Practices and Controls*, BOSTON BAR J., Aug. 1993, at 5; Dan Tarlock & Sarah B. Van de Wetering, *Growth Management and Western Water Law: From Urban Oases to Archipelagos*, 5 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 163 (1999); A. Dan Tarlock, *Putting Rivers Back in the Landscape: The Revival of Watershed Management in the United States*, 6 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 167 (2000); A. Dan Tarlock & Lora A. Lucero, *Connecting Land, Water, and Growth*, LAND USE L. & ZONING DIG., Apr. 2002, at 3-9; A. Dan Tarlock, *The Potential Role of Local Governments in Watershed Management*, 32 ELR 11273 (Nov. 2002) [hereinafter Tarlock, *Local Governments*]; Mark Thompson, *Forging the Link Between Land Use and Water Quality*, PUB. MGMT., Apr. 1, 2002, at A12; Sarah B. Van De Wetering & Robert W. Adler, *New Directions in Western Water Law: Conflict or Collaboration?*, 20 J. LAND, RESOURCES & ENVTL. L. 15 (2000); Jim Vergura & Ron Jones, *The TMDL Program: Land Use and Other Implications*, 6 DRAKE J. AGRIC. L. 317 (2001); Jon D. Witten, *Protecting Drinking Water Resources*, COMMISSIONER (American Planning Ass'n, Planning Comm'rs Serv.), Winter 2001, at 1-4; Douglas A. Yanggen & Leslie L. Amrhein, *Groundwater Quality Regulation: Existing Governmental Authority and Recommended Roles*, 14 COLUM. J. ENVTL. L. 1 (1989); Rose Young, *The Public Trust Doctrine in California, Florida, and New Jersey: A Critique of Its Role in Modern Land Use Law*, 41 RUTGERS L. REV. 1349 (1989). In addition, Scott Coulson, a candidate for a master's degree in urban and regional planning at the University of Colorado Denver-Boulder (Department of Planning and Design) is writing his thesis on developing a framework for incorporating municipal water availability into land use decisionmaking in Colorado. E-mails from Scott Coulson, to Tony Arnold (Mar. 11, Apr. 5, & May 12, 2004) (on file with author). For a more theoretical and global perspective on the need to link land rights and water rights, see Stephen Hodgson, *Land and Water—The Rights Interface*, UNITED NATIONS FOOD & AGRIC. ORG. LEGAL PAPERS ONLINE NO. 36 (2004), *available at* http://www.fao.org/legal/pub-e.htm (last visited Apr. 2004).

34. I regularly receive announcements and agendas of land use planning conferences, water law or water engineering conferences, and environmental law conferences that have panels addressing the land use-water resource interface. The Urban Land Institute hosted an urban growth forum in late 2002 on the connection between land use and water use. Trisha Riggs, *ULI Examines Connection Between Land Use and Water Use*, URB. LAND, Jan. 2003, at 110. The International City Managers' Association, in conjunction with the University of Maryland School of Public Affairs and the U.S. Environmental Protection Agency (EPA), held a workshop "on the link between land use decisions and water quality." Thompson, *supra* note 33.

able land use. For example, the U.S. Environmental Protection Agency (EPA) has compiled some examples of integrated approaches to land and water protection, available on its website.[35]

Several developments in linking land and water reflect an inchoate but real wet growth agenda. Localities are increasingly considering growth's impacts on water supplies and water quality in their general or comprehensive planning documents, environmental impact assessments of specific development proposals, and decisions to approve or deny development proposals. For example, in 2001, the California Legislature adopted Senate Bill (SB) 221,[36] which prohibits cities and counties from approving subdivisions of 500 or more residential units unless the local water agency verifies in writing that it has enough water to serve the new development for 20 years, and SB 610,[37] which requires water supply assessments for large residential, commercial, and industrial development projects and inclusion of these assessments in all environmental impact documents prepared pursuant to the California Environmental Quality Act.[38] Despite the failure of an earlier toothless version of SB 221[39] and concerns that developers will circumvent its requirement by submitting piecemeal proposals of subdivisions less than 500 units,[40] there seems to be growing interest in securing actual available water supplies prior to land development approvals in California.[41] According to Michele Staples, an attorney at Jackson, DeMarco & Peckenpaugh and speaker at the Wet Growth conference, some planning officials are choosing to require an SB 221-type of water-supply analysis even for large projects not covered by SB 221.[42] In addition, California courts have invalidated development approvals, including a 56-home subdivision on the September Ranch in Monterey County and a 21,600-home multi-use development on the Newhall Ranch in northern Los Angeles County, that were based on environmental impact reports lacking legally sufficient evidence of reliable water supplies and legally sufficient mitigation of adverse environmental impacts caused by new demands for water.[43]

The use of moratoria on new water supplies in order to control or stop growth have not fared well. Although water districts have a "duty to serve" domestic uses and to seek ways to augment their supplies to accommodate growth, courts have been reluctant to require that districts take affirmative action to augment their supplies and have upheld service denials because of predictions of future water shortages.[44] Nonetheless, water moratoria often succumb to political and economic pressures and to ineffectiveness as growth control mechanisms.[45] In contrast, growth moratoria imposed because of water concerns have fared much better. For example, a voter-initiated moratorium on new building permits pending infrastructure improvements—upheld in a classic judicial opinion on growth controls and the regional welfare—included sufficient wastewater system capacity as one of three conditions that had to be met before the moratorium could be listed.[46] The Tahoe Regional Planning Authority enacted its controversial moratorium on new development surrounding Lake Tahoe as a means to stem declining water quality because of development-related runoff, which was recently held by the U.S. Supreme Court not to be a per se regulatory taking.[47]

Location-specific land use restrictions offer more promise than do widespread growth moratoria. Cities and counties are using land use regulatory powers to restrict land use and development on lands that have the greatest impact on waters because of location and hydrologic processes: riparian lands, coastal lands, aquifer recharge zones, wetlands, and critical watershed drainage lands. For example, some Pennsylvania localities like Kennett Township, Lycoming County, Montgomery County, and West Brandywine Township have created riparian buffer zones covering lands bordering streams and rivers and limited land development and use in those zones.[48] Likewise, the Massachusetts Watershed Protection Act and Massachusetts River Protection Act prohibit certain kinds of land uses in setbacks along the banks of rivers and streams.[49] Austin, Texas, has a comprehensive watershed ordinance that restricts development

35. U.S. EPA, Local Source Water Protection Programs: Summary of All Case Studies (2002), *available at* http://www.epa.gov/safewater/protect/casesty/casestudysum.html (last visited Feb. 1, 2003); U.S. EPA, Watershed Protection Management (1999), *available at* http://www.p2pays.org/ref/04/03686/ch4-2b.html (last visited June 24, 2003).

36. Cal. Gov't Code §66473.7 (West 2002, amended 2004).

37. Cal. Water Code §§10910-10912 (West 2002).

38. California Environmental Quality Act, Cal. Pub. Resources Code §§21000 et seq. (West 2004).

39. Hundley, *supra* note 8, at 524-25; Tarlock & Lucero, *supra* note 33, at 5.

40. Kibel & Epstein, *supra* note 33, at 25; Tarlock & Lucero, *supra* note 33, at 5.

41. *See, e.g.*, Kasler, *supra* note 29; Kibel & Epstein, *supra* note 33.

42. *California's Newly Enacted Water Law Takes Effect*, S. Cal. Builders, Feb. 2002, *available at* http://www.biasc.org/SCBuilders/2002%20magazines/feb_cover_story.htm (last visited Oct. 19, 2002).

43. *See* Save Our Peninsula Comm. v. Monterey County Bd. of Supervisors, 104 Cal. Rptr. 2d 326 (Cal. Ct. App. 2001); Santa Clarita Org. for Planning the Env't v. County of Los Angeles, 131 Cal. Rptr. 2d 186 (Cal. Ct. App. 2003); Martha L. Willman, *Water Firm Ordered to Review Supplies Development: PUC Vote Ratifying Judge's Decision Postpones Building of Thousands of New Homes*, L.A. Times, Oct. 20, 2000, at B4; Jason Takenouchi, *Ranch Project Goes On: Developer Begins Preparing New Analyses*, L.A. Daily News, June 4, 2000, at SC1. *See also* Stanislaus Nat'l Heritage Project v. County of Stanislaus, 48 Cal. App. 4th 182 (Cal. Ct. App. 1996); Hi-Desert Water Dist. v. Blue Skies Country Club, 23 Cal. App. 4th 1723 (Cal. Ct. App. 1994); County of Amador v. El Dorado County Water Agency, 91 Cal. Rptr. 2d 66, 30 ELR 20224 (Cal. Ct. App. 1999); Planning & Conservation League v. Department of Water Resources, 100 Cal. Rptr. 2d 173, 31 ELR 20178 (Cal. Ct. App. 2000).

44. *See, e.g.*, Swanson v. Marin Mun. Water Dist., 56 Cal. App. 3d 512 (Cal. Ct. App. 1976); Lockary v. Kayfetz, 917 F.2d 1150 (9th Cir. 1990); Gilbert v. California, 218 Cal. App. 3d 234 (Cal. Ct. App. 1990); Building Indus. Ass'n v. Marin Mun. Water Dist., 235 Cal. App. 3d 1641 (Cal. Ct. App. 1991).

45. Hundley, *supra* note 8, at 519 (stating that attempts to control growth through limited water supply have not been successful). *See also* Carla Hall, *Santa Barbara Opens the Tap to Developers*, L.A. Times, Mar. 24, 1997, at A3 (describing how Santa Barbara's slow-growth limits on water supplies gave way to new water supplies and an accompanying boom in development).

46. Associated Home Builders v. City of Livermore, 557 P.2d 473 (Cal. 1976). *See also* First Peoples Bank of N.J. v. Township of Medford, 599 A.2d 1248 (N.J. 1991).

47. Tahoe-Sierra Preservation Council v. Tahoe Reg'l Planning Auth., 535 U.S. 302, 32 ELR 20627 (2002). For other valid restrictions on land development because of limited available water supplies, see, e.g., San Mateo County Coastal Landowners' Ass'n v. County of San Mateo, 45 Cal. Rptr. 2d 117 (Cal. Ct. App. 1995); Serpa v. County of Washoe, 901 P.2d 690 (Nev. 1995).

48. Flenner, *supra* note 33.

49. Hutchinson, *supra* note 33; Sussler, *supra* note 33.

densities according to various watershed categories and prohibits or limits development in setbacks near creeks or streams.[50] Wisconsin's Shoreland Management Program is a state statutory and regulatory program that mandates local land use regulation of shorefront lands along lakes, ponds, rivers, and streams, subject to state review and approval. These regulations create a mandatory setback from shores for all building and regulate the types of shoreland use and development according to the classification of the water body according to its ecological and physical features.[51] One of the most interesting exercises of land use powers to prohibit development in watersheds is New York City's state-granted authority to regulate land use in seven upstate counties containing watersheds from which New York City obtains its drinking water; New York City regulates wastewater treatment plants, subsurface sewage treatment systems, and impervious cover in these watersheds.[52]

Zoning codes increasingly contain aquifer recharge overlay zones to limit development on critical lands from which waters recharge groundwater aquifers. For example, the Cape Cod Commission created a "Model Aquifer Protection Bylaw" for Cape Cod towns to adopt.[53] This suggested addition to local zoning rules contains the creation of an aquifer protection overlay district in the town's zoning, the prohibition of certain uses, e.g., gas stations, hazardous waste sites, automotive salvage yards, road salt stockpiles, landfills, airports, dry cleaning establishments, certain manufacturing facilities, in the district, the designation of certain uses allowable only by special permit and criteria for review of special permit applications, and performance standards for nitrogen management and stormwater management within the district.[54] San Antonio, Texas, also established the Edwards Aquifer Recharge Zone, an overlay zone limiting development on lands through which water percolates into the Edwards Aquifer, which is the primary source of the region's drinking water and supports habitat for endangered species. This overlay zone prohibits virtually all development in certain preservation areas and buffer zones, restricts the type of development and amount of impervious cover on other lands in the recharge zone, imposes additional land use approval procedures to evaluate the water-related impacts of the proposed development (done by the San Antonio Water System), and mandates best management practices (BMPs), including detention, sedimentation, and filtration for water quality control, vegetation buffer zones, water conservation, integrated pest management programs, and plans for construction sequencing and erosion control.[55]

The foregoing examples aimed at protecting watershed lands involve the regulation of development and uses on privately owned lands, as well as limits on the use of government-owned lands in some circumstances. Another well-used way to protect critical watershed lands from harmful development or use is for the government or a nonprofit land trust to acquire fee title or conservation easements in these lands.[56]

Another set of innovations involve BMPs in the design, construction, and operation of new and existing land uses to minimize or treat urban runoff.[57] BMPs vary according to the type of development and activities occurring on the land, the type, quantity, and content of runoff, and the location's soil and drainage patterns, among other factors. BMPs might include: construction of runoff retention and desiltation basins; grading to manage the direction of flow; use of porous paving materials or limit on the amount of impervious cover; use of swales, wetlands, and other natural drainage and filtration; landscape filter strips; the placement of nets with absorbent granules in storm drains to filter out oil in runoff; minimization of wastes; design of efficient irrigation systems; use of vegetation and slope stabilization techniques to prevent erosion and sedimentation of runoff; and public education including stenciling storm drains. Localities are using their land use powers to impose these practices, in some cases due to city or county efforts to protect local waters and in some cases because federal and state agencies are requiring local governments to do so as part of stormwater management plans under both national pollutant discharge elimination system (NPDES) and total maximum daily load (TMDL) powers (as well as similar state powers). In addition, water quality protection agencies and local units of government are starting to adopt new rules to prohibit runoff that degrades surface waters or

50. David S. Caudill et al., *The Politics of Legal Doctrine: A Case Study of Texas Land-Use Planning Under the Shadow of* Lucas, 5 Hofstra Prop. L.J. 11, 15 (1992). The Austin comprehensive watershed ordinance, passed in 1986, was followed in 1992 by a voter initiative, "Save Our Springs" Ordinance that provided even stronger protections for the Barton Creek/Barton Springs watershed. *Id.* at 15-18.

51. Kuckenski, *supra* note 33. *See also* Just v. Marinette County, 201 N.W.2d 761, 3 ELR 20167 (Wis. 1972).

52. Nolon, Well Grounded, *supra* note 3, at 307-09; Stanford L. Sch. Envtl. & Nat. Resources L. & Pol'y Prog., *New York City's Water Supply, Parts I & II*, SLS Case Nos. 036-99 & 037-99 (Oct. 1999), *available at* http://casestudies.stanford.edu (last visited Jan. 2001).

53. Cape Cod Commission, *Model Aquifer Protection Bylaw*, *at* http://www.capecodcommission.org/bylaws/wataeroverlay.htm (last visited Mar. 28, 2001).

54. *Id.*

55. San Antonio, Tex., Ordinance No. 81491 (Jan. 12, 1995).

56. *See, e.g.*, Frederico Cheever, *Public Goods and Private Magic in the Law of Land Trusts and Conservation Easements: A Happy Present and a Troubled Future*, 73 Denv. U. L. Rev. 1077 (1996); Jean Hocker, *Land Trusts: Key Elements in the Struggle Against Sprawl*, Nat. Resources & Env't, Spring 2001, at 244; John L. Hollingshead, *Conservation Easements: A Flexible Tool for Land Preservation*, 3 Envtl. Law. 319 (1997); Victor Hull, *$8.85 Million Deal to Preserve Land*, Sarasota Herald-Trib., Oct. 27, 1999, at A1; Bob Jagolinzer, *Town Council Approves a 2 Percent Property Sales Tax*, Providence J.-Bull., Apr. 17, 1998, at C03; John Laidler, *Preserving Open Space Can Help the Cause*, Boston Globe, May 7, 2000, at 1; Chuck Lindell, *Protecting Water Supply Is Key to Land Purchase*, Austin Am.-Statesman, Mar. 22, 1998, at A1; John A. McVickar, *Land Trusts: A Growing Conservation Institution*, 21 Vt. B.J. & L. Dig. 33 (Oct. 1995); John Walliser, *Conservation Servitudes*, 13 J. Nat. Resources & Envtl. L. 47 (1997).

57. For the increasing use of BMPS, the nature of BMPS, and their imposition through local land use regulation, see generally Oliver A. Houck, The Clean Water Act TMDL Program: Law, Policy, and Implementation (Envtl. L. Inst. 2d ed. 2002); Sanjay Jeer et al., American Planning Ass'n Rep. No. 476, Nonpoint Source Pollution: A Handbook for Local Governments (1997); Will Hagin, Curbing Urban Runoff: The Use of Best Management Practices by Three Orange County Municipalities (2004) (unpublished manuscript) (on file with author); Terry Rodgers, *Ruling May Force Builders to Control Storm Runoff*, San Diego Union & Trib., Sept. 1, 2000, at A1; Kimberly Wind, *Urban Runoff*, O.C. Law., Jan. 2001, at 10-13; Luis M. Yeager, Public Control of Golf Course Water Runoff (2003) (unpublished manuscript) (on file with author).

to enforce rigorously existing rules that arguably address runoff.[58] For example, the Santa Ana Regional Water Quality Control Board, a regional entity governing the Orange County, California, area under the authority of California's State Water Control Board, has in recent years taken aggressive enforcement action against the well-known land developer the Irvine Company and its contractors for discharges of sediment-laden, recycled, and chlorinated waters from construction, golf, and pipe-cleaning activities, respectively, into a state-designated "Area of Special Biological Significance" in the nearshore coastal waters at Crystal Cove State Park.[59]

Important changes are occurring not only through site-specific and locality-specific regulation, though, but also through planning, management, and regulation at the watershed level. Both participants and observers of water, environmental, and land use issues commonly talk of a watershed movement popping up all over the nation. However, this "movement," centered around the idea that a watershed is the proper level at which to plan and manage water resources, land, and human impacts on the natural environment, is composed of three different but somewhat related developments. One is the proliferation of grass-roots watershed-based environmental conservation groups.[60] The second is the use of collaborative multistakeholder negotiation, planning, and problem-solving processes, which compose a hybrid of intergovernmental cooperation, multiparty negotiation involving both public and private interests, and an experiment in participatory planning processes at a regional level.[61] These processes do not necessarily involve new governance or management institutions beyond coordinated groups of existing institutions and stakeholders. The third is the creation of new watershed-based institutions that have governance and/or management authority with respect to at least some aspects of the watershed.

