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SARAH BATES*

Bridging the Governance Gap: Emerging Strategies to Integrate Water and Land Use Planning

ABSTRACT

This article provides a broad overview of the historical disconnect between land use and water planning. This problem can be described as a "governance gap"—a lack of integration in planning processes and a failure to examine and communicate the consequences of both land use and water choices at various levels of government. This article describes the various problems that arise due to this governance gap, articulates a vision for a more sustainable future based on emerging strategies to integrate land and water use early in the planning process, and suggests key policy changes that would move us more deliberately in that direction. The article focuses on the arid western United States, but many of the tools are applicable throughout the country.

I. INTRODUCTION

Historically, land use and water planning have occurred separately from one another. In most states, land use planning and decisionmaking is the responsibility of local officials, while water allocation happens through the cumulative decisions of many individuals who develop water based on their immediate and projected needs. State officials exert control over water use indirectly, through their administration of water rights; federal agencies play a role through their management of large water storage and delivery projects and through implementation of federal environmental laws.

With few exceptions, land use planners have addressed water in a fairly cursory fashion, if at all. Planners safely assumed that water would be available for all projected growth and would not be a limiting factor. Increasingly, however, local land use decisions run headlong into concerns about the sustainability of water supplies and the impacts of with-

* Senior Fellow, Center for Natural Resources and Environmental Policy, and Adjunct Professor of Law, University of Montana. This article is adapted from a policy report published in the spring of 2011 by the Center for Natural Resources and Environmental Policy, and available at http://cnrep.org/publications/policy_reports.html. This scholarship continues the line of thinking I have pursued with Professor A. Dan Tarlock in a variety of publications; I am deeply grateful for 25 years of fruitful collaboration and friendship.

drawals on aquatic ecosystems, recreational resources, and other important public values.

In some cases, existing uses are depleting finite water supplies, raising questions about their future reliability. For example, in some fast-growing rural areas of Arizona, homeowners draw their water from wells that, prior to their homes' construction, the state water officials declared "not reliable" due to insufficient underground supplies.[1] Some homeowners did not realize the tenuous nature of their water supplies and have been forced to construct cisterns and pay for trucked-in water for their domestic use.[2]

Elsewhere, officials are beginning to face the high social, environmental, and economic costs of obtaining water to meet rising urban demands. Urban growth around Phoenix, Denver, and Boise has been fueled by voluntary, market-based reallocation of water from farms to cities, which will continue in the future.[3] But public outcry over Las Vegas's long reach into rural Nevada signals renewed concerns over the impacts of large-scale water transfers, both on the rural communities from which the water is taken and on the pocketbooks of the consumers receiving it.

Water security issues are more visible in the arid western states, but they are emerging throughout the country. For example, fast-growing Atlanta, Georgia, ran into conflicts with neighboring states in the 1990s when its diversions from Lake Lanier threatened the downstream states' ability to receive the hydroelectric and water supply benefits they counted on.[4] In a 2009 ruling, federal judge Paul Magnuson ruled against Atlanta and the U.S. Army Corps of Engineers (which operates the dam and reservoir from which Atlanta draws its water), but stayed his ruling for three years to allow the parties to work out their differences.[5] The judge noted in his opinion that local governments, motivated by the promise of increased tax revenues, encourage unchecked growth but "do not sufficiently plan for the resources such unchecked growth will re-

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1. Shaun McKinnon, *Developers Cashing in on Weak Water Laws*, ARIZONA REPUBLIC, June 27, 2005, http://www.azcentral.com/specials/special26/articles/0627rwater-main27.html.

2. *Id.*

3. A. Dan Tarlock & Sarah Bates Van de Wetering, *Growth Management and Western Water Law: From Urban Oases to Archipelagos*, 5 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 163, 170 (1999).

4. *See* Lora Lucero, *Water Supplies and Growth: The Elephant in the Living Room*, 62 PLANNING & ENVT'L. L. 3, 4–5 (2010).