Prof. Janet Neuman argues for the creation of new watershed governance institutions and offers several examples of either watershed institutions or collaborative processes that are developing into institutions.[62] Among her examples are the CALFED/Bay Delta Program, which is "a highly complex multiyear effort that will ultimately involve changes in irrigation practices, flood control, urban water use, and numerous other water and land use activities"; the purely advisory Northwest Power Planning Council and the intergovernmental Columbia River Forum in the Columbia River Basin, which are offering new ideas for addressing fish and wildlife needs that conflict with hydropower generation and other water demands; a Great Lakes agreement among the five states, two Canadian provinces, and the federal governments of the United States and Canada that "began as an effort simply to maintain naturally fluctuating lake levels, but is evolving into a more comprehensive program to protect the entire basin's ecological and hydrologic integrity"; and the Delaware River Basin Compact Commission, which has broad powers to make long-term plans for the basin, control every aspect of the Delaware River water management, and approve or disapprove all projects in the basin that could substantially affect the basin's water resources. Another important (although less powerful) watershed institution is the Susquehanna River Basin Commission, created by compact among Maryland, New York, Pennsylvania, and the federal government.[63] One of the most promising watershed planning and management projects in the United States is the Water Resources Inventory Area No. 1 (WRIA 1) Watershed Management Project, governing the Nooksack River Basin and neighboring drainages like California Creek and Lake Whatcom under the authority of Washington's Watershed Management Act and the partnership of the city of Bellingham, Lummi Indian Nation, Nooksack Indian Tribe, Public Utility District No. 1, and Whatcom County.[64] The project is aimed at allocating water, protecting water quality, and restoring fish habitat, and includes changes in local zoning codes and restrictions on land development to protect key watershed resources.

Conservation of limited water supplies has also been an area of innovation. One of the most successful examples of water conservation programs was that undertaken by Los Angeles and the Southern California region in response to the combination of losing the landmark public trust case, *National Audubon Society v. Superior Court of Alpine County*[65] (which put in question Los Angeles' rights to appropriate feeder-stream waters from the shrinking, degrading Mono Lake Basin), public support for saving Mono Lake, the efforts of the Mono Lake Committee to convince Los Angeles to find an environmentally sustainable solution to its loss of Mono Lake water, and federal and state funds to support water conservation and reclamation measures.[66] In 1998, the Metropolitan Water District service area, which

58. Rodgers, *supra* note 57; Wind, *supra* note 57.

59. Cal. Reg'l Water Quality Control Bd., Santa Ana Region, Cease & Desist Order No. 00-87 (Nov. 16, 2000); Alexis Penn, The Role of Ecology in Developing the Last Open Spaces of Orange County: A Look at Crystal Cove's Newport Coast Planned Community and the Impacts of Development in an Already Impacted Landscape (2004) (unpublished manuscript) (on file with author).

60. *See, e.g.*, John T. Woolley et al., *The California Watershed Movement: Science and the Politics of Place*, 42 NAT. RESOURCES J. 133 (2002). See also American Rivers website available on the Internet at http://www.amrivers.org/groups (last visited Oct. 28, 2003).

61. David H. Getches, *The Metamorphosis of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role?*, 20 STAN. ENVTL. L.J. 3 (2001); Bradley C. Karkkainen, *Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism*, 21 VA. ENVTL. L.J. 189 (2002); A. Dan Tarlock, *The Creation of New Risk Sharing Water Entitlement Regimes: The Case of the* Truckee-Carson *Settlement*, 25 ECOLOGY L.Q. 674 (1999); A. Dan Tarlock, *Putting Rivers Back in the Landscape: The Revival of Watershed Management in the United States*, 6 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 167 (2000). A significant example of multistakeholder negotiation and collaborative problem solving is the famous CALFED process to solve water use problems affecting water quality and threatened species in the San Francisco Bay-Delta System. See HUNDLEY, *supra* note 8, at 398-425; Elizabeth Ann Rieke, *The Bay-Delta Accord: A Stride Toward Sustainability*, 67 U. COLO. L. REV. 341 (1996); Patrick Wright, *Fixing the Delta: The CALFED Bay-Delta Program and Water Policy Under the Davis Administration*, 31 GOLDEN GATE U. L. REV. 331 (2001).

62. Janet Neuman, *Dusting Off the Blueprint for a Dryland Democracy: Incorporating Watershed Integrity and Water Availability Into Land Use Decisions*, *in* WET GROWTH, *supra* note 31.

63. See Susquehanna River Basin Commission website available on the Internet at http://www.srbc.net (visited Nov. 1, 2003).

64. WHATCOM COUNTY RESOURCES DIVISION, DRIVING THE WRIA 1 WATERSHED MANAGEMENT PROJECT: THE WATERSHED MANAGEMENT ACT (2000); WHATCOM COUNTY RESOURCES DIVISION, DRIVING THE WRIA 1 WATERSHED MANAGEMENT PROJECT: OVERVIEW (2000).

65. 658 P.2d 709, 13 ELR 20272 (Cal. 1983).

66. Craig Anthony (Tony) Arnold, *Working Out an Environmental Ethic: Anniversary Lessons From Mono Lake*, 4 WYO. L. REV. 1 (2003) [hereinafter Arnold, *Environmental Ethic*].

covers a significant portion of southern California including Los Angeles, used the same amount of water as it had in 1983, 15 years earlier, despite a population growth of about 30%.[67] In addition to the combination of public trust litigation, public education and participation, and collaborative problem solving, changes in water pricing are also contributing to water conservation. Prof. Barton Thompson writes:

> Most cities that historically charged a flat rate for water, no matter how much water a consumer actually used, have begun metering their water (although there have been a few significant holdouts), a move that typically has reduced water use by approximately a third. Other cities have achieved significant reductions in water use through increases in their per-gallon prices. A few cities have moved toward tiered pricing systems in which consumers pay more per gallon as they use more water. Over a decade ago, for example, the Irvine Ranch Water District in Southern California switched to a tiered approach. As a result of this and other demand-management measures, per capita water use in the district's service area has dropped substantially.[68]

In another example, San Antonio, Texas, adopted a "four-tiered, conservation-based rate structure, which increases the cost per gallon as monthly usage rises" as well as a public education campaign, and experienced a 41% decrease in per capita water usage over eight years.[69]

Several of these innovations in linking land and water have been broadly inclusive, involving low-income communities of color. Prof. Eileen Gauna argues that new approaches to, and institutions for, addressing watershed health must also address distributive impacts, cultural values, and socioeconomic concerns.[70] The process must include low-income communities of color, including Native American tribes and the *acequia* communities of the Southwest. Professor Gauna observes that low-income people of color traditionally have enjoyed fewer water rights, worse environmental protection, and more intensive zoning than those in higher income categories or nonminority status.[71] However, many new efforts at sustainable land use practices include environmental justice considerations and the participation of low-income communities of color. For example, the CALFED process that Professor Neuman discusses[72] has included environmental justice groups and the preparation of an environmental justice action plan as part of the overall plan.[73] San Antonio's Edwards Aquifer recharge overlay zoning resulted from a three-way deal among local environmentalists, local developers, and leaders of low-income Latino neighborhoods on San Antonio's West and South sides.[74] The efforts of the Mono Lake Committee to save Mono Lake and encourage conservation among Southern California water users involved partnerships with well-known environmental justice and community groups in Los Angeles' inner city, as well as environmental education programs aimed at inner-city children and assistance for low-flush toilets and other conservation measures for low- and moderate-income households.[75] And two of the five participants in Washington's WRIA 1 Watershed Management Project are Indian tribes interested in managing water use, improving water quality, and enhancing the instream habitat of fish.[76]

These various examples of new wet growth approaches to land use can serve as models and experiments from which other decisionmakers can learn. However, they also illustrate the growing recognition of our need to integrate land and water controls—of our need to change what we are doing as we use and develop land.

II. The Need for Integration

Growth and land use practices have adverse impacts on aquatic ecosystems and water resources. These impacts form a set of problems that require solutions cutting across the boundaries of land use law and planning, water law and planning, and environmental controls over water quality. At the same time, we need new ideas about the integration of land and water controls also because of a set of social goals concerning sustainable development, i.e., living within nature's carrying capacity and respecting, or at least considering, ecological health in our land use practices. Whether we seek to solve problems or to shape ethics (or both),[77] and

67. *Id.* at 25.

68. Barton H. Thompson Jr., *Water Management and Land Use Planning: Is It Time for Closer Coordination?*, *in* WET GROWTH, *supra* note 31.

69. Jerry Needham & Christopher Anderson, *S.A. Seen as Leader in Saving Water*, S.A. EXPRESS-NEWS, Mar. 11, 2003, at 1A.

70. Eileen Gauna, *Environmental Justice in a Dryland Democracy: A Comment on Water Basin Institutions*, *in* WET GROWTH, *supra* note 31.

71. *Id.*

72. Neuman, *supra* note 62.

73. See CALFED BAY-DELTA PROGRAM, ENVIRONMENTAL JUSTICE WORKPLAN (2000); Press Release, CALFED Bay-Delta Program, Stockton Workshop Looks at Environmental Justice of the CALFED Bay-Delta Program (2001) (on file with author); Silicon Valley Toxics Coalition, *Sustainable Water—A Commitment to a Healthy Water for Life*, *at* http://svtc.igc.org/sust_water (last visited Oct. 25, 2002); and Environmental Justice Coalition for Water website available on the Internet at http://www.ejwatercoalition.org (last visited Oct. 25, 2002).

74. Arnold, *Planning Milagros*, *supra* note 1, at 104-05.

75. Arnold, *Environmental Ethic*, *supra* note 66, at 19, 39-41.

76. See sources cited *supra* note 64.

77. For examples of problem solving approaches to environmental concerns, see DANIEL A. FARBER, ECO-PRAGMATISM: MAKING SENSIBLE ENVIRONMENTAL DECISIONS IN AN UNCERTAIN WORLD (1999); Craig Anthony (Tony) Arnold, *Litigation as Dispute Non-Resolution: Lessons From Case Studies in Water Rights Disputes*, *in* BEYOND LITIGATION: CASE STUDIES IN WATER RIGHTS DISPUTES 1-14 (Craig Anthony (Tony) Arnold & Leigh A. Jewell eds., Envtl. L. Inst. 2002) [hereinafter Arnold, *Dispute Non-Resolution*]; Bradley C. Karkkainen, *Environmental Lawyering in the Age of Collaboration*, 2002 WIS. L. REV. 555; Barton H. Thompson Jr., *Tragically Difficult: Obstacles to Governing the Commons*, 30 ENVTL. L. 241, 267-69 (2000) [hereinafter Thompson, *Tragically Difficult*]. For examples of literature calling for the development of an environmental ethic as a necessary response to environmentally harmful behaviors, see, e.g., ERIC T. FREYFOGLE, JUSTICE AND THE EARTH: IMAGES FOR OUR PLANETARY SURVIVAL (1995) [hereinafter FREYFOGLE, JUSTICE AND THE EARTH]; ERIC T. FREYFOGLE, BOUNDED PEOPLE, BOUNDLESS LANDS: ENVISIONING A NEW LAND ETHIC (1998) [hereinafter FREYFOGLE, NEW LAND ETHIC]; ERIC T. FREYFOGLE, THE LAND WE SHARE: PRIVATE PROPERTY AND THE COMMON GOOD (2003) [hereinafter FREYFOGLE, THE LAND WE SHARE]; CHARLES F. WILKINSON, THE EAGLE BIRD: MAPPING A NEW WEST (1992); *Symposium: Environmental Ethics and Policy: Bringing Philosophy Down to Earth*, 37 U.C. DAVIS L. REV. 1 (2003); Craig Anthony (Tony) Arnold, *The Reconstitution of Property: Property as a Web of Interests*, 26 HARV. ENVTL. L. REV. 281, 305-06, 318-21, 334, 344, 349-58 (2002) [hereinafter Arnold, *Web of Interests*]. For attempts to link environmental problem solving and environmental ethical development, see RECONSTRUCTING CONSERVATION: FINDING COMMON GROUND (Ben A. Minteer & Robert E. Manning eds., 2003) [hereinafter RECONSTRUCTING CON-

whether we begin policy analysis with problem identification or with goal identification,[78] we nonetheless must increasingly consider the water-related impacts of our growth patterns and land uses and incorporate these concerns into our decisions and policies.

In the natural world, land and water are inextricably interconnected. Conservation science and ecology describe the components of nature as part of an integrated whole, connected by dynamic processes and relationships, in which harm to one part affects other parts and the entire system.[79] For example, the hydrologic cycle involves both land and water as precipitation falls on the ground and either runs into waterways like rivers and streams or filters into the soil and perhaps into underground aquifers.[80] The vegetation health, river-bank or stream-bank stability, and wildlife viability of riparian lands depend on the health of waterways free from artificially and excessively diminished or enhanced flows, i.e., drying up or flooding.[81] Wetlands are the classic example of integrated land and water and perform essential ecosystem functions like filtering pollutants from surface runoff, controlling flooding and shoreline erosion, recharging groundwater, and supporting biodiversity.[82] However, wetlands are not the only examples of transitions between land and water or mixed land-water ecosystems. The boundaries between land and water are typically fuzzy, variable, and incapable of precise delineation.

As a general principle, we should treat things that are substantially interrelated in a holistic or integrated manner to the extent possible, not in a piecemeal or fragmented manner.[83] On this principle alone, we should make greater efforts to integrate our treatment of land and water. However, it is also clear that our fragmented approach to land and water has substantial costs.

Land use practices make both withdrawals from and deposits to natural hydrological systems and bodies. The nature and extent of these "taking out" and "putting in" activities are particularly harmful to ecological health and the social benefits of water resources when they involve sprawl development. The more that land development grows, the more we take water out of surface freshwater bodies, groundwater, and perhaps increasingly (with the rise in desalination practices) specific marine ecosystems of our oceans. And the more that land development grows, the more we degrade our waters and water-related environment, including wetlands, stream beds and banks, riparian and coastal vegetation, aquatic habitats, and hydrologic processes and cycles. In addition, the two problems are interrelated. Use of water can affect water quality, and poor water quality can affect the supply of usable water.[84]

One of the problems with land development is its *location*. In general, the greatest growth in the United States is, and has been, occurring in arid and semi-arid regions, especially in the American West, but also in other areas of water stress in the eastern United States.[85] In areas where the demand for water is high and the supply of water is scarce, the pressures to overexploit sources of water and to make trans-basin (out-of-watershed) transfers are great. For example, the Los Angeles metroplex grew and sprawled at the cost of water, biodiversity, and ecosystem health in locations far from the urban area: Owens Lake (now dry), Mono Lake (now protected and rising after 25 years of environmental activism), and the Colorado River (overdrawn but now the subject of an agreement by California appropriators to reduce diversions).[86] Likewise, the fast-growing Phoenix metropolitan area depends on water from the Colorado, Salt, and Verde rivers and from overdrafting (or mining) groundwater with significant environmental and economic costs.[87] In 1990, 18 western states had 31% of the nation's population but 41% of the nation's surface water withdrawals.[88]

But the West is not the only place of growth and water scarcity. Water stress has come to the eastern United States, where water was always thought to be plentiful. Many eastern Massachusetts communities, for example, lack sufficient water supplies while the greater Boston metropolitan

servation]; Arnold, *Environmental Ethic*, *supra* note 66; Holly Doremus, *Constitutive Law and Environmental Policy*, 22 Stan. Envtl. L.J. 295 (2003).

78. *See* Buzbee, *Sprawl's Dynamics*, *supra* note 5, at 521.

79. *See* Stewardship Across Boundaries (Richard L. Knight & Peter B. Landres eds., 1998); Rachel Carson, Silent Spring 246 (1962); Frank B. Golley, A Primer for Environmental Literacy 18-25, 29-36, 90-100 (1998); Aldo Leopold, A Sand County Almanac and Sketches Here and There 201-26 (1949); Randolph, *supra* note 4, at 509-14; O.J. Reichman, Konza Prairie: A Tallgrass Natural History 1-8, 36-57 (1987); Arnold, *Web of Interests*, *supra* note 77, at 318-20; Fred P. Bosselman, *What Lawmakers Can Learn From Large-Scale Ecology*, 17 J. Land Use & Envtl. L. 207 (2002); Fred P. Bosselman & A. Dan Tarlock, *The Influence of Ecological Science on American Law: An Introduction*, 69 Chi.-Kent L. Rev. 847 (1994); Turner et al., *supra* note 10; and the works of Eric Freyfogle cited *supra* note 77.

80. Randolph, *supra* note 4, at 363-71.

81. Randolph, *supra* note 4, at 363, 404-06, 469-72; Raymond Herrmann et al., *Water Use*, *in* Status and Trends of the Nation's Biological Resources (U.S. Geological Survey ed., 1998); Turner et al., *supra* note 10. *See also* Freyfogle, New Land Ethic, *supra* note 77, at 60-63.

82. Randolph, *supra* note 4, at 538-54; Jon Kusler & Teresa Opheim, Our National Wetland Heritage: A Protection Guide (Envtl. L. Inst. 2d ed. 1996); S. Scott Burkhalter, *Oversimplification: Value and Function: Wetland Mitigation Banking*, 2 Chap. L. Rev. 261 (1999).

83. *See generally* Leopold, *supra* note 79, at 201-26; David W. Orr, Earth on Mind: On Education, Environment, and the Human Prospect 8, 94 (1994); Edward O. Wilson, Consilience: The Unity of Knowledge (1998); Arnold, *Web of Interests*, *supra* note 64; Eric T. Freyfogle, *The Tragedy of Fragmentation*, 32 ELR 11321 (Nov. 2002). As Aldo Leopold stated, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." Leopold, *supra* note 79, at 224-25.

84. *See generally* David H. Getches et al., Controlling Water Use: The Unfinished Business of Water Quality Protection (1991).

85. *See, e.g.*, David Carle, Water and the California Dream: Choices for the New Millenium (2003); David M. Gillilan & Thomas C. Brown, Instream Flow Protection: Seeking a Balance in Western Water Use 39 (1997); Hundley, *supra* note 8; Marc Reisner, Cadillac Desert: The American West and Its Disappearing Water (rev. ed. 1993); Donald Worster, Rivers of Empire: Water, Aridity, and the Growth of the American West (1985); Franz et al., *supra* note 10, at 228; Turner et al., *supra* note 10; William E. Riebsame, *Geographies of the New West*, *in* Across the Great Divide: Explorations in Collaborative Conservation and the American West 45-51 (Philip Brick et al. eds., 2001). For examples of water stress along the East Coast, see Robert Glennon, Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters 71-86, 99-111 (2002).

86. Hundley, *supra* note 8, at 121-71, 215-34, 336-62.

87. Franz et al., *supra* note 10, at 229-30; Gallagher, *supra* note 5, at 220; Tom R. Rex. *Environmental Alterations Have Negative Consequences*, Ariz. Bus., Oct. 1, 1999, at 8.

88. Gillilan & Brown, *supra* note 85, at 39.

area (including these communities) has developed land at a greater rate than Phoenix and Orlando, and Cape Cod has transformed from a resort community to an exurb of Boston.[89] The Florida Everglades' water flow has been altered to supply and protect a thriving, thirsty Miami's drinking water, adversely changing the Everglades' water flows and composition, natural vegetation, and wildlife habitat, among other biological factors.[90] Connecticut has experienced episodes of insufficient stream flows to supply its urban area populations,[91] and Georgia cities are eyeing the Alabama-Coosa-Tallapoosa River Basin in Georgia and Alabama, even though damming the river for urban water supply would harm mussels, snails, and fish dependent on instream flows.[92] Researchers from the University of New Hampshire's Water Systems Analysis Group have prepared an astonishingly thorough global picture of current and future water stress by individual drainage basins and subbasins, showing that both dense population growth and climate contribute to high water stress and scarcity, and that projected growth is likely to increase water problems in many locations around the world.[93]

At the same time, lands that serve important water system functions in their natural state,[94] such as riverfront lands, coastal lands, wetlands, aquifer recharge areas, and hillside and mountain slopes, are targeted for development due to their landscape amenities that consumers of development want.[95] Similarly, waterways in areas of growth are often reshaped, redirected, and lined with concrete, destroying their natural features and substantially degrading their natural health and functions.[96]

Another problem is that our growth is *high-demand*. From 1950 to 1990, water use in the United States grew by 106%, in comparison to population growth of 92%, with notable rises in domestic use.[97] Not only does the quantity of new people and economic activity in growing regions create new demands for increased supplies of water, but also the nature of the development itself stresses water sources, resulting in dangerously reduced instream flows and overdrafted groundwater aquifers.[98] With sprawl comes water-intensive land use practices, including large grassy lawns even in dry and hot climates, swimming pools, golf courses, water recreational parks, fountains, non-native landscaping, vehicle washing activities, and even lush lawns for commercial and industrial centers.[99]

Las Vegas is a prime example.[100] Las Vegas uses about twice the amount of water per capita than in southern California, even though, surprisingly, Las Vegas has twice the density than most major western cities have. Although hotels' extravagant fountains, swimming pools, and water shows and the region's many golf courses receive much public attention for potentially wasting water, the majority of water used in the metropolitan area is for watering residential lawns: 75% of total water usage in the Las Vegas metropolitan area is for households, of which 70% is used to irrigate lawns. In the hot, arid climate of this region, where only three to five inches of rain fall annually, landscaping is primarily lush lawns of water-dependent grass, flowers, shrubs, and trees. Local officials have now imposed conservation measures, will fine homeowners who violate water use restrictions, and require new development to use xeriscape landscaping. However, many local residents are hostile, even defiant, toward water conservation requirements and apparently feel entitled to live in a desert oasis well beyond the carrying capacity of the local environment. Despite predictions that Las Vegas will run out of water by 2025, planning officials and water officials see no limits to potential growth. They are confident that they will find the water. Changing water usage practices is one way. If Las Vegas were to approximate citywide the sustainable practices of the desert community of Civano, Arizona—xeriscaping, recycling water for landscaping, placing water-dependent vegetation around swales that catch runoff, and other conservation techniques—Las Vegas would save 103,712 acre-feet of water per year. This fact illustrates the water-intensive nature of the current land use practices in Las Vegas.

Given their intense demands, urban areas will often take aggressive measures to find the water from somewhere, whether from other watersheds, agricultural users of water, or water sources that support aquatic species.[101] For example, booming growth and land development in Colorado[102] is occurring on the Front Range, which is the eastern side of the Rocky Mountains that receives very little precipitation, while the vast bulk of Colorado's precipitation falls on the

89. Glennon, *supra* note 85, at 99-111; Anthony Flint, *Report Ties Sprawl to Boston Area's Water Woes: Rainfall Is Lost to Paved Surfaces*, Boston Globe, Aug. 29, 2002, at B.1; Gallagher, *supra* note 5, at 221.

90. Herrmann et al., *supra* note 81.

91. John R. Nolon, *The Duty to Supply Water to Developing Regions*, N.Y. L.J., Apr. 18, 2001, at col. 2 [hereinafter Nolon, *Duty to Supply*].

92. Tracy Watson, *Effects of Sprawl Flow Into River in Illinois*, USA Today, Apr. 12, 1999, at A10.

93. Charles J. Vorosmarty et al., *Global Water Resources: Vulnerability From Climate Change and Population Growth*, 295 Science 284-88 (2000); Fen Montaigne, *Water Pressure*, Nat'l Geographic, Sept. 2002, at 2, 15-16.

94. For analysis of critical ecosystem services provided by undeveloped lands, see Nature's Services: Societal Dependence on Natural Ecosystems (Gretchen Daily ed., 1997). For evidence that the economic value of ecosystem services vastly exceeds the economic value of development or commercial use, see Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 Nature 253 (1997); Andrew Balmford et al., *Economic Reasons for Conserving Wild Nature*, 297 Science 550 (2002).

95. National Research Council, Privatization of Water Services in the United States: An Assessment of Issues and Experience 6, 104, 105 (Box 6-1) (National Academy of Sciences 2002); Randolph, *supra* note 4, at 445; Matthew Futterman, *Watershed's Development Rekindles Fight*, Star-Ledger (Newark, N.J.), Feb. 10, 1999, at 017; Gallagher, *supra* note 5, at 221; Riebsame, *supra* note 85, at 48-51.

96. *See* Freyfogle, New Land Ethic, *supra* note 77, at 60-63, 134-35; Randolph, *supra* note 4, at 441-42, 469-72; Turner et al., *supra* note 10; Herrmann et al., *supra* note 81.

97. Riggs, *supra* note 34.

98. *See, e.g.*, Glennon, *supra* note 85; Hundley, *supra* note 8, at 515-16; William Booth, *Liquid Assets: Thirsty States Turning to New Water Sources*, Seattle Times, Aug. 15, 2002, at A3.

99. Hundley, *supra* note 8, at 515-16; Gallagher, *supra* note 5, at 220; Watson, *supra* note 92.

100. For the facts of the Las Vegas example, see Kay Brothers, *Water Wars: From Competition to Cooperation*, Urb. Land, Sept. 2002, at 110-113, 143; Nathan Fransen, Las Vegas: How a Rapidly Growing Desert City Deals with Water (2004) (unpublished manuscript) (on file with author); Lisa Snedeker, *Will Las Vegas' Explosive Growth Go On Indefinitely?*, L.A. Times, June 3, 2001, at B5.

101. Hundley, *supra* note 8; Herrmann et al., *supra* note 81; Kasler, *supra* note 29; Riebsame, *supra* note 85.

102. For the facts of the Colorado Front Range development example, see Franz et al., *supra* note 10, at 230-31; Herrmann et al., *supra* note 81.

western slopes of the mountain range. To obtain water, Front Range communities have appropriated waters from the Gunnison, San Juan, and Colorado rivers on the western slope by engineering 38 transmountain diversions across the Continental Divide. As a result, salinity in western slope water basins is increased, continued growth on the eastern slope is encouraged, and biota-supporting rivers are endangered by diversions reducing instream flows.[103] The problems are likely to intensify, as Colorado's population is expected to grow from 3.7 million people to 5.2 million people by 2025.[104] Urban land uses are not the only threat to instream flows, though. The recreational ski industry has attempted to divert protected state conservation interests in instream flows in waters like Snowmass Creek for use to make artificial snow so that ski operations are not interrupted by natural variations in snowfall during winter months.[105]

A third problem is land development's *impervious cover*, which includes structures, streets, sidewalks, patios, paved parking lots, and any other impermeable covering that impedes the natural filtration of precipitation and water flows into the soils.[106] The development of land usually creates a one-way ratchet from natural features and greater permeability to artificial (or human-built) features and lesser permeability.[107] Moreover, low-density sprawl, by its nature, has a relatively high rate of impervious cover per person and covers a wider range of lands with impervious cover than would be the case with a more concentrated, higher density pattern of development.[108]

Impervious cover has several deleterious effects on water quality, water supply, and the vitality of both natural and human environments. Professor Randolph writes:

> Urbanization, with its smooth impervious parking lots, streets, and rooftops tends to reduce infiltration and increase the rate of accumulation and the amount of stormwater runoff, which in turn exacerbates drainage and flooding problems and channel erosion downstream. This runoff carries with it nonpoint source water pollutants that now exceed industrial and municipal "point" discharges in contributing to the pollution of lakes, rivers, and estuaries in the United States.[109]

Research shows that after a watershed experiences urban land development, the peak flows from a given storm event are greater, the baseflow between storms—"critical to support stream ecology and riparian vegetation"—is substantially less, stream flood flows are higher, and stream floodplains are wider.[110] The amount of runoff from undeveloped land with natural cover is 10%, while residential land uses have between 23% and 30% runoff, and 55% of the water runs off of developed land in urban centers.[111] Impervious cover directly and indirectly affects the integrity of natural streams and creeks.[112] "[M]ore than 10 percent impervious surface in a watershed can impact stream health, while more than 25 percent can degrade stream health to nonsupporting beneficial uses."[113] Finally, impervious cover impedes infiltration of surface water and precipitation into groundwater that both contributes to natural stream flow between storm events (shallow groundwater) and underground aquifer recharge (deep groundwater).[114] A study by American Rivers, the Natural Resources Defense Council, Inc., and Smart Growth America examined the water supply effects of sprawl in the 20 U.S. metropolitan areas that had the greatest amount of land development, mostly where land development outpaced population growth by two to three times. The study found that groundwater supplies, on which local water systems relied for use, had imperviousness-related infiltration "losses" ranging from a high of between 56.9 billion and 132.8 billion gallons of water per year in the Atlanta metropolitan area, to a low of between 6.2 billion and 14.4 billion gallons of water per year in the Dallas metropolitan area.[115]

A fourth problem is that growth and land development generate *pollutants* that contaminate stormwater and other water runoff that end up in rivers, lakes, streams, bays and estuaries, and oceans and that seep into the groundwater. Studies show that land use development correlates to decreased quality in surface water and groundwater,[116] as well as nearshore coastal waters.[117] For example, in the Traverse City, Michigan, area within the Grand Traverse Bay watershed, the population more than doubled from 1980 to 1998, causing concentrated chloride-based pollutants in waters proximate to the greatest concentrations of population.[118] Urban runoff is the leading cause of beach contamination and closures nationwide, and a 1996 Santa Monica Bay study in California linked stormwater pollution to growing illnesses among surfers and ocean swimmers.[119]

Degraded water quality from urban development is related in part to the amount of impervious cover that increases runoff into stormwater systems and into bodies of water, as discussed previously. However, water quality impacts from land development also result from the nature and concentration of pollutants used on urban, suburban, and exurban lands.[120] Fertilizers, pesticides and herbicides, and

103. The Gunnison River has been declared one of the 10 most endangered rivers in the United States. *See* American Rivers, America's Most Endangered Rivers of 2003, at 20-21 (2003); American Rivers, *Gunnison River*, *at* http://www.amrivers.org/mostendangered/gunnison2003.htm (last visited Oct. 28, 2003).

104. Franz et al., *supra* note 10, at 228.

105. *See* Aspen Wilderness Workshop v. Colorado Water Conservation Bd., 901 P.2d 1251 (Colo. 1995).

106. American Rivers et al., Paving Our Way to Water Shortages: How Sprawl Aggravates the Effects of Drought (2002); U.S. General Accounting Office (GAO), Federal Incentives Could Help Promote Land Use That Protects Air and Water Quality (2001) (GAO-02-12); Randolph, *supra* note 4, at 363, 373, 375-76, 404-06, 486-87.

107. Turner et al., *supra* note 10.

108. Randolph, *supra* note 4, at 107.

109. *Id.* at 363 (emphases omitted).

110. *Id.* at 373.

111. *Id.* at 375, tbl. 13.1.

112. *Id.* at 404-06.

113. *Id.* at 405.

114. *Id.* at 486.

115. American Rivers et al., *supra* note 106.

116. David F. Boutt et al., *Identifying Potential Land Use-Derived Solute Sources to Stream Baseflow Using Ground Water Models and GIS*, Ground Water, Jan. 1, 2001, at 24-34.

117. C. Leitch & J. Harbor, *Impacts of Land Use Change Into the Near-Coast Zone*, J. Soil & Water Conservation, July 1, 1999, at 584-92.

118. Boutt et al., *supra* note 116.

119. Rodgers, *supra* note 57.

120. For the types and impacts of pollutants attributable to urban growth and discussed in this and the following paragraph, see Jeer et al.,

pet waste come from lawns, golf courses, parks, and other humanly landscaped areas especially prevalent in sprawling communities. Freeways, streets, parking lots, car wash locations, automotive repair and storage facilities, and driveways are sources of automobile oil, coolants, other fluids, and contaminated car-washing runoff. Other pollution sources include commercial and household cleaning fluids; sediment and soil from construction, grading, landscaping, or other land alteration; decomposing litter; industrial and commercial chemicals and wastes; gas stations and their underground storage tanks; and landfills. These pollutants may run off ultimately into surface and coastal waters, facilitated by impervious cover. But they may also contaminate groundwater, degrade species' habitat, or overtax the natural filtration functions of soils, wetlands, and estuaries.

Pollution from urban development harms more and more biological communities as this development sprawls across our landscapes. Organic wastes, such as pet wastes, deplete receiving waters' dissolved oxygen, which can contribute to fish kills. Nutrients in fertilizers that enter urban runoff enhance algae growth in surface and coastal waters, affecting not only the types of plants and animals living in the waters but also dissolved oxygen levels and the survival of aquatic species. Pesticides, chemicals used in or with vehicles, and some household products contain toxics that can biomagnify in concentration in the food chain (including in fish consumed by humans) and kill aquatic life. Soil erosion from construction and land development activity causes "sedimentation of streams, lands, and estuaries, which can smother bottom feeding or benthic organisms."[121]

However, our problem is not merely sprawl itself. Our problem is that we make decisions about using land without evaluating, modifying, or limiting our land uses so as to minimize, mitigate, or avoid harms to water and water-related ecosystems. In other words, sprawl is just one manifestation of land use practices that fail to consider adequately their impacts. Interestingly, Las Vegas has twice the density of other western cities but uses twice the water per capita because of how the water is used and the mismatch between the type of land development and the natural conditions of the local environment.[122]

High-density, pedestrian-friendly, infill development may not be "smart" if it occurs in the wrong location. For example, anti-sprawl planners may prefer a complex of clustered condominiums or a "new urbanist" housing development that covers a vacant lot in an already developed urban area, to a low-density subdivision of single-family residences on a large undeveloped tract at the outskirts of the metropolitan area. However, if the vacant lot is one of the last few sites lacking impervious cover in the entire area, serving important water drainage and filtration functions, the development might be entirely wrong. Likewise, the development might be wrong if it were to occur alongside a stream, creek, or river running through the urban area because it could lead to erosion of the bank, destruction of wetlands, interference with riparian vegetation and wildlife habitat, and particularly intensive runoff effects from impervious cover so proximate to the water body. Furthermore, increasing the density of the population in areas already containing significant populations could put the local burden on watersheds and water bodies over some threshold level of harm, i.e., a tipping point, either for a watershed or water body as a whole or even for a specific critical location of impact.[123]

With respect to water, is it possible that we would cause less harm to the environment if we spread out our impacts geographically instead of concentrating them as is suggested by the smart growth literature? I do not know the answer to this question, but I am skeptical of simplistic assumptions that densely concentrated development is always the best for the environment.