5. *In re* Tri States Water Rights Litigation, 639 F. Supp. 2d 1308, 1355 (M.D. Fla. 2009), *rev'd*, 644 F. 3d 1160 (11th Cir. 2011) (holding that the U.S. Army Corps of Engineers was authorized to reallocate reservoir water for urban water supply).

quire. Nor do individual citizens consider frequently enough their consumption of our scarce resources" unless faced with an imminent loss of water as was the case in Atlanta in 2007.[6]

California is another state that has been working on solutions to emerging water security issues. A California water law symposium that convened in 2010 provided an excellent overview of the accomplishments and challenges of that state's ambitious effort to link land use and water through a combination of development approval and environmental review processes.[7] The symposium organizers noted a great deal of commentary about "wet growth" initiatives such as California's 2001 legislation,[8] but there is little agreement about what we are trying to achieve with these efforts: Are we seeking to minimize water depletions and thus protect and restore functioning aquatic ecosystems, or is the emphasis on achieving water security for a growing population in the face of climate uncertainty? This important question—*toward what end?*—is useful to keep in mind in evaluating the emerging strategies and policy options described here.

Although absolute water shortages may provide a hard barrier to growth only in isolated places, the failure to connect land use and water planning will have far-reaching and increasingly unacceptable consequences throughout the country. This problem can be described as a "governance gap"—a lack of integration in planning processes and a failure to examine and communicate the consequences of both land use and water choices at various levels of government. This article describes the various problems that arise due to a governance gap, presents a vision for a more sustainable future based on emerging strategies aimed at closing the gap by integrating land and water use early in the planning process, and suggests key policy changes that would move us more deliberately in that direction.

Part II sets the stage by describing the key characteristics of the western United States, including aridity (exacerbated by climate change) and increasing population with concurrent growth in water demands. Part III describes the separate legal processes of water and land use plan-

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6. *Id.*

7. *See* Symposium, *Real Water: California's Land Use—Water Law Turns Ten*, 4 GOLDEN GATE UNIV. ENVTL. L.J. 1 (2010). *See generally* WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? (Craig Anthony Arnold ed., 2005), for an excellent compilation of thinking on the subject from a national perspective.

8. Paul Stanton Kibel & Anthony A. Austin, *Conservation of What?: An Introduction to the Issue*, 4 GOLDEN GATE UNIV. ENVTL. L.J. 1, 4 (2010) ("Wet growth" refers to the notion that land use planning and development decisions should be coordinated with meaningful assessments of water availability). *See* WET GROWTH, *supra* note 7 for a broad treatment of this subject.

ning and explains historical challenges to their integration, including the important role of federal land management agencies in this region and the overlay of federal environmental laws. Part IV proposes a vision for integrated land and water planning supported by emerging strategies in two broad areas: (1) water-conscious land use planning and decision processes, and (2) community-conscious water supply planning and management. Part V concludes the article by suggesting key policy changes aimed at closing the governance gap and encouraging integration of water and land use planning.

II. A SHIFTING LANDSCAPE

Water and land use decisions take place within the context of a landscape that is dynamic in every sense. Dramatic changes in population growth patterns and lifestyle choices bring new and different demands for (and impacts on) land and water. Moreover, heightened public concerns about the consequences of land and water decisions have resulted in new laws that require additional disclosure and protective measures. Understanding these factors is an important first step in appreciating governance challenges and the need for more integrated land and water strategies in the future. This part highlights the difficulties of land and water planning when rapid population growth occurs in the most arid parts of the country. It then lays out challenges of predicting future water demands, which relate both to population numbers and to patterns of development. These challenges will be complicated by the impacts of global climate change, which will likely exacerbate water shortages in western states. Finally, this part describes the important influence of federal public lands and federal environmental laws on land and water planning in the western states.

A. Where the People Are

People are drawn to scenic, warm parts of the country. As demonstrated by information gathered in the U.S. Census, much of the fastest growth is occurring in areas with the most limited water supplies.[9] Initial figures released from the 2010 census revealed that the U.S. population continues to grow and migrate from the Northeast and Midwest to the South and West.[10] The West experienced a 13.8 percent growth rate between 2000 and 2010, making it the second fastest growing region behind

9. U.S. CENSUS BUREAU, RESIDENT POPULATION DATA (2010), http://2010.census.gov/2010census/data/apportionment-pop-text.php.