We need to reduce our overall impacts on water environments, of course. Discussion of spreading or concentrating these impacts might distract us from conservation, preservation, and pollution-reduction or pollution-elimination goals. However, at some point, even with changes in public values, human behaviors, and land use practices, we will have modified our most egregiously harmful land use practices; we will have "picked all the 'low hanging' fruit."[124] Then (and perhaps sooner), we will face more difficult questions about the location of land use activities for which increasingly dense urban development may not be the "wet growth" answer—at least in certain contexts, depending on the lands, land uses, and water impacts involved.

At the same time, it is not clear that the preservation of lands for agricultural uses and protection of these lands against urban sprawl will always result in the most ecologically healthy outcomes. Although there is great variation among different kinds of agricultural activities, in general agricultural land uses demand more water per acre than do urban uses, and contaminate surface waters and groundwater with pesticides, herbicides, silt, and animal wastes, among other runoff pollutants.[125] In addition, the cumulative or synergistic effects of urban growth and agricultural land uses with high water impacts have been especially harmful to rivers and streams, groundwater, and related biodiversity.[126] One of the problems implicated by this situation is the lack of land use regulatory controls over the types and specific operational practices of agricultural activities on lands zoned for agriculture (or possibly not subject to any zoning or land use controls at all). More often than not, the owner of land zoned for agricultural use can grow cotton, plant citrus groves, cultivate vineyards, sow wheat, raise chickens, or graze cattle, depending on the owner's assessment of the land's support for the agricultural

supra note 57; RANDOLPH, *supra* note 4, at 393-95, 400-02, 404, tbl. 13.14, 487-88; Ernst, *supra* note 29.

121. RANDOLPH, *supra* note 4, at 400.

122. See sources cited *supra* note 100 and accompanying text.

123. *See* RANDOLPH, *supra* note 4, at 405 ("[M]ore than 10 percent impervious surface in a watershed can impact stream health, while more than 25 percent can degrade stream health to nonsupporting beneficial uses.").

124. Tarlock, *Local Governments*, *supra* note 33, at 11276.

125. RANDOLPH, *supra* note 4, at 398 (agriculture is the source of 48% of river and stream impairment and 41% of lake and pond impairment, compared to 13% and 18%, respectively, from urban runoff; urban sources account for most of the estuary impairment nationwide, though) & 400 (agricultural sources of runoff pollution cause more river basin degradation than do urban sources); Herrmann et al., *supra* note 81; Turner et al., *supra* note 10; Rex, *supra* note 87. *But see* Ernst, *supra* note 29 (contending that concentrations of pesticides running off from urban lands can be four times higher than those from agricultural lands).

126. Turner et al., *supra* note 10 (discussing the problem in general, but also presenting the case study of Lake Mendota in Wisconsin); Herrmann et al., *supra* note 81 (discussing the problem in general, but also presenting the case study of the Illinois River).

activity, not the propriety of the activity for the broader environment (including water impacts). In addition, land use regulations do not mandate that agricultural users adopt water-efficient practices. Thus, zoning for agriculture and rejection of new development of agricultural lands do not reduce overconsumption of water. Merely favoring agricultural uses over urban sprawl for undeveloped lands does not necessarily achieve an integration of land use with conservation of water-related ecosystems and resources.[127]

At the core, we neither see sufficiently, nor care sufficiently about, the connections between land and water. A significant contributing factor to our blindness, callousness, and stupidity is that we treat things that are interconnected as if they are separate and distinct. These "interconnected things" are not only the components of nature, such as land and water, but also the nature-society dynamic: human activity and ecological health. To understand our current problems with land use impacts on aquatic ecosystems, we must understand the many types of fragmentation in our social institutions and human behaviors.

III. The Problems of Fragmentation

A. Legal Regimes

Decisions about land use, water use, and water quality are essentially divided among three separate and very different legal or regulatory regimes. *Water quality controls* are mostly found in federal environmental statutes—especially the Federal Water Pollution Control Act, known more commonly as the Clean Water Act[128]—and EPA regulations implementing these statutes, as well as state statutes and regulations implementing federal standards but also in some cases establishing additional state standards and rules. *Water use* is largely a matter of long-standing state common-law doctrines of property rights—prior appropriation in the West, riparianism in the East, and a hybrid of the two for states along the 100th Meridian and the Pacific Coast (with distinctive regimes in Hawaii, Louisiana, and Puerto Rico)—that have been implemented and modified by modern state regulatory regimes. State constitutional and statutory provisions, as well as federal controls over dams and reclamation projects, Indian tribal rights, and waters for federal lands, have some effect, but rules for water usage in essence arise out of state property law.[129] *Land use controls*, on the other hand, are largely matters of local government planning and zoning, even though federal and state environmental regulations may also affect land use in some cases. Local land use controls, which arguably apply to more people than any other type of environmental regulation in the United States, constitute a distinctively hybrid regulatory-property regime: founded both in the local police power to advance the public health, safety, morals, and welfare, and in the protection of property owners and other property interests from harms and costs imposed by neighbors' land uses.[130]

The three types of legal-regulatory regimes are aimed at very different core goals. Water law is designed to *encourage or facilitate growth*, as Prof. Dan Tarlock documents in his discussion of the perpetual or inherent growth bias in American water law.[131] Land use regulation is designed to *channel growth*. Water quality regulation is designed to *control the impacts of growth*. Although each regime may not always accomplish its goal with complete effectiveness and may have inherent limits that lead to situations of regulatory failure, these core goals shape the nature and operation of these regimes and are in some degree of tension with one another.

Each regime has a different "expert culture"—different professional and organizational norms, different ways of looking at the world, and different ways of conceptualizing problems and solutions.[132] Decisionmakers in each regime have different ways of primarily or perhaps initially (but by no means exclusively) perceiving the problems or issues that they must address. The land use planner or regulator (including, to some extent, the city council member or appointed planning commission member) thinks *spatially*. He or she considers the geo-spatial relationships of different land uses, whether he or she conceives of the space as public space or private space or perhaps some type of commons. When making decisions or recommendations, he or she looks at maps, drawings and diagrams (including blueprints and elevations), photographs, traffic circulation drawings, exhibits of materials to be used, and even physical models of the development and surrounding areas.

The water use planner or regulator thinks *quantitatively and directionally*. He or she focuses on the volume, flow, and transportation of water, both within water sources but also from source to site(s) of use. Decisions are made about: the number of acre-feet per unit of time that a water user may withdraw and put to use outside of the water body; the volume, flow, and pressure of groundwater pumping; the cubic-feet-per-second that does or must flow past a certain point in a river or stream; and the quantity and rate of recharge of an aquifer or return flow into surface water.

The water quality planner or regulator thinks *compositionally*. He or she analyzes the content and characteristics of waters for things like temperature, acidity and alkalinity, salinity, turbidity, dissolved oxygen, algae, and the types and concentrations of various biological and chemical substances, especially pollutants like: mercury, lead, and other heavy metals; fecal coliform; organic wastes, measured by biochemical oxygen demand, which is the amount of oxygen necessary to decompose them; nitrates, phosphorus,

127. Leitch and Harbor observe that increased urbanization may not result in proportionately higher runoff, depending on changes in other land uses, such as when conversion of agricultural lands from high runoff activity to low runoff activity offset increased runoff from urban growth. Leitch & Harbor, *supra* note 117. This phenomenon is essentially the water pollution version of the growing water-supply transfers from agricultural water uses to urban water uses, i.e., lower agricultural impacts on water allow for higher urban impacts on water, although in the water pollution context it is unlikely that the agricultural land users are being compensated for their "transfer."

128. Federal Water Pollution Control Act §404, 33 U.S.C. §1344 (1994).

129. *See generally* A. Dan Tarlock, Law of Water Rights and Resources (1993 & Ann. Supp.).

130. *See* Village of Euclid v. Amber Realty Co., 272 U.S. 365 (1926); Arnold, *Planning Milagros*, *supra* note 1, at 93-94; Charles M. Haar & Michael Allan Wolf, *Euclid Lives: The Survival of Progressive Jurisprudence*, 115 Harv. L. Rev. 2158 (2002); Bradley C. Karkkainen, *Zoning: A Reply to the Critics*, 10 J. Land Use & Envtl. L. 45 (1994).

131. A. Dan Tarlock, *We Are All Water Lawyers Now: Water Law's Potential But Limited Impact on Urban Growth Management*, *in* Wet Growth, *supra* note 31.

132. These observations are based on my participation in all three types of regimes as a planning commissioner, attorney practicing in all three areas, and scholar writing and teaching in all three areas.

ammonia, and other nutrients; silt and other suspended solids; and synthetic volatile organic chemicals like pesticides and petroleum products. He or she also analyzes the characteristics and composition of inputs into waters, such as stormwater runoff, industrial discharges, and sewer system discharges. Minimum levels of water quality for bodies of water (TMDLs) and maximum levels of pollution discharges into bodies of water (NPDES permits) are based primarily on composition.

There are also differences in the types of interests to influence the decisionmakers and regulators in each regime (or possibly "capture" the decisionmakers, if one accepts the "agency capture" theory).[133] For example, the primary regulated community in the land use regime is composed of land developers and local property owners,[134] whereas the primary regulated community in the water use regime is composed of water institutions, e.g., water districts, irrigation districts, and other major users of water.[135] Not only might the regulated community influence the decisionmakers, but so too might those groups with a strong interest in regulation, groups that vary with the type of regime. For example, large national environmental organizations influence the decisions and culture of federal water quality regulators, whereas neighborhood groups have influence over local land use decisions. The former arguably favors science-based, statute- and litigation-driven command-and-control regulation of environmental outputs, e.g., pollution, and industry processes.[136] In contrast, the latter arguably pushes for protection of neighborhood quality-of-life and property values against new development that might increase traffic, create an eyesore, consume open space and landscape amenities, crowd schools and other public services, and bring unwanted numbers or types of people.[137]

B. Government Authority

The power and responsibility to regulate land use, water use, and water quality are fragmented across many different governmental entities. First, there are "vertical disconnects": authority is divided among the three levels of government: federal, state, and local.[138] The primary authority to set standards for water quality rests with the federal government.[139] State government primarily controls water allocation decisions.[140] And local governments—cities and counties—have primary responsibility for land use regulation.[141] These generalities have exceptions and variations, not in the direction of unification or integration of land and water controls but in the direction of additional layers of complexity and fragmentation of power and responsibility for environmental regulation. For example, the federal Endangered Species Act, which protects the critical habitats of endangered and threatened species,[142] has significant regulatory impacts on both water use and land use.[143] Over the past several decades, various federal and state laws, protecting specific resources like wetlands or coastal resources or establishing regional planning goals and processes, have asserted land use regulatory authority,[144] although in the end, land use regulation remains essentially a local matter.[145] Often these federal and state environmental or multijurisdictional regional controls are "overlays": additional constraints laid over top of underlying local zoning and planning.[146] In other examples of jurisdictional complexity, states can play a significant role in water quality regulation, and federal and Indian reserved water rights and federal dam and reclamation policies affect water allocation within states.

Second, there are "horizontal disconnects."[147] The functions of regulating and managing land and water do not coalesce around unitary decisionmakers, even within a level of government. One manifestation is the dispersion of authority across political geography: the United States has 38,971 counties, cities, and townships, most of which have general land use regulatory powers within—and to some degree in the areas just outside of—their political boundaries, and na-

133. *See, e.g.*, Bradford C. Mank, *Superfund Contractors and Agency Capture*, 2 N.Y.U. Envtl. L.J. 34 (1993); Matthew D. Zinn, *Policing Environmental Regulatory Enforcement: Cooperation, Capture, and Citizen Suits*, 21 Stan. Envtl. L.J. 81 (2002).

134. *See generally* Joe R. Feagin & Robert Parker, Building American Cities: The Urban Real Estate Game (1990); Mike Davis, City of Quartz: Excavating the Future in Los Angeles 151-219 (1992); Arnold, *Planning Milagros*, *supra* note 1, at 134-36; Richard Briffault, *Our Localism: Part I—The Structure of Local Government Law*, 90 Colum. L. Rev. 1 (1990); Robert C. Ellickson, *Suburban Growth Controls: An Economic and Legal Analysis*, 86 Yale L.J. 385 (1977); Jerry Frug, *The Geography of Community*, 48 Stan. L. Rev. 1047 (1996); Karkkainen, *supra* note 130.

135. *See generally* Barton H. Thompson, *Institutional Perspectives on Water Policy and Markets*, 81 Cal. L. Rev. 671 (1993).

136. Tarlock, *Local Governments*, *supra* note 33; Luke Cole, *Empowerment as the Key to Environmental Protection: The Need for Environmental Poverty Law*, 19 Ecology L.Q. 619, 634-42 (1992).

137. See sources cited *supra* note 134.

138. Tarlock & Lucero, *supra* note 33, at 4-5. *See also* Peter A. Buchsbaum, *Permit Coordination Study by the Lincoln Institute of Land Policy*, 36 Urb. Law. 191 (2004).

139. *See* Robert W. Adler et al., The Clean Water Act: 20 Years Later (1993); Houck, *supra* note 57.

140. *See* Tarlock, *Local Governments*, *supra* note 33. *But see* Getches, *supra* note 61.

141. *See* Arnold, *Planning Milagros*, *supra* note 1, at 93-94; Nolon, *Parochialism*, *supra* note 3, at 373; Tarlock, *Local Governments*, *supra* note 33. *See also* Robert V. Percival et al., Environmental Regulation: Law, Science, and Policy 768 (3d ed. 2000) ("Land use regulation in the United States traditionally has been the province of local governments using zoning ordinances and building codes as their principal regulatory tools."); Zygmunt J.B. Plater et al., Environmental Law and Policy: Nature, Law, and Society 1164 (2d ed. 1998) ("In day-to-day practice, the overwhelming majority of land-use management occurs at the local level, predominately through local government regulation.").

142. Endangered Species Act, 16 U.S.C. §§1531-1544, ELR Stat. ESA §§2-18.

143. Arnold, *Conserving Habitats*, *supra* note 1; Doremus, *supra* note 33; Getches, *supra* note 61; Elizabeth Ann Rieke, *The Bay-Delta Accord: A Stride Toward Sustainability*, 67 U. Colo. L. Rev. 341 (1996). *See, e.g.*, National Ass'n of Home Builders v. Babbitt, 130 F.3d 1041, 28 ELR 20403 (D.C. Cir. 1998).

144. Fred Bosselman et al., Federal Land Use Regulation (1977) (depicting the increasing federalization of land use controls); Malone, *supra* note 2; Callies, *supra* note 1.

145. *See* Arnold, *Planning Milagros*, *supra* note 1, at 89-96; Tarlock, *Local Governments*, *supra* note 33.

146. *See, e.g.*, Lindell L. Marsh & Peter L. Lallas, *Focused, Special-Area Conservation Planning: An Approach to Reconciling Development and Environmental Protection*, *in* Collaborative Planning for Wetlands and Wildlife: Issues and Examples 7, 9 (Douglas R. Porter & David A. Salvesen eds., 1995) (layers of regulation of species' habitat and land use). *See also* Buchsbaum, *supra* note 138 (same); Kusler & Opheim, *supra* note 82 (a guide to multiple levels of regulation and policy to protect wetlands).

147. Tarlock & Lucero, *supra* note 33, at 5.

tionally there are over 10,000 local special districts with responsibility for the management, conservation, and/or supply of water.[148] Thus, land use regulatory authority, and at least some aspects of water use and quality decisions, are fragmented and diffused across thousands of separate, distinct governments. These entities' jurisdictional boundaries, or sometimes called political boundaries or administrative boundaries, do not conform to the "boundaries" of nature, generally to the detriment of sustainable ecosystem management practices.[149] Nearly every watershed, which is the most commonly accepted ecological unit of management of land and water and defined as "the catchment or drainage area of an individual stream or river,"[150] transcend local political boundaries. The result is that no one regulatory agency or manager is controlling land use across an entire watershed, but instead many different entities are doing so.

Moreover, municipalities within a region or metropolitan area compete with one another for tax revenues, economic development, federal and state funds, and control over the local physical and social environment.[151] They use their land use planning and zoning powers in doing so.

However, the result is neither a race-to-the-bottom nor a race-to-the-top,[152] but instead polycentrism: a distribution of widely varying local land use practices across a broad, decentralized, fragmented spectrum.[153] Some localities are more water-conscious and nature-conscious in their policies and decisions, while others are less so. Nonetheless, this system has few incentives for local governments to coordinate their land use policies and regulations, to take responsibility for total watershed health, or even to be able to influence land use patterns sufficiently to achieve significant environmental protections.