10. *Id.*

the South, which grew at a rate of 14.3 percent.[11] All five of the states with the highest growth rates are located in the West: Arizona (24.6 percent), Idaho (21.1 percent), Nevada (35.1 percent), Texas (20.6 percent), and Utah (23.8 percent).[12]

Growth patterns are at least as important as absolute numbers of people, and the trend is toward larger houses spread farther apart from one another. The U.S. Department of Agriculture's *National Resources Inventory* concluded that developed land in the contiguous United States increased 34 percent between 1982 and 1997.[13] During the same 15-year period, population grew by about 15 percent.[14] Thus, our footprint is getting bigger: land consumption occurred at more than twice the rate of population growth. And, as the U.S. Environmental Protection Agency (EPA) noted in presenting this information, more than a quarter of all the land conversion from rural to urban and suburban uses since European settlement occurred in this same 15-year time period.[15]

The development slowdown that accompanied the economic slowdown that began in 2008 dampened the rate of growth and the pressures of development in the region, but not the overall trends.[16] Thus, we can expect to see continued migration of people to the warmer, drier parts of the country in coming decades. This migration increases pressure on already strained water resources.

B. Water Demand Forecasts

So far, lack of water has not prevented urban areas from expanding, but cities such as Las Vegas, Nevada, face formidable physical and political obstacles in their continuing efforts to meet future demands. Part of the challenge is accurately forecasting these demands, which are not linked as tightly as one might expect to population and economic growth figures.

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11. *Id.*

12. *Id.*

13. U.S.D.A., NATURAL RESOURCES INVENTORY (2001), *cited at* EPA, WATERSHED ACADEMY WEB, http://cfpub.epa.gov/watertrain/moduleFrame.cfm?parent_object_id=85 (last visited Nov. 2, 2011).

14. U.S. CENSUS BUREAU (2000), *cited at* EPA, WATERSHED ACADEMY WEB, http://cfpub.epa.gov/watertrain/moduleFrame.cfm?parent_object_id=85 (last visited Nov. 2, 2011).

15. EPA, WATERSHED ACADEMY WEB, http://cfpub.epa.gov/watertrain/moduleFrame.cfm?parent_object_id=85 (last visited Nov. 2, 2011).

16. The 2010 census confirmed that western states continue to gain population, with most increases coming from immigration. U.S. CENSUS BUREAU, *supra* note 9. *But see* Jonathan Thompson, *Demise of the Housing Growth Machine*, HIGH COUNTRY NEWS, GOAT BLOG (Oct. 11, 2011), http://www.hcn.org/blogs/goat/demise-of-the-housing-growth-machine.

According to the U.S. Geological Survey (USGS), the United States as a whole currently uses less water now than it did in 1975, largely because of more efficient agricultural and industrial practices.[17] Indeed, as a 2009 interpretation of the USGS data put it, "the U.S. now produces far more wealth, with far less water, than at any time in the past."[18] Researchers analyzing the "economic productivity" of water (dollars of Gross Domestic Product (GDP) per unit of water used) concluded that this metric has nearly tripled since the 1970s, to $8.45 of GDP produced per hundred gallons used in 2005, from only $3.18 in 1975 (in 2005 dollars).[19]

About 86 percent of Americans depend on public supplies for their domestic water; most of the others rely on private wells.[20] The USGS found that the total amount of water withdrawn for public water supplies increased by just two percent between 2000 and 2005, during which our national population expanded by five percent, reflecting gains in urban water use conservation and efficiency.[21]

Per capita water use varies tremendously, however, with the highest rates occurring in the dry western states where more than half of each household's water is used to water lawns and gardens.[22] Thus, to a large extent, efficiency gains in individual households will be offset by the ongoing migration of people to drier states and the trend toward larger houses on bigger (landscaped and irrigated) lots. A 2005 study of water and growth in California concluded that growth trends in that state indicate an increase in water demand by 40 percent between 2000 and 2030 if per capita use remains constant.[23] Even if per capita use is reduced aggressively, urban water demand will increase by 1.5 million acre-feet, requiring water suppliers to look to a wide range of options: groundwater banking, recycling, conservation measures, and water transfers.[24]

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17. JOAN F. KENNY ET AL., U.S.G.S., ESTIMATED USE OF WATER IN THE UNITED STATES IN 2005 42–45 (2009), *available at* http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf.