Another type of dispersion of authority is by subject matter. Different agencies within a unit of government have different responsibilities and authority for interrelated matters. For example, just at the federal level alone (not considering the likely dozens of state and local entities that could be involved), the regulation or management of land and water in a given watershed might involve: wetlands under the shared jurisdiction of the U.S. Army Corps of Engineers and EPA; endangered species under the jurisdiction of the U.S. Fish and Wildlife Service (FWS) in the U.S. Department of the Interior (DOI); national parks under the jurisdiction of the National Park Service in the DOI; national forests under the jurisdiction of the U.S. Forest Service in the U.S. Department of Agriculture (USDA); Indian tribal lands under the jurisdiction of the Bureau of Indian Affairs in the DOI; federal highways under the Federal Highway Administration of the Department of Transportation; water quality under the jurisdiction of EPA; federal grazing lands under the U.S. Bureau of Land Management in the DOI; soil erosion issues under the jurisdiction of the Natural Resources Conservation Service of the USDA; control of solid wastes and toxic substances by EPA; federal water reclamation projects under the Bureau of Reclamation of the DOI; and if there were impacts on marine ecosystems, perhaps both the National Oceanic and Atmospheric Administration (NOAA) and its sub-entity the National Marine Fisheries Service (known as NOAA Fisheries) of the U.S. Department of Commerce. Turf wars and poor coordination can characterize interagency dynamics.[154] However, aquatic ecosystem viability does not divide itself by the human, artificial, political subject matter boundaries that define jurisdictional lines between agencies.

With the dispersion of authority by subject matter come tensions over the considerations that go into decisions about land and water. Different agencies have different missions and goals, as well as different standards that they apply. One of the more challenging types of conflicts arising over the land-water interface involves regulators focused on protecting a specific component of the natural environment versus regulators focused on balancing a wide range of environ-

148. U.S. Census Bureau, Preliminary Rep. No. 1 (GC02-1(P)), 2002 Census of Governments, at 1, 7 (2002) (Government Units in 2002), *available at* http://ftp2.census.gov/govs/cog/2002COG prelim_report.pdf (last visited July 19, 2004).

149. *See* Stewardship Across Boundaries, *supra* note 79; Buchsbaum, *supra* note 138; Tarlock & Lucero, *supra* note 33. For an example of interjurisdictional, interresources, and interimpact fragmentation in which land use activities degrade watershed health, see Helen Ingram et al., Divided Waters: Bridging the U.S.-Mexico Border (1995).

150. Tarlock, *Local Governments*, *supra* note 30, at 11278. However, Professor Randolph urges a more nuanced concept of "watershed nesting" or a "tiered approach" to watersheds descending from basins typically of 1,000 to 10,000 square miles, to subbasins typically of 100 to 1,000 square miles, to watersheds typically of 10 to 100 square miles, to subwatersheds typically of 1 to 10 square miles, to catchments typically of .05 to .50 square miles. Randolph, *supra* note 4, at 256-57. He states: "Most effective watershed planning is guided by larger issues of the basin but focuses on smaller scale subwatersheds and catchments for action. Guidance, policies, and financial and technical assistance may be basinwide, but specific plans and implementation occur in subwatersheds." *Id.* at 258. A subwatershed is an effective scale for management not only because it may be small enough to fall within one local jurisdiction or just a few local jurisdictions, but also because the influence of land use on watershed health is the greatest at the subwatershed scale, as well as the easiest to control. *Id.*

151. *See, e.g.*, Vicki Been, *"Exit" as a Constraint on Land Use Exactions: Rethinking the Unconstitutional Conditions Doctrine*, 91 Colum. L. Rev. 473 (1991).

152. *See* Tarlock, *Local Governments*, *supra* note 33, at 11277. For the idea that interstate and interlocal competition foster a "race-to-the-bottom": the lowest possible environmental protections needed to attract economic investment and tax revenues, see, e.g., Been, *supra* note 151, at 509; Kirsten H. Engel, *State Environmental Standard-Setting: Is There a "Race" and Is It "to the Bottom?,"* 48 Hastings L.J. 271 (1997) Richard B. Stewart, *Pyramids of Sacrifice?: Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 Yale L.J. 1196, 1212 (1977). For the rejection of the idea that local and state governments will inevitably adopt weaker environmental laws than neighboring local and state governments or even the federal government, see, e.g., Jonathan H. Adler, *Let 50 Flowers Bloom: Transforming the States Into Laboratories of Environmental Policy*, 31 ELR 11284 (Nov. 2001); Richard L. Revesz, *Federalism and Environmental Regulation: A Public Choice Analysis*, 115 Harv. L. Rev. 555 (2001); Nolon, *Parochialism*, *supra* note 3.

153. Some scholars have criticized the polycentric nature of local land use controls as a major contributor to sprawl. *See* Buzbee, *Legal Reform*, *supra* note 25; Salkin, *supra* note 6, at 382-84. In contrast, for a relatively optimistic report on the polycentric management of groundwater in California, see William Blomquist, Dividing the Waters: Governing Groundwater in Southern California (1992). *But see* Hundley, *supra* note 8, at 527-38 (criticizing the chaos and fragmentation of the polycentric management of water in California).

154. Jeanne Nienaber Clarke & Daniel C. McCool, Staking Out the Terrain: Power and Performance Among Natural Resources Agencies (2d ed. 1996); Kyle J. Matthews, *Who Controls the Fate of the Fish?: Interagency Fighting Over Section 10(j) of the Federal Power Act*, 74 S. Cal. L. Rev. 1165 (2001); Keith W. Rizzardi, *The Everglades in Jeopardy: A Drama of Water Management and Endangered Species*, 27 Fla. St. U. L. Rev. 349 (2000).

mental and nonenvironmental considerations. For example, this type of conflict arises when FWS officials evaluate land development proposals solely for their ecological impact on endangered species' habitat, while local land use officials are considering goals of economic development, housing availability and affordability, and provision of public infrastructure and services, among others.[155] Land use planners do not consider just water preservation and ecosystem conservation goals when they make decisions about land use, in contrast to those water planning officials and environmental regulators who have strong ecological missions.

A third type of dispersion of authority is by function or role. Government inevitably divides its tasks among a variety of officials, in part for practical reasons related to the scope of governing and in part for normative reasons to avoid the concentration and abuse of power. Legislative bodies set policies, adopt general prescriptive and proscriptive rules, and designate implementing entities and processes. Officials in implementing agencies in the executive branch adopt rules that are supposed to implement the legislative directives in greater detail and specificity (yet often with general applicability) than the legislation provides. With different decisionmakers, the considerations that go into legislation may vary considerably with the considerations that go into regulation. Some contend that legislation is written purposefully to be vague, symbolic, and unenforceable in practice.[156] Others contend that regulation-writing agency officials undermine the principles adopted by the legislative body.[157] Still others acknowledge a practical problem of writing enforceable, rational, information-supported rules from a broad directive issued by a highly political (and itself probably fragmented) legislative body.[158] In any event, different decisionmakers result in some variation between legislation and regulation.

Even within the rule-writing process, there can be tensions between an elected executive, e.g., the president of the United States, or his/her politically appointed top officials and the rank-and-file bureaucrats within the agency. Further variation comes from implementation of the regulations and legislation by yet different agency officials who make decisions about a regulated entity's permit application, variance request, reporting documentation, or other application of the rules to a specific situation. In some circumstances, experts within the government agency may evaluate the situation and make a recommendation to a distinct decisionmaking official or set of officials. There is usually some sort of appellate decisionmaker within the agency to review the initial decision. And yet further variation results from enforcement decisions by perhaps even different agency officials about whom and when to investigate, whether statues and regulations have been violated, and what remedies to seek. If civil or criminal penalties are involved, a civil litigation attorney or a criminal prosecutor will likely make key decisions about whether and how to proceed with the enforcement action.

Furthermore, in our system of environmental and land use laws, affected citizens (including environmental and growth-control groups) can seek to enforce statutes and regulations not only against private violators but also against government officials for failure to comply with or enforce the statutes. These "private attorneys general" play an important role.[159] Finally, judges in federal and state courts at both trial and appellate levels play important roles, especially given the amount of litigation that occurs over environmental, land use, and water issues. Courts may have yet entirely different perspectives than any of the other decisionmakers, as they arguably look more to legal rights, duties, and powers than they do to ultimate policy outcomes. Significantly, courts often do not resolve in any final way the policy decisions or conflicts underlying the legal issues that they decide, but instead loop land-water-environment disputes back into a complex, ongoing dynamic among multiple participants and "decision" makers.[160]

Third, government policy has "internal disconnects." As discussed previously, plans and policies of different agencies or entities within a governmental unit may conflict with or vary from one another, creating internal inconsistency for the governmental unit as a whole.[161] However, even where a single plan governs or a single decisionmaker (individual or group of officials) makes policy, the plan or set of policies can often have internal inconsistencies. Conflicting or even mutually inconsistent policy goals are common in American policy and planning documents. However, a more prevalent disconnect is between plans and decisions.[162] Plans may identify the carrying-capacity constraints of waters and their related ecosystems and articulate sustainable development goals. However, decisions about actual development, land uses, and water impacts are made in an ad hoc, piecemeal fashion: project-by-project for land development permits, expenditure-by-expenditure for government projects, and rule-by-rule for zoning and regulations.[163] These decisions are subject to political pressures, pragmatic compromises, and toleration of many small impacts that form large impacts in the aggregate; the result is the "tyranny of small decisions" in which actual results are shaped by ad hoc decisionmaking and are disconnected from plans and policy goals.[164] Finally, planning and even regulation designed to constrain adverse impacts on aquatic resources frequently cannot keep pace with actual growth, which is yet another type of plan-implementation disconnect.[165]

155. Arnold, *Conserving Habitats*, *supra* note 1.

156. *See, e.g.*, John P. Dwyer, *The Pathology of Symbolic Legislation*, 17 Ecology L.Q. 233 (1990).

157. *See, e.g.*, Christopher H. Schroeder, *Cool Analysis Versus Moral Outrage in the Development of Federal Environmental Criminal Law*, 35 Wm. & Mary L. Rev. 251, 258-63 (1993).

158. *See, e.g.*, Lynda L. Butler, *State Environmental Programs: A Study in Political Influence and Regulatory Failure*, 31 Wm. & Mary L. Rev. 823 (1990); Richard J. Lazarus, *The Tragedy of Distrust in the Implementation of Federal Environmental Law*, L. & Contemp. Probs., Autumn 1991, at 311.

159. *See, e.g.*, Barton H. Thompson Jr., *The Continuing Innovation of Citizen Enforcement*, 2000 U. Ill. L. Rev. 185.

160. Arnold, *Environmental Ethic*, *supra* note 66, at 33-39.

161. *See* Tarlock & Lucero, *supra* note 33, at 4.

162. *See, e.g.*, Arnold, *Planning Milagros*, *supra* note 1, at 92-93.

163. *See, e.g.*, *id.*; Marsh & Lallas, *supra* note 146; Nolon, *Duty to Supply*, *supra* note 91; Carol M. Rose, *Planning and Dealing: Piecemeal Land Controls as Problem of Local Legitimacy*, 71 Cal. L. Rev. 837 (1983).

164. Beatley & Manning, *supra* note 5, at 7.

165. "[T]he outpouring of restrictions—zoning regulations, requirements to identify water sources before building new subdivisions or communities, floor-space controls, service demands, greenbelt requirements, and much more—has been invariably outpaced and effectively nullified by exploding population growth, almost all of it resulting from natural increase and international migration." Hundley, *supra* note 8, at 518. *See also* Nolon, *Duty to Supply*, *supra* note 91 (stating that many land use plans are out of date).

C. Property Rights

While government regulators have some control over land and water, primary control over land and water lies with those who hold property interests in land and/or water. In several respects, American property regimes impede our ability to treat land and water in integrated ways. Most obviously, American property law promotes the parcelization and widespread ownership of land.[166] At times, American property institutions have excluded or removed certain groups from this norm of widespread land ownership, among them women,[167] African Americans,[168] Native Americans,[169] Mexican Americans,[170] and the poor.[171] Nonetheless, currently American land has many owners—individuals, families, groups, business entities, nonbusiness organizations, and government entities. This widespread ownership creates problems of coordination and integration with respect to natural features of land that do not correspond to legal boundaries and ownership patterns and often means that one owner's activities on his or her land have impacts on neighbors and a surrounding (sometimes very broad) community.[172] In calling for the "non-ownership of land at the water's edge," Prof. Robert Adler highlights the ecological harms that come from the fragmenting parcelization and privatization of natural ecosystems where the boundaries between land and water are neither clear nor defined physically, chemically, or biologically.[173]

American law also treats property as an abstract "bundle of rights" that can be fragmented, disaggregated, and held by many. Thus, at least theoretically, the right to use land can be analyzed separately from the right to exclude others. Both of these rights can be analyzed separately from the rights to possess land and to manage and receive income from land, among others. Each "stick" in the bundle of rights can be chopped up into smaller pieces so that many can hold rights in the same land. In fact, the "bundle of rights" theory of property posits that the land—the object of the property rights—is unimportant conceptually; instead, the nature of relationships among rights-holders is what property means. This approach disconnects those with interests in land from the land itself and the characteristics (including natural or ecological characteristics) of the particular land in question. It also treats rights as separate from duties and responsibilities, instead of treating rights, duties, and responsibilities as parts of integrated relationships with the land and with other interest-holders, including neighbors and community. Its abstraction and anthropocentrism disconnect people and institutions from the concrete realities and contexts of lands as interconnected parts of ecological systems or communities. Although there is reason to believe that people and legal institutions treat property more like an integrated "web of interests" than a fragmented "bundle of rights," there is little doubt that traditional property norms facilitate environmental harm, personal and social alienation, weak ethics, and economically sub-optimal "unbundling" of property interests.[174]

American property law also disconnects property in land from property in water.[175] Land ownership is possessory by nature. In contrast, rights in water are merely usufructuary and a number of state constitutions or laws declare that the state owns the surface waters within its borders. In prior appropriation states, water rights are completely separate from land ownership. They depend on priority of appropriation, and the water may be used off-site and, with a few exceptions, even out-of-basin, regardless of who owns the riparian land and whether the appropriator (who holds the water rights) owns the land on which the water is ultimately put to use. Rights to surface water in riparian states and rights to groundwater are generally based in land ownership but have evolved to allow off-site and even out-of-basin transfers, depending on the state, as well as shared management of common water resources. In addition, across the United States, water law has accommodated and facilitated the creation of water institutions that develop and manage water that they supply to users on lands lacking a (usable) supply of water. These factors contribute to disconnections and mismatches between decisions about land use and decisions about water resources.

D. Humans and Nature

The most foundational problem of fragmentation is the disconnect between people and nature. We are disconnected from nature in our ethics, our knowledge and understanding, and our behavior. As Prof. Eric Freyfogle asserts, we engage in environmentally harmful land activities fundamentally because we in American society lack an environmental ethic, or "land ethic," that values the whole of nature and seeks ecological health in our land practices.[176] Instead, the values reflected in our actions and the normative underpinnings of our legal theories center around self-gratification, individualism, anti-community libertarianism, and consumeristic consumption, according to Professor Freyfogle. According to the philosopher Max Horkheimer, the reason and utilitarianism of modernity alienates people from the natural world, as people fail to appreciate the intrinsic value of nature and instead treat the natural world as a

166. *See* Lawrence M. Friedman, A History of American Law 230-34 (2d ed. 1985).

167. *See, e.g.*, Marylynn Salmon, Women and the Law of Property in Early America (1986); Richard H. Chused, *Married Women's Property Law, 1800-1850*, 71 Geo. L.J. 1359 (1983).

168. *See, e.g.*, Phyliss Craig-Taylor, *To Be Free: Liberty, Citizenship, Property, and Race*, 14 Harv. Blackletter L.J. 45 (1998); Berta Esperanza Hernandez-Truyol & Shelbi D. Day, *Property, Wealth, Inequality, and Human Rights: A Formula for Reform*, 34 Ind. L. Rev. 1213 (2001); Thomas W. Mitchell, *From Reconstruction to Deconstruction: Undermining Black Landownership, Political Independence, and Community Through Partition Sales of Tenancies in Common*, 95 Nw. U. L. Rev. 505 (2001).

169. *See, e.g.*, Johnson v. M'Intosh, 21 U.S. 543 (Mem), 5 L.Ed. 681, 8 Wheat. 543 (1823); Tee-Hit-Ton Indians v. United States, 348 U.S. 272, 279 (1955).

170. *See, e.g.*, Guadalupe T. Luna, *Chicana/Chicano Land Tenure in the Agrarian Domain: On the Edge of a "Naked Knife,"* 4 Mich. J. Race & L. 39 (1998).

171. *See, e.g.*, Quintin Johnstone, *Major Issues in Real Property Law*, 55 Mo. L. Rev. 1, 33-34 (1990); Jane E. Larson, *Informality, Illegality, and Inequality*, 20 Yale L. & Pol'y Rev. 137, 151 (2002).

172. *See* Stewardship Across Boundaries, *supra* note 79; Freyfogle, The Land We Share, *supra* note 77.

173. Robert W. Adler, *The Law at the Water's Edge: Limits to "Ownership" of Aquatic Ecosytems*, *in* Wet Growth, *supra* note 31.

174. Arnold, *Web of Interests*, *supra* note 77.

175. *See generally* Tarlock, *supra* note 129; Tarlock, *Local Governments*, *supra* note 33, at 11278-79.

176. Eric T. Freyfogle, *Private Rights in a Connected Land*, *in* Wet Growth, *supra* note 31.

dominatable means to anthropocentric ends.[177] Alternatively, our treatment of the natural environment may be a manifestation of our overarching hubris and self-centeredness, an alienation from God and neighbor. C.S. Lewis wrote: "Man's power over Nature means the power of some men over other men with Nature as the instrument."[178] We may be recognizing the ethical, spiritual, social, and psychological costs of our alienation from the natural environment, though. There is a substantial emerging set of writings on environmental ethics.[179] Nonetheless, the prospects of a widespread unified environmental ethic seem dim. Studies of people's attitudes toward environmental issues show tremendous variety in ethical orientations, representing an "ethical refraction" across the American public.[180]

As Prof. Holly Doremus highlights, our knowledge and understanding of land-water dynamics (and indeed ecology generally) and of human impacts on land and water are limited. She writes:

> We frequently do not fully understand environmental background conditions, the extent of anthropogenic change, or the effects of our actions on aquatic systems. Without that information, we do not know what limits we need to impose in order to abide by our principles. Being optimists by nature, we have a tendency to allow activities to go ahead until we force ourselves to see their impacts. Furthermore, aquatic systems are often affected by multiple, overlapping causes, making it difficult to precisely identify those actions and those actors responsible for the harm.[181]

Professor Doremus offers several examples of complexity and uncertainty in watershed planning and management efforts, including the Everglades in the Southeast, the Columbia River in the Pacific Northwest, and the Platte River in the Great Plains. Doremus is not alone in her concerns. Recently, the U.S. General Accounting Office called for better coordination and consistency in collection of water quality data nationwide.[182] A lesson for watershed planning also might be learned from our experiences with habitat conservation for wildlife that are endangered or at risk. Even though regional habitat conservation planning for biodiversity has many benefits for achieving certainty and key habitat protection that might not be possible through project-by-project decisionmaking,[183] case studies of the natural community conservation planning (NCCP) initiatives in California show that plans were developed without adequate scientific data at the time. Because of this uncertainty and resulting insufficient resources, these plans do not provide sufficient protection of biodiversity and core ecological values.[184] However, we are seeing significant advancements in both the quantity and quality of our information and analytical methods, evidenced by resources like Professor Randolph's *Environmental Land Use Planning and Management*.[185] Another example of our progress is the development of the Long-Term Hydrologic Impact Assessment (L-THIA) technique for evaluating impacts of land use change on runoff. L-THIA departs from traditional methods focused on single storm events of specified recurrence intervals, and instead looks at long-term runoff patterns based on long-term precipitation data, soil type, land use type, and the nature of vegetation and similar surface characteristics.[186] Nonetheless, even as we attempt to improve our understanding of how we affect the natural environment, we need to acknowledge our inherent cognitive limits and tendencies to divide rather than unify knowledge.[187]

Moreover, even when we have good ethics and good information, often our behaviors do not correspond to what we believe or know to be environmentally beneficial. It may be that we simply do not really adhere to the ethics that we espouse in the abstract when concrete application, with costs, is required.[188] The engine of development is difficult to stop or even direct. Housing consumers display the typical American paradoxical behavior of wanting environmental protection but also wanting to live in sprawling suburbia. We have a hopeless optimism that we can satisfy all of our consumer desires without environmental costs or that someone else will sacrifice to conserve our environmental amenities. William Riebsame writes about the "geographies of the New West":

> The coalescence of forces for development, which often disregards community desires, has been called the "growth machine," and the machine is humming along nicely in the West. The well-known cogs in the machine—property rights, investment strategies, profit

177. Max Horkheimer, Eclipse of Reason 92-127 (1985).

178. C.S. Lewis, That Hideous Strength 178 (1946).

179. *See, e.g.*, Ethics and Environmental Policy: Theory Meets Practice (Frederick Ferre & Peter Hartel eds., 1994); Postmodern Environmental Ethics (Max Oelschlaeger ed., 1995); Sacred Trusts: Essays on Stewardship and Responsibility (Michael Katakis ed., 1993); Seeing Things Whole: The Essential John Wesley Powell (William deBuys ed., 2001); Upstream/Downstream: Issues in Environmental Ethics (Donald Scherer ed., 1990); Robin Attfield, The Ethics of Environmental Concern (2d ed. 1991); J. Baird Callicott, In Defense of the Land Ethic: Essays in Environmental Philosophy (1989); Carson, *supra* note 79; Leopold, *supra* note 79; Aldo Leopold, The River of the Mother of God and Other Essays (Susan L. Flader & J. Baird Callicott eds., 1991); Aldo Leopold, For the Health of the Land (J. Baird Callicott & Eric T. Freyfogle eds., 1999); Max Oelschlaeger, The Idea of Wilderness (1991); Holmes Rolston, III, Environmental Ethics: Duties to and Values in the Natural World (1988); Joseph Sittler, Evocations of Grace: Writings on Ecology, Theology, and Ethics (Steven Bouma-Prediger & Peter Bakken eds., 2000); Richard Sylvan & David Bennett, The Greening of Ethics (1994).

180. Robert E. Manning, *Social Climate Change: A Sociology of Environmental Philosophy*, *in* Reconstructing Conservation, *supra* note 77, at 207-22.

181. Holly Doremus, *Crossing Boundaries: Commentary on "The Law at the Water's Edge," in* Wet Growth, *supra* note 31.

182. U.S. GAO, Watershed Management: Better Coordination of Data Collection Efforts Needed to Support Key Decisions (2004) (GAO-04-382).

183. *See* Arnold, *Conserving Habitats*, *supra* note 1; Buchsbaum, *supra* note 138; Marsh & Lallas, *supra* note 146.

184. Mandy Revell, Natural Community Conservation Plans: Inadequate Protection of Biodiversity (2004) (unpublished manuscript) (on file with author) (case studies of NCCPs in California, analyzed from the perspective of conservation science and ecology).

185. Randolph, *supra* note 4. *See also* Jeer et al., *supra* note 57; Bosselman, *supra* note 79.

186. Leitch & Harbor, *supra* note 117.

187. Freyfogle, Justice and the Earth, *supra* note 77, at 133-54; Orr, *supra* note 79; Thompson, *Tragically Difficult*, *supra* note 77.

188. For a classic discussion of the challenges of acting on one's beliefs in the face of costs, see Dietrich Bonhoeffer, The Cost of Discipleship (1937) (R.H. Fuller trans., 1959, rev. Irmgard Booth ed., 1963, reprinted 1983). Dr. Dietrich Bonhoeffer's faith motivated his active opposition to the Nazi government in Germany, for which he paid with his mortal life.

> margins, government subsidy, growth-oriented land-use planning and zoning, and the notion that any community not growing is dying—are now increasingly driven by an additional fuel: landscape preferences. Economists Thomas Power and Ray Rasker tell us that the West's new economy is driven by people seeking a higher quality of life. They go where they want to live and bring development with them.[189]

It may be that economic self-interest, cognitive biases and limits, finite resources, and institutional constraints pose obstacles to acting on our environmental ethics, or more problematically, translating individual environmental responsibility into social change and actual results.[190] Or it may be that the process of "working out an environmental ethic" in practice is complex, multifaceted, and poorly understood.[191] In particular, fragmentation of disciplines of study and research impede our understanding of how environmental ethics translate into behaviors across a range of people and settings so as to translate into effective environmental conservation.[192]

In particular, how we frame our problems and decisions about land use, water use, and water quality often impedes finding an integrated, sustainable approach to land use. Framing is a cognitive and social process by which we organize, orient ourselves to, and understand the world and specific events, phenomena, conflicts, and problems that we encounter. It occurs in individual mental processing, interpersonal dynamics, group dynamics, and social (including societywide) processes.[193] In general, we repeatedly frame land use decisions as discrete decisions about private control of land subject to regulation to protect nearby neighbors' interests. In our framing of land use decisions, we disconnect such decisions from impacts on waters and watersheds, minimize the prospects and effects of environmental harms that could result from land use activities, worry more about impacts on recreational and scenic amenities than on ecosystem health, and assume that the greatest harms to the environment would come from new, large development projects instead of from daily activities and existing land uses.

The reasons why we frame land use problems in these ways are increasingly explained by psychology and by the vague, passive content of our environmental values. We have limited cognitive capacity to process and understand all of the relevant interconnections in the natural world that are in a state of flux and all of the countless points of human relationship to the natural environment, including the cumulative and synergistic effects of endless permutations of decisions and actions. Out of necessity, we adopt heuristic devices or mental shortcuts, some of which involve faulty assumptions, artificial categorization schemas, and mental fragmentation of things that are in fact interconnected.[194] Implicit in the suggestions by Professor Doremus for improving our information about the environmental impacts of growth and land use activities is the need for more accurate, sophisticated mental schema, assumptions, and information-processing models when we make land use decisions. Similarly, our areas of knowledge and expertise are fragmented across different disciplines and professions, and we need to move toward more multidisciplinary, collaborative work.

We tend to see environmental regulation, ecosystem conservation, and water management as matters for experts to decide and control, although land use regulation seems to be a shared responsibility of experts and nonexperts and there is some counterexpert sentiment among some grass-roots environmental groups and members of the public. We frame environmental issues, including watershed health, as scientific and technical problems instead of problems of human values and human behaviors. One of the strongly ingrained results of this framing bias is a delegation of decision-making to professionals and managers who make decisions biased by professional norms, organizational culture, self-interest, and concepts of the public good shaped by their limited disciplinary or experiential perspectives.[195] Prof. Charles Wilkinson writes:

> Western water has long been the province of "experts," mostly engineers and lawyers. Professionals from many other disciplines—economists, historians, biologists, sociologists, political scientists, and ecologists are just a few—have much to offer to water policy. So, too, does the generalist, the conscientious citizen, have much to offer this field, where a fresh look is so critical. . . . The engineering mentality has been one factor in making water policy one-sided in favor of building and extractive uses. It is now clear that there is much more in our rivers than we are allowed to see through the lens with which our policies view them.[196]

We also tend to see regulation as an outer limit on private control of land, water, and the environment. For example, land use controls in the contemporary United States generally are prohibitive, as opposed to mandatory, means of environmental stewardship. In other words, they restrict certain land uses and land use practices and only require affirmative action by landowners when the landowner seeks a government permit to do something that is otherwise prohibited. In contrast, in the colonial period, according to the legal historian Prof. John Hart, land use law required landowners to make certain affirmative uses of their lands or lose title to them.[197] As a result of our current system, we find

189. Riebsame, *supra* note 85, at 49.

190. *See* Ann E. Carlson, *Recycling Norms*, 89 CAL. L. REV. 1231 (2001); Thompson, *Tragically Difficult*, *supra* note 77.

191. Arnold, *Environmental Ethic*, *supra* note 66, at 48-55.

192. *Id.*

193. Barbara Gray, *Framing of Environmental Disputes*, *in* MAKING SENSE OF INTRACTABLE ENVIRONMENTAL CONFLICTS: CONCEPTS AND CASES 11-34 (Roy J. Lewicki et al. eds., 2003); Amos Tversky & Daniel Kahneman, *The Framing of Decision and the Psychology of Choice*, 211 SCIENCE 453 (1981). *See also* JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (Daniel Kahneman et al. eds., 1982) [hereinafter JUDGMENT UNDER UNCERTAINTY]; ROBIN HOGARTH, JUDGMENT AND CHOICE 85-111 (2d ed. 1987); ROBERT H. MNOOKIN ET AL., BEYOND WINNING: NEGOTIATING TO CREATE VALUE IN DEALS AND DISPUTES 156-72 (2000); Arnold, *Dispute Non-Resolution*, *supra* note 77, at 1-14; Jeffrey J. Rachlinski, *The Uncertain Psychological Case for Paternalism*, 79 NW. U. L. REV. 1165, 1170-73 (2003) [hereinafter Rachlinski, *Paternalism*].

194. *See generally* JUDGMENT UNDER UNCERTAINTY, *supra* note 193; HOGARTH, *supra* note 193, at 114; Samuel Issacharoff, *Behavioral Decision Theory in the Court of Public Law*, 87 CORNELL L. REV. 671 (2002).

195. *See, e.g.*, Bunyan Bryant, *Issues and Potential Policies and Solutions for Environmental Justice: An Overview*, *in* ENVIRONMENTAL JUSTICE: ISSUES, POLICIES, AND SOLUTIONS 8 (Bunyan Bryant ed., 1995); Cole, *supra* note 136; Sheila R. Foster, *Meeting the Environmental Justice Challenge: Evolving Norms in Environmental Decisionmaking*, 30 ELR 10992 (Nov. 2000).

196. WILKINSON, *supra* note 33, at 291.

197. John F. Hart, *Colonial Land Use Law and Its Significance for Modern Takings Doctrine*, 109 HARV. L. REV. 1252 (1996).

ourselves trying to stop the worst kinds of harms, instead of encouraging, facilitating, and even requiring landowners to use their lands in ways that promote ecosystem health. I do not mean to suggest that we should necessarily switch to a "use-it-this-way-or-lose-it" approach, nor am I convinced that such a sea-change would be politically feasible. However, we need to recognize that we tend to think in the negative (avoid harm), rather than in the positive (do good).

More fundamentally, though, we frame changes in land use practices aimed at environmental conservation as losses. This framing choice has enormous consequences for efforts to adopt and implement new wet growth policies and reforms. Psychology research shows that people are generally loss-averse and, because of a phenomenon known as the endowment effect, treat the loss of something they have as a greater loss than a foregone gain of equal value. Thus, it makes a significant difference whether a limitation on land development or land use is framed as an entitlement that has been taken or as a potential gain that has not been realized.[198]

Although there are many more sophisticated formulations of the factors that lead us to treat limitations on land use as a loss, they fundamentally are private property norms and expectations, a culture of consumerism and self-gratification, and a political philosophy of strong individual freedoms against government control. Whether one thinks that these core American values are harmful or beneficial, they serve as major psychological and political barriers to reforms in legal doctrine, in regulatory programs, and in human behavior and land use practices because they limit how we think about our problems of land use impacts on watershed integrity. Moreover, countervailing norms of environmental protection and ecosystem conservation are weak in effect. Despite widespread support for environmental policies, the depth and content of environmental ethics is quite varied societywide,[199] and environmental values in the abstract often do not translate into consistent behaviors in practice. We look at environmental problems through the lense of unfounded optimism that our behaviors do not have harmful consequences or that major sacrifices will not be needed to protect the environment.[200] We perceive that responsibility for environmental problems rests with others or is diffused over many, thus psychologically freeing us to act in irresponsible or selfish ways.[201] Even when one's commitment to environmental ethics is strong and deep, one may not know how to act on that commitment with any kind of meaningful impact on ecosystem health or social values[202]; thus, we return to the problem of cognitive limits.

Yet another influence on framing is the tendency to see problems as intergroup conflicts and to identify oneself with a group.[203] This insight primarily from social psychology (in contrast to cognitive psychology) is subject to some disagreement about how group identity and intergroup conflict work in a variety of situations. Nonetheless, the insight seems particularly relevant to the kinds of issues raised by the fragmentation of land use and water. We see many of the problems framed as intergroup conflicts: urban users of water and land versus agricultural users of water and land; new-comers (including junior appropriators and new land development projects) versus old-timers (including senior appropriators and existing land uses); communities with abundant financial and political resources versus communities with limited financial and political resources (including low-income communities of color and indigenous communities); and point sources of pollution versus nonpoint sources of pollution. However, this tendency to treat problems as intergroup conflicts promotes fragmentation and impediments to collaborative problem solving. We underappreciate how much our problems and goals are interrelated. For example, polluted runoff from agriculture and polluted runoff from urban development combine to degrade rivers, streams, lakes, and coastal waters.[204] In a success story, groups in the Los Angeles inner city, like the Mothers of East Los Angeles-Santa Isabel, Iglesia Poder de Dios, Korean Youth and Community Center, and the Watts Labor Community Action Committee, joined with the environmental scientists and activists of the Mono Lake Committee to find ways to save the Eastern Sierra's Mono Lake while bringing water conservation tools and environmental education programs to Los Angeles' low-income neighborhoods of color.[205] Nonetheless, our framing mechanisms contribute to fragmented human understandings of, and relationships to, the natural environment. This cognitive, social, and ethical fragmentation is the greatest barrier to an integrated approach to land and water.

IV. New Ideas About Integration: The Role of Land Use Regulation

A. Policy Diversity

The title of the book, *Wet Growth: Should Water Law Control Land Use?*, is purposefully provocative. It is unrealistic and unwise to believe that water law will or should govern

198. Hogarth, *supra* note 193, at 109; Mnookin et al., *supra* note 193, at 164-65; Jeffrey Rachlinski, *Gains, Losses, and the Psychology of Litigation*, 70 S. Cal. L. Rev. 113 (1996); Thompson, *Tragically Difficult*, *supra* note 77, at 256-57; Tversky & Kahneman, *supra* note 193.

199. Manning, *supra* note 180, at 207-22.

200. Holly Doremus, *Biodiversity and the Challenge of Saving the Ordinary*, 38 Idaho L. Rev. 325, 344-45 (2002); Issacharoff, *supra* note 194, at 671; Rachlinski, *Paternalism*, *supra* note 193, at 1170-75; Thompson, *Tragically Difficult*, *supra* note 77, at 258-65.

201. According to psychologists, the diffusion of responsibility correlates to irresponsible, nonresponsive, uncooperative, or even anti-normative behaviors; harms result from no one person or small group of people having psychologically sufficient accountability for his/her/its actions. *See* Michael A. Hogg, *Social Processes and Human Behavior: Social Psychology*, *in* International Handbook of Psychology 305, 321 (Kurt Pawlik & Mark R. Rosenzweig eds., 2000) ("Deindividuation prevents people from adhering to the prosocial norms of society that usually govern our behavior, because the critical factor of identifiability, which is necessary for conformity to norms is no longer present. People regress to a primitive, selfish, and uncivilized behavioral level."). *See also* Bibb Latane & John M. Darley, The Unresponsive Bystander: Why Doesn't He Help? (1970); Albert Bandura, *Social Cognitive Theory of Moral Thought and Action*, *in* 1 Handbook of Moral Behavior and Development 45, 88 (William M. Kurtines & Jacob L. Genuitz eds., 1991).