18. PACIFIC INSTITUTE, FACT SHEET ON WATER USE IN THE UNITED STATES (Oct. 28, 2009), *available at* http://www.pacinst.org/press_center/usgs/US%20Water%20Fact%20Sheet%202005.pdf.

19. *Id.*

20. KENNY ET AL., *supra* note 17, at 16.

21. KENNY ET AL., *supra* note 17, at 19.

22. WESTERN RESOURCES ADVOCATES, SMART WATER: A COMPARATIVE STUDY OF URBAN WATER USE EFFICIENCY ACROSS THE SOUTHWEST 97 (2003), *available at* http://www.westernresourceadvocates.org/media/pdf/SWChapter4.pdf.

23. ELLEN HANAK, WATER FOR GROWTH: CALIFORNIA'S NEW FRONTIER 29 (2005), *available at* http://www.ppic.org/content/pubs/report/R_705EHR.pdf.

24. *Id.* at 19–20.

Indeed, water suppliers increasingly turn to the market to purchase water already developed for agricultural irrigation, or invest in conservation and wastewater reuse technology. Some cities in coastal areas are exploring options for desalting ocean water or treating brackish groundwater.[25] The search for "new" water is no longer limited to looking upstream for a suitable dam site or drilling a deeper well.

C. Climate Change as the Wild Card

The water supply picture is further complicated by global climate change, which offers a new set of challenges and uncertainties. As climate change researcher Brad Udall testified before Congress in 2010, "water will be the delivery mechanism for many of the most important impacts of climate change."[26] Scientists warn that the very regions experiencing the fastest growth are likely to suffer the greatest impacts from a warming atmosphere.[27] The current predictions agree that this warming trend will continue, and scientists are already observing predicted trends, such as: (1) snowlines moving to higher elevations, with more precipitation falling as rain instead of snow in the winter, and earlier, "flashier" runoff patterns; (2) flooding and erosion during high runoff events, causing murkier rivers and damaging riparian habitat; (3) low streamflows during the hottest months of the summer and early fall, with related fish kills, water quality problems, and competition among water users; and, (4) drier western forests with more extensive insect infestations, leading to tree deaths and more frequent and intense fires.[28]

The Colorado River Basin, which provides hydroelectric power and supplies drinking and irrigation water to 30 million people, may be especially vulnerable to these impacts. The Western Water Assessment concluded in a 2009 report that the reservoirs of the Colorado River could be dry up to half of the time if current demand projections are

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25. *See, e.g.*, Sabrina Shankman, *California Gives Desalination Plants a Fresh Look*, WALL ST. J., July 10, 2009, http://online.wsj.com/article/SB124708765072714061.html.

26. *Oversight Hearing on the Proposed Fiscal Year 2011 Budget Requests for the Bureau of Reclamation and the Water Resources Division of the United States Geological Survey, Before the Subcomm. on Water and Power of the H. Comm. on Natural Resources*, 111th Cong. 4 (2010) (statement of Bradley Udall, Director, National Oceanic and Atmospheric Administration—University of Colorado Western Water Assessment), *available at* http://naturalresources.house.gov/UploadedFiles/UdallTestimony03.11.10.pdf.

27. *Id.* at 6, n.14.

28. Sarah Bates, *Forests in Hot Water: Climate Change, Water, and Our National Forests*, YOUR NAT'L FORESTS, Winter–Spring 2009, at 18, 20, *available at* http://www.cnrep.org/publications/bates_pubs.html. *See generally* STEPHEN SAUNDERS ET AL., HOTTER AND DRIER: THE WEST'S CHANGED CLIMATE (2008), *available at* http://www.nrdc.org/globalwarming/west/west.pdf.

accurate and if Colorado River flows decline by 20 percent, as some studies suggest they will.[29]