202. *See* Arnold, *Environmental Ethic*, *supra* note 66, at 6, 50-55; Thompson, *Tragically Difficult*, *supra* note 77, at 267-69.

203. *See, e.g.*, H. Tajfel & J.C. Turner, *The Social Identity Theory of Intergroup Behavior*, *in* Psychology of Intergroup Relations (S. Worchel & W.G. Austin eds., 1985); H. Tajfel & J.C. Turner, *An Integrative Theory of Intergroup Conflict*, *in* The Social Psychology of Intergroup Relations (W.G. Austin & S. Worchel eds., 1979).

204. *See* Herrmann et al., *supra* note 81; Leitch & Harbor, *supra* note 117; Turner et al., *supra* note 10.

205. Arnold, *Environmental Ethic*, *supra* note 66, at 37.

land use decisions, or alternatively that land use planning and regulation will or should govern water management.

Nonetheless, the initially unsettling question of whether one area of law and policy should control the other provokes discussion and reflection on both why and how we might move toward greater integration of land and water controls. This task of seeking new ideas is daunting in several respects. The interrelationships within ecosystems and between ecosystems are complex, dynamic, and varied, involving not only the multitude of interfaces—often place-specific—between land and water but also among other natural processes and component parts, such as wildlife, air and wind, geologic change, and the like. This plane of complexity intersects with the complex set of interrelationships among legal rules, processes, and decisionmakers in all branches of government and at all levels of government. These two planes of complexity then intersect with the complex set of behavioral and social dynamics in which people interact with the natural environment, one another, political and legal systems, and social and cultural forces. Even understanding these relationships—not to mention the more difficult task of designing institutions and methods that effectively address human impact on land and water—is no easy feat and should be pursued with some degree of humility. In addition, new ideas about integrating land and water controls risk being merely ivory tower ruminations or self-indulgent bombast unless they are capable of implementation and at least partially effective. Moreover, it is difficult to develop a comprehensive, cohesive program of "wet growth" when so many different experts disagree about the nature of the problem(s) and the best way(s) to address it/them.

Given this complexity, policy diversity is preferable to focused attention to a single idea or proposed reform. We are more likely to integrate land and water decisions in environmentally sustainable ways if we pursue a variety or mix of efforts and changes at many different levels than if we fixate on one "answer" or "solution." Integration is not the same as centralization. Polycentric approaches to environmental problems and natural resources management can be fragmented and parochial, but they can also be innovative, adaptive, and highly functional.[206] Moreover, policy diversity is often a rational response to the various legal, political, and financial limits to each type of policy, as well as the limited effectiveness of any one policy option to address complex environmental problems in a complex, diverse society.[207] Just as nature is complex and multifaceted, our social institutions and our points of human connection with the natural environment are also complex. We need *diverse methods* of integrating watershed health and integrity into land use at *multiple points* of decision and behavior.

Local land use controls offer great potential for developing diverse methods to address multiple points of impact on land and water. In particular, local zoning mechanisms, as well as related planning and regulatory tools, offer some of the more promising means to incorporate water-related concerns into land use practices and land development patterns. Increasingly we see innovations in "water-conscious" or "watershed-regarding" local land use controls. These diverse innovations reflect the multifaceted, context-dependent aspects of growth's impact on watershed health and aquatic ecosystem integrity, as well as the need for adaptive experimentation and generation of many new ideas. It is telling that one of the more thoughtful urban planning books on sustainable development, Timothy Beatley and Kristy Manning's *The Ecology of Place*, departs from the traditional smart growth literature and instead offers a range of ideas and principles to guide communities in planning and developing "sustainable places."[208]

B. Planning and Zoning for Wet Growth[209]

The integration of aquatic ecosystem protection into local land use requires a comprehensive approach involving the three primary aspects of local land use regulation—planning, zoning, and development permits—and the four primary types of urban impacts on watersheds—water use, pollution, runoff, and habitat loss. In general, localities should give attention to the location of development and growth, the propriety of particular land uses given the characteristics of the land in relationship to the watershed's features and processes, and the design, construction, and ongoing operation/management of development to minimize or mitigate pollution, runoff, water use, and habitat alteration.

Each locality's comprehensive or general plan should incorporate as a primary policy the directive that all growth, land use, and development shall be sustainable with respect to the carrying capacity of all watersheds in which the locality is located, the health and integrity of aquatic ecosystems generally, and the conservation of water resources. Each aspect of the locality's comprehensive plan—land use, transportation and circulation, housing, public infrastructure, economic development, and conservation of open space and natural resources, among others—should be consistent with this policy. The plan should also contain specific objectives and action items directly addressing and effectuating this wet growth planning principle.

Moreover, as Lora Lucero asserted in her comments at the Wet Growth conference, plans must be implemented if they are to have any real effect. Ms. Lucero and Professor Tarlock have argued that "[t]he consistency doctrine is the linchpin for connecting land, water, and growth."[210] The consistency doctrine requires that all zoning and land use decisions be "in accordance with a comprehensive plan," and that planning not be merely advisory or rhetorical.[211] Legislatures in a number of states have adopted statutes expressly mandating that local land use decisions and zoning codes be consistent with written, locally adopted comprehensive plans.[212] Land use experts often comment that comprehensive plans can easily be amended, be ignored, or become out-of-date. However, in my experience as a member

206. *See* BLOMQUIST, *supra* note 153.

207. *See* Thompson, *Policy Diversity*, *supra* note 1.

208. BEATLEY & MANNING, *supra* note 5. For a similarly thoughtful law review article on urban ecosystem management and sprawl, see Nancy Perkins Spyke, *Charm in the City: Thoughts on Urban Ecosystem Management*, 16 J. LAND USE & ENVTL. L. 153 (2001).

209. In addition to the ideas and examples discussed in this section, *see also* Nolon, *Parochialism*, *supra* note 3; Yanggen & Amrhein, *supra* note 33; Green & Alby, *supra* note 33.

210. Tarlock & Lucero, *supra* note 33, at 7.

211. *See* Charles Haar, *In Accordance With a Comprehensive Plan*, 68 HARV. L. REV. 1154 (1955). Actually, this doctrine refers to vertical consistency. Plans must also be horizontally, or internally, consistent among their various parts.

212. Tarlock & Lucero, *supra* note 33, at 7.

of a planning commission and a general plan advisory board in a jurisdiction with a statutory consistency doctrine (California), comprehensive plans play a useful role if neither too much nor too little is expected of them. Plans are not regulations. They do not mandate that a particular vision of future development actually be achieved, nor can they in a system based on private ownership and control of land. Plans must adapt not only to changing conditions but also to inaction by private landowners (who usually cannot be compelled to put their land to the desired use) and development proposals and opportunities not anticipated during the planning process. Often in the periods between comprehensive planning efforts, public officials and planners formulate new planning principles to guide development in response to new or reframed problems. On the other hand, the comprehensive planning process serves to focus officials, planners, and the public on the principles and objectives that they wish to guide development, regulations, and decisions about specific projects. It facilitates the identification of problems that exist beyond specific parcels or particular permit decisions. The consistency requirement, even if it is difficult to enforce legally, imposes background expectations on decisionmakers (and perhaps even landowners and developers) that land use and development must be consistent with the plan's contents or there must be a good reason to justify amending the plan. It can make the process more thoughtful than it might otherwise be (and arguably more thoughtful than decisionmaking processes among other organizations, at least in my experience). Like the pirate's code in *Pirates of the Caribbean*, plans are "more what you'd call 'guidelines' than actual rules."[213]

To effectuate wet growth principles, localities will also need to amend their zoning codes. One option is to review and revise the lists of allowed, conditional, and prohibited uses in various zoning classifications. For example, a city might want to eliminate from its commercial zones some intensive land uses that might involve significant amounts of hazardous chemicals or wastes, and confine such uses to properties zoned for industrial uses. Another option is to adopt performance zoning standards:

> Performance zoning does not regulate land uses, but instead regulates the impacts of activities that occur on land. A performance zoning ordinance establishes certain performance standards for possible negative impacts on neighboring property, such as dust and smoke, noise, odor, vibration, toxic pollutants, runoff, glare and heat, and other nuisances, i.e., negative externalities. It prohibits any land use with impacts that exceed these levels which have been predetermined to be tolerable. There are two ways of classifying performance standards. One is to distinguish between standards related to development density, design, and preservation of natural resources—often associated with areas of new development—and standards related to the nuisance-like impacts of industrial activity, such as air, water, and soil pollution; noise; vibration; and odors—often in established industrial areas. Another is to distinguish between what are known as "primitive" standards, which have only general definitions stemming from common law nuisance concepts, e.g., prohibitions on emission of "any offensive odor, dust, noxious gas, noise, vibration, smoke, heat or glare beyond the boundaries of the lot," and "precision" standards, which are developed from scientific data and reflected in quantifiable measurements, e.g., limits on permissible decibel levels in designated octave bands per second or designated center frequency-cycles per second. Nevertheless, all types of performance zoning ordinances are a supplement to, not a replacement for, traditional, use-based Euclidean zoning. And courts have largely upheld the validity of performance zoning standards both as reasonable means of protecting the public from nuisances and as sufficiently measurable according to a "reasonable person" nuisance standard.[214]

A commonly used technique in protecting watersheds, riparian lands, and aquifers is overlay zoning. An overlay zone imposes additional restrictions and requirements (or sometimes adds permissible uses or exceptions from existing restrictions) on a designated geographic area, while leaving in place the underlying zoning in that area, which is often a mix of various use designations for different parcels or subareas.[215] Local planning officials can select areas for overlay zones based on their functions in the hydrologic cycle (including runoff patterns and proximity to receiving surface waters and groundwater), support for aquatic biodiversity, and potential impact on watershed health if developed. Officials can employ a variety of different categories of overlay zones, each with a different set of restrictions appropriate to the geographic area and its ecological characteristics, so that restrictions are relatively narrowly tailored to minimizing likely adverse impacts of development: a relatively close regulatory "fit" that neither overrestricts land use nor underprotects the environment.

A related technique is the buffer zone. At its core, the buffer zone is simply a designated area with specified land uses selected primarily to serve as a buffer between more-intensive and less-intensive uses. Although a common but questionable practice is to designate multi-family housing to serve as a buffer between commercial/industrial areas and single-family residential subdivisions,[216] it is also becoming common for local or state governments to adopt riparian or shoreline buffer zones that restrict development within a certain distance of river banks, stream banks, and lake shores.[217] These zones help to protect riparian vegetation and habitat, prevent erosion and bank/shoreline alteration, preserve wetlands, and minimize the potential of increased runoff and pollution from proximate development.

Zoning codes are critical starting points for imposing new development standards and restrictions aimed at water-sustainable development, regardless of whether the locality imposes the new regulations jurisdictionwide via traditional Euclidean zoning classifications and generally applicable rules (including even performance zoning), or whether new regulations apply only to specific areas designated as over-

213. Pirates of the Caribbean: The Curse of the Black Pearl (Disney 2003) (statement of Captain Barbossa; consider also the exchange between Captain Jack Sparrow—"I thought you were supposed to keep to the Code"—and Gibbs—"We figured they were more actual . . . guidelines.").

214. Arnold, *Planning Milagros*, *supra* note 1, at 117-18 (citations omitted). *See also* Lane Kendig, Performance Zoning (1980); Frederick W. Acker, *Performance Zoning*, 67 Notre Dame L. Rev. 363, 364 (1991); Witten, *supra* note 33, at 4.

215. Arnold, *Planning Milagros*, *supra* note 1, at 116-17; Witten, *supra* note 33, at 4.

216. Arnold, *Planning Milagros*, *supra* note 1, at 119.

217. *See, e.g.*, Flenner, *supra* note 33; Hutchinson, *supra* note 33; Kuckenski, *supra* note 33.

lay zones or buffer zones (or perhaps some combination of both generally applicable rules and area-specific rules). These regulations might include: restrictions on the percentage of the land that may be covered with impervious surfaces; requirement that users and developers of the land use BMPs (by requiring BMPs in general or by requiring specific, designated practices) to eliminate and control runoff, minimize the use of pollutants on the property, and/or conserve the use of water; standards for evaluating the watershed impact of development proposals and for granting or denying permits; requirements that landowners and developers obtain permits or submit water management plans for review and approval; prohibitions on the uses of certain chemicals on specified lands; and prohibitions on certain types, content, or quantity of runoff from land use activities. They might authorize previously prohibited (or discouraged) sustainable development practices, such as cluster development, meeting parking requirements through shared off-site parking garages, i.e., thus reducing the amount of soil covered by impervious surfaces over the practice of requiring a surface parking lot on every development site, increased building height limits, mixed use projects, nontraditional architecture and design standards, or the use of pervious surfaces for driveways, sidewalks, roads, and patios. They also might include incentives to engage in sustainable development (bonus zoning), such as increased development densities, transferable development rights, exceptions to restrictions, streamlined processes, vested rights, and other advantages not otherwise permitted. These incentives would be conditioned on the developer or landowner using identified sustainable development and land use practices that the locality encourages—but does not require—ones that achieve a higher level of watershed-regarding development than zoning regulations mandate.

Although planning and zoning are necessary foundations to integrating watershed considerations into local land use controls, some of the most significant impacts will result from decisions on land use permit applications and the conditions of approval for the permits. The system of local land use regulation as it has developed in U.S. society today is primarily a system of discretionary permit decisions—decisions about conditional use permits (or their equivalents), variances, subdivision maps or plats (or their equivalents), planned development approvals, development agreements, site plans, and in some cases building permits, construction permits, or grading permits. This system allows officials to evaluate the particular nature and scope of each specific development proposal in its ecological and sociospatial context, given the theory that no two projects are exactly alike in characteristics, location, and impact. Standards in the zoning code guide and constrain the discretion of the officials, yet the permitting system presumes—accurately from the perspective of practical implementation and operation—that an entirely rule-based system cannot be constructed with sufficient precision and detail to avoid both underregulation and overregulation. Planning experts can study and predict the likely impact of the project on hydrologic processes, vegetation and habitat, runoff, water quality, and water consumption, and can identify means to reduce, eliminate, alter, or offset those impacts. Officials may choose to deny permit approvals based on watershed health considerations, but more often than not they will approve development projects with detailed, specific conditions aimed at having the developer or landowner minimize, mitigate, or internalize harmful impacts on neighbors, the community or public (including public infrastructure), and the natural environment. New methods like L-THIA allow planners to evaluate the long-term impacts of various land use changes on runoff and to select conditions and impact fees to minimize or mitigate to impacts attributable to each particular proposed project.[218] The permit-by-permit approach offers all of the advantages and disadvantages of flexibility, piecemeal decisionmaking, loosely constrained regulatory discretion, context-specific outcomes instead of outcomes resulting solely from generally applicable rules, and pragmatic, often-negotiated problem solving.

The conditions that planning officials—local planning staff, planning commissioners, and city or county council members—craft when considering an application for a land use permit (often during or following input from, and dialogue with, the applicant and interested members of the public) can make the difference between unsustainable development and sustainable development. One of the most promising types of conditions involves mandatory BMPs. BMPs may involve design and management of land uses, pollutant source reduction, or runoff control and treatment.[219] Design-related BMPs, sometimes called "conservation and minimization" integrated management practices, involve "clustering development, site 'fingerprinting' or clearing only the area needed and retaining site vegetation, using narrower streets and permeable pavements like grid pavers or porous asphalt, and retaining vegetation and buffers, among others."[220] Other such BMPs may require developers to select drought-resistant and native landscaping, conserve natural vegetation, incorporate water-saving devices into their developments, e.g., low-flow showers and low-flush toilets, design highly efficient irrigation systems, avoid fountains and other water-intensive design features, reclaim and reuse water, and plan for contingent water supplies.

BMPs for pollutant source reduction include litter control policies, management of hazardous wastes, nutrient management plans that "specify fertilizer applications based on calculations of plant uptake," and integrated pest management programs that use alternative pest control measures like "biological controls (i.e., natural enemies and reproductive disruption), cultural methods (i.e., temporal and spatial adjustments to planting and harvesting cycles), and reduced amounts of pesticides that are selective to the species."[221] For example, a model water resource protection ordinance, recommended by the American Planning Association, prohibits any land use in an overlay zone from generating, at the downgradient property boundary, nitrogen levels exceeding five milligrams per liter, and requires new development to remove, on-site, at least 80% of the annual total suspended solids generated from the development runoff, among many other specific and general regulations.[222]

BMPs to manage stormwater and runoff "aim to reduce runoff, increase infiltration, and provide settling, filtering,

218. Leitch & Harbor, *supra* note 117.

219. Randolph, *supra* note 4, at 442.

220. *Id.* at 443.

221. *Id.* at 446-47.

222. Jeer et al., *supra* note 57, at 76, 78.

and biological treatment of the remaining runoff."[223] There are many different types of runoff/stormwater management techniques, the bulk of which fall into six categories: (1) bioretention, e.g., bioretention channels, bioretention benches, which involves a sink that contains mulch, soil, and vegetation usually located in parking lot islands and residential land depressions and that detains and filters runoff; (2) stormwater ponds, e.g., wet ponds, wet extended detention ponds, multiple pond systems, pocket ponds, dry ponds, other storage facilities like cisterns and downspout barrels, which detain and store runoff for slow release and some of which treat runoff through settling and algal uptake of nutrients; (3) constructed wetlands, e.g., shallow marsh, extended detention wetland, wetland-pond system, pocket wetland, which have less biodiversity than natural wetland but are highly effective at detaining and treating runoff through settling and biological uptake; (4) filtration, e.g., surface sand filter, underground sand filter, perimeter underground filter, organic filter, filter strip, which filter sediment and pollutants through the engineered use of sands, vegetation, and organic matter, e.g., peat, compost, charcoal; (5) infiltration, e.g., infiltration trench, infiltration basin, porous pavements with underlying gravel or stone reservoirs, dry wells if used with pretreatment, which involves excavated trenches or drains that provide infiltration of runoff to subsurface flow; and (6) conveyance and open channels, e.g., dry swales, wet swales, level spreaders, diversion beams, which move runoff slowly from the site or to pervious areas.[224]

The use of conditional land use approvals or permits can be especially effective when requiring landowners and developers to use BMPs because particular BMPs appropriate to the land use and location can be selected and incorporated into the permit. BMPs may focus on design, construction, and structural features of the development, or on land user behaviors and practices.[225] Selecting the most effective or appropriate BMPs depends on several factors: location, type of land use, proposed development design and construction processes, operational and management plans for the land use, hydrologic and ecological characteristics of the land, surrounding land uses and their runoff impacts, the types of pollutants that might be used on the property, relative costs and benefits, the capacity of the landowner to implement BMPs effectively, and the types of problems threatening local watersheds.[226] For example, an underground sand filter is suitable for commercial high-density development but not for residential development.[227] A dry swale removes 93% of total suspended solids, 83% of total phosphorous, and 92% of total nitrogen, but offers little flood protection, drains less than five acres, and has a modest performance record for removing metals and poor performance for removing fecal coliform bacteria. A wet pond can drain more than 25 acres at relatively lower initial and maintenance costs than most other practices, and removes 79% of total suspended solids but only 32% of total nitrogen.[228] Discretionary permit decisions, tailored to each specific land use proposal and its potential watershed impacts, are necessary and beneficial because it is difficult or even impossible to create precise, detailed rules fixing the specific mix of BMPs and other conditions for every conceivable land use scenario.

C. Responses to the Skeptics of Local Land Use Controls

It is far more common in the literature on the environmental regulation of land use, though, to reject local land use controls as important instruments for environmental policy. Critics offer several reasons why zoning and city planning fail to protect the environment, and instead recommend regional or centralized governance institutions that can evaluate, plan, and regulate at a watershed level or even at a national level, promoting standardized protection of ecosystems.[229] They argue that local environmental law is essentially a "race-to-the-bottom."[230] This argument has a strong version, which is that local governments have economic and financial incentives to underprotect the environment in order to attract development and industry, and a weak version (perhaps a "walk-to-the-bottom" or a "slide-to-the-bottom"), which is that local governments lack sufficient incentives to consider overall ecosystem or watershed health when regulating land use. However, the overall concept of a "race-to-the-bottom" has been strongly contested.[231] Moreover, there are many examples of strong environmental regulation by local units of government, some of which I have discussed throughout this Article and some of which are analyzed in the work of Professor Nolon.[232]

There is also a concern that increasingly stringent land use controls stimulate a "race to develop": landowners and developers will develop more intensively and harmfully if they perceive that restrictions on land use will be increasing or are starting to increase than if other means of conservation are used.[233] Despite some examples of landowners and developers engaging in the race to develop (including, in some cases, increases in land development permit applications immediately before a new regulation takes effect), the impact, if any, is usually negligible. Prof. Jeffrey Rachlinski's empirical study comparing the health of endangered plants on private lands subject to state regulation and the

223. RANDOLPH, *supra* note 4, at 447.

224. *Id.* at 448-56.

225. *See, e.g.*, JEER ET AL., *supra* note 57, at 56.

226. *Id.* at 56-57.

227. RANDOLPH, *supra* note 4, at 462, tbl. 14.5 (Stormwater Management Practice Selection Matrix for Various Land Uses).

228. *Id.* at 460-61, tbls. 14.3 & 14.4 (Comparison of Urban Stormwater Control and Treatment Practices; Pollutant Removal Capabilities of Stormwater Treatment Practices).

229. For an overview, and rejection, of the typical critique, see Nolon, *Parochialism*, *supra* note 3. For calls for regional, state, or national land use planning, see, e.g., Shelby D. Green, *The Search for a National Land Use Policy: For the Cities' Sake*, 26 FORDHAM URB. L.J. 69 (1998); J.B. Ruhl et al., *Proposal for a Model State Watershed Management Act*, 33 ENVTL. L. 929 (2003); Salkin, *supra* note 6. For a recommendation for a national water policy, see Janet C. Neuman, *Federal Water Policy: An Idea Whose Time Will (Finally) Come*, 20 VA. ENVTL. L.J. 107 (2001). However, several scholars have made strong cases for a major role for local governments in ecosystem management and conservation. *See* Spyke, *supra* note 208; Daniel B. Rodriguez, *The Role of Legal Innovation in Ecosystem Management: Perspectives From American Local Government Law*, 24 ECOLOGY L.Q. 745 (1997); Tarlock, *Local Governments*, *supra* note 33.

230. *See, e.g.*, Been, *supra* note 151, at 509; Ruhl et al., *supra* note 229. *See also* Engel, *supra* note 152; Stewart, *supra* note 152, at 1212.

231. *See, e.g.*, Revesz, *supra* note 152.

232. *See supra* note 3.

233. *See, e.g.*, David A. Dana, *Natural Preservation and the Race to Develop*, 143 U. PA. L. REV. 655 (1995); Barton H. Thompson Jr., *The Endangered Species Act: A Case Study in Takings and Incentives*, 49 STAN. L. REV. 305 (1997).

health of endangered plants on private lands not subject to state regulation showed that regulation produced significantly better biological health.[234] A specific example also questions the "race to develop" wisdom. When San Antonio, Texas, adopted its stringent overlay zoning to protect the recharge zone of the Edwards Aquifer, it exempted from impervious cover limits those lands for which the owner had already applied for a development permit or plat prior to the ordinance's effective date.[235] Interestingly, the exempted land was developed at an average of only 28% impervious cover, even though over the prior two decades new housing subdivisions in the area had averaged 60% impervious cover.[236] Reportedly developers were taking their cues from the strict ordinance (even though it exempted them) and from general public and housing consumer sentiment for environmentally sensitive development.[237] Finally, the number of landowners and developers who have the project planning, financial resources, and foresight to seek permits and/or begin development just before new regulations take effect is likely to be small in comparison to all of the possible land development projects that will be subject to the new regulations. All things being equal, a rational developer will weigh the costs and benefits of hurrying to get a project through the pipeline with the projected economic impact of the new regulations—which most of the time will not prohibit development altogether (in the end, anyway) but instead will require scaling back plans, agreeing to expensive mitigation measures, doing more environmental impact analysis and public relations, and taking more time to process (and perhaps even litigate) permits—and yet may substantially increase the value of the ultimately developed but scaled-back project due to both constraints on the supply of developable land and regulatory protections of nearby environmental amenities enjoyed by the project's consumers.

The third major concern with local land use regulation is that it is fragmented, piecemeal, and chaotic. Local land use planners may lack the information or expertise to assess fully the impact of land use patterns and specific development proposals on watershed health. Policies adopted in one locality may differ and even conflict with policies adopted in a neighboring locality. Some localities may regulate more strictly and others very little or not at all. In this situation, the "exit" option for developers and land use consumers might facilitate a shift in development from the more regulated communities to the less regulated communities, resulting in severe watershed impacts coming quickly and intensively to some places.[238] Local governments might "pick and choose" among possible regulatory reforms instead of enacting a comprehensive program; the result could be ineffectual, symbolic "action" to protect watersheds.

However, these possible objections seem aimed at a wet growth strategy built primarily or solely on local land use regulation. They miss the point that local land use regulation should be just a part of a diverse policy agenda. There will need to be watershed-level planning and coordination of policies. Federal and state governments will undoubtedly play a role. The law and regulations governing water allocation/use and water quality must adapt to consider the impacts of growth and development on watershed health. We will also need private conservation efforts, voluntary decisions by landowners and developers to adopt sustainable land use practices, and changing ethics at personal and societal levels.

At the same time, though, it is clear that local land use regulation will play a critical role. Existing institutional and power arrangements have great staying power. New watershed institutions or other regional planning authorities are not likely to replace local governments as the primary regulators of land use. City and county governments will strongly and effectively resist ceding their core functions and sources of power, particularly the power over local land use. Furthermore, local governments regulate many aspects of land use that have only tangential connections, at most, to watershed health, such as: the signage, hours of operation, and security of a liquor store; a church's request for a variance from building height limits, setback requirements, and prohibition of icons above the parapet; the supply of affordable housing for moderate-, low-, and very low-income households; a new shopping center's number of parking spaces, traffic signals, and flow of traffic in and out of the site; the appropriate land use classification for cyber cafes; review of architectural plans and drawings for changes to an historic house subject to historic preservation regulations; and so forth. Experts in conservation ecology, aquatic biodiversity, water chemistry, and watershed management would not likely have the interest or expertise to take on these kind of decisions in a watershed-based system of land use regulation.

Moreover, neighborhood residents and city voters, who take considerable interest in local land use decisions, are likely to form strong political opposition to a new watershedwide institution usurping the land use regulatory power of the city and county officials with whom local residents seem to have access and some level of comfort. According to Profs. David Callies, David Breemer, and Calvert Chipchase, the system of local land use is designed to balance environmental considerations and economic considerations, which is not done well by agencies focused primarily on environmental policy.[239] In short, it is unlikely that we will see nationwide a wholesale restructuring of land use regulatory authority to a regional or watershed level.

Nonetheless, it is conceivable that watershed-based institutions or processes in which local governments participate could influence local land use regulations or impose on local governments and/or landowners additional minimum requirements for watershed protection. One example of the latter involves current requirements in California that cities and counties use their land use authority to require all new development to use BMPs in minimizing and managing runoff.[240] Indeed, many of the federal and state regulations that affect land use are regulatory "accretions" or "overlays," not

234. Jeffrey J. Rachlinski, *Protecting Endangered Species Without Regulating Private Landowners: The Case of Endangered Plants*, 8 Cornell J.L. & Pub. Pol'y 1 (1998).

235. San Antonio, Tex., Ordinance No. 81491, §§34-925 & 34-926 (Jan. 12, 1995).

236. Needham & Anderson, *supra* note 69.

237. *Id.*

238. For a discussion of the "exit" option, see, e.g., Been, *supra* note 151.

239. David L. Callies et al., *Balancing Water Values and Human Needs in an Enlightened Land Use Planning Regimen*, *in* Wet Growth, *supra* note 31.

240. *See, e.g.*, Hagin, *supra* note 57; Penn, *supra* note 59; Rodgers, *supra* note 57; Wind, *supra* note 57; Yeager, *supra* note 57.

substitute regimes.[241] Regulatory accretions and overlays, new programs and policies, greater coordination among multiple agencies and units of government, and multistakeholder negotiations over regional planning may supplement local land use controls and may even force localities to share responsibility for land use. Nonetheless, powerful forces—deeply ingrained in the American political and sociocultural landscape in less than a century since the widespread adoption of zoning codes—will ensure that zoning and other local land use controls do not become obsolete or largely supplanted, at least on any widespread scale.

Perhaps even more importantly, watershed planning experts emphasize the role of the local level in developing and implementing specific plans. Although it is common in legal literature to refer to planning and management at the "watershed level," watershed specialists and environmental planners call for a more nuanced "nesting" concept in which five levels of scale are considered: basin, subbasin, watershed, subwatershed, and catchment.[242] The basin level (typically covering between 1,000 and 10,000 square miles, draining to a major river) should be considered when developing general policies, but experts recommend the subwatershed (typically covering between 1 to 10 square miles, draining to second-order streams) as the best level for making specific plans and implementing them.[243] Professor Randolph writes:

> Most effective watershed planning is guided by larger issues of the basin, but focuses on smaller scale subwatersheds and catchments for action. Guidance, policies, and financial and technical assistance may be basinwide, but specific plans and implementation occur in subwatershed. The subwatershed is a critical scale for management: It is small enough to be within one or a few jurisdictions, there is a strong influence of land use and impervious cover, there are few compounding pollutant sources, its is small enough for monitoring and mapping at a workable yet detailed scale, and stakeholders have a close connection to the issues and are manageable in number.[244]

V. The Future

Land use regulation, water law, and environmental law are in a state of transition as we consider new ways to link watershed health and integrity to land development and growth. Innovation and diversity characterize the changes that are occurring nationwide, as well as the ideas that experts are offering. Wet growth is, in essence, about transitions. It is about the areas and types of physical, biological, and chemical transition—and connection—between land and water. It is about identifying and understanding the transition from ecological health to ecological degradation, caused or facilitated by land use and development.

However, the wet growth concept is also about transitions to increasingly sustainable practices and policies. The environmental regulation of land use is a growing phenomenon. In less than half the time that zoning has existed in the United States (at least in its contemporary widespread form), we have incorporated into land use controls various means of protecting biodiversity, open space, scenic vistas, riparian and coastal areas, underground aquifers and their recharge zones, wetlands, and other environmental features. We are finally attempting to tackle nonpoint source pollution, not just point source pollution. Both urban and agricultural water users are finding it advantageous, even necessary, to adopt conservation measures—to use water more efficiently. Maintaining instream flows for environmental and recreational reasons has become a much higher priority in the laws and administration of water allocation and use, as well the laws and administration of water quality. A growing number of watersheds are subjects of multistakeholder collaborative processes of planning, problem solving, dispute resolution, and/or management. New watershed institutions are forming, and local units of government are adopting various zoning and other land use regulatory and planning mechanisms aimed at watershed conservation.

The changes may be incremental, ad hoc, fragmented, and perhaps even not nearly as effective as we would like, but they nonetheless are occurring in noticeable ways. The law is relevant not only as a source of tools and mechanisms for effectuating reforms and policy innovations, but also as a means of managing the conflicts that inevitably arise out of transitions.[245] Michele Staples, a partner at Jackson, DeMarco & Peckenpaugh, observed at the Wet Growth conference that agricultural users of water and land are being displaced by both urban and environmental water and land uses. According to Wet Growth conference speakers, the transition to more aggressive control of urban runoff is imposing high costs on developers, local governments, and consumers of new development. Attorneys Paul Singarella, Susan Hori, and Richard Montevideo spoke of these costs and practical difficulties in the bumpy road to incorporating urban runoff controls into land use permitting standards, as well as the distributional equity issues associated with different standards for new development, in comparison to existing land uses. The law of takings is another arena in which the transition to watershed conservation, or wet growth, is playing out.[246] Many of the high profile takings cases of recent years involve restrictions on the use of water[247] or on the use of lands important to the hydrologic cycle and aquatic ecosystem functions such as coastal wetlands,[248]

241. *See, e.g.*, Buchsbaum, *supra* note 138; Marsh & Lallas, *supra* note 146. *See also* J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 Geo. L.J. 757 (2003).

242. Randolph, *supra* note 4, at 256-57.

243. *Id.* at 255-58 (citing, inter alia, T. Schueler, *Basic Concepts of Watershed Planning*, *in* The Practice of Watershed Protection 145-61 (T. Schueler & S. Holland eds., 2000)).

244. Randolph, *supra* note 4, at 258.

245. *See, e.g.*, Karkkainen, *supra* note 77.

246. For a discussion of transitions and takings, see Holly Doremus, *Takings and Transitions*, 19 J. Land Use & Envtl. L. 1 (2003).

247. Tulare Lake Basin Water Storage Dist. v. United States, 49 Fed. Cl. 313, 31 ELR 20648 (Fed. Cl. 2001); Robinson v. Ariyoshi, 887 F.2d 215 (9th Cir. 1989); Franco-American Charolaise, Ltd. v. Oklahoma Water Resources Bd., 855 P.2d 568 (Okla. 1990); Hage v. United States, 35 Fed. Cl. 147, 153 (Fed. Cl. 1996), 42 Fed. Cl. 249 (Fed. Cl. 1998).

248. Palazzolo v. Rhode Island, 533 U.S. 606, 32 ELR 20516 (2001); Loveladies Harbor, Inc. v. United States, 28 F.3d 1171, 24 ELR 21072 (Fed. Cir. 1994).

riparian wetlands,[249] coastal lands,[250] and lands surrounding, and draining to, surface waters.[251]

Transitions are difficult. They involve costs. They redistribute power and resources. They require adaptation to changing and perhaps unforeseen conditions. They involve letting go of some old ways of thinking and adopting new mental constructs, while not losing indiscriminately the best of existing ideas, principles, and ways of life. They involve uncertainty and ambiguity. But they are necessary and inevitable aspects of life. It is common for those who are bearing the greatest burdens of change to complain loudly and assertively but ultimately to adapt to the changes. One way or another we will have to adapt to the fact that our current land use practices in many ways exceed the carrying capacity of watersheds. We will have to pursue growth policies and practices that are smarter than smart growth, at least with respect to the integration of land use and water.

249. Just v. Marinette County, 201 N.W.2d 761, 3 ELR 20167 (Wis. 1972).

250. Lucas v. South Carolina Coastal Council, 505 U.S. 1003, 22 ELR 21104 (1992); City of Monterey Dunes v. Del Monte Dunes at Monterey, Ltd., 526 U.S. 687, 29 ELR 21133 (1999).

251. Tahoe-Sierra Preservation Council v. Tahoe Reg'l Planning Agency, 535 U.S. 302, 32 ELR 20627 (2002); Dolan v. City of Tigard, 512 U.S. 374, 24 ELR 21083 (1994).