Water suppliers recognize their vulnerability and are exploring a variety of avenues to ensure water security in a less certain future. For example, in 2008, eight of the nation's largest water utilities formed the Water Utility Climate Alliance, aimed at combining resources "to improve research into the impacts of climate change on water utilities, develop strategies for adapting to climate change, and implement tactics to reduce their greenhouse gas emissions."[30] For its part, the Colorado Water Conservation Board sponsored a climate vulnerability study to help water managers understand and prepare for climate change impacts on shared watersheds.[31]

Some of the newest information on climate change illustrates a less obvious connection between land use and water resources. Real estate development and recreational activities on desert lands in the Southwest generate large clouds of dust that travel to the high-country headwaters of the Colorado River.[32] These dust clouds coat the winter snow with a dark, heat-absorbing layer that results in faster snowmelt, reducing the amount of water available to fill basin reservoirs by five percent.[33] While this increases the vulnerability of the desert states to water shortages, few expect political leaders in Arizona or Nevada to restrict such development and recreational activities for the sake of protecting high-country snowpack.

Similarly, recent analyses of the steep energy costs of developing, treating, and moving water have underscored the important link between water and energy uses.[34] Water conservation initiatives thus do more than stretch that limited resource further; they also reduce the demand for energy (which lowers greenhouse gas emissions), thus providing some mitigation benefits related to climate change.

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29. Balaji Rajagopalan et al., *Water Supply Risk on the Colorado River: Can Management Mitigate?*, 45 WATER RESOURCES RES. W08201 (2009), *available at* http://cires.colorado.edu/~tpainter/private/courses/geog6960/2010/papers/Rajagopalan.pdf.

30. Press Release, Western Utility Climate Alliance, Major U.S. Water Agencies Form New National Climate Alliance (Feb. 26, 2008), *available at* http://www.wucaonline.org/assets/pdf/press_room_release_022608.pdf.

31. *Climate Change*, COLO. WATER CONSERVATION BD., http://cwcb.state.co.us/environment/climate-change/Pages/main.aspx (last visited Nov. 23, 2011).

32. Jeff Deems & Jeff Lukas, *Dust on Snow and Hydrologic Impacts in the Colorado River Basin*, 7 INTERMOUNTAIN WEST CLIMATE SUMMARY 1 (Jan. 2011), *available at* http://wwa.colorado.edu/IWCS/docs/2011_January/IWCS_Jan2011_Feature.pdf.

33. *Id.*

34. *See generally* THE WATER-ENERGY NEXUS IN THE WESTERN UNITED STATES (Douglas Kenney & Robert Wilkinison eds. 2011).

III. WATER AND LAND USE PLANNING: THE HISTORICAL DISCONNECT

The persistent disconnect between water and land use planning arises from the separate legal bases for each area of governance. Water allocation occurs through thousands of individual decisions, with water rights administered by state agencies, while land use planning is within the authority of local officials. Generally speaking, water planning is subordinated to land use planning. That is, water planners obtain water to meet the demands of expected population growth; local land use planners do not constrain development in response to limited water supplies. It is important to understand these distinct legal authorities before considering options to bring the two closer together.

This part first discusses the historical and modern legal regimes for recognizing water rights and planning for water supplies to meet future demands. It then describes the framework for local land use planning, focusing particularly on the opportunities to consider water availability and demands. Although most land use and water planning occurs under state law, these decisions are also governed by an overlay of federal environmental statutes, two of which are described here. This part concludes by highlighting the importance of federally managed public lands, which dominate the western landscape and provide critical sources of high-quality water for the region's growing population.

A. Water: Individual Actions, Limited State Oversight

Historically, states have taken the lead in recognizing and protecting private claims to use water. Distinct rules for water rights in the eastern and western states reflect different precipitation levels, land use patterns, and other traditions. Eastern states adopted the riparian rights approach, a rule based on shared use of streamflows by owners of water-adjacent lands.[35] In the drier western states, a self-help rule based on the principle of "first-come, first-served" developed into what is now known as the prior appropriation doctrine.[36] Importantly, the prior appropriation doctrine separates water rights from land ownership.[37] A few states retain a combination of these two principles, sometimes called a hybrid system of water rights.[38]

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35. A. DAN TARLOCK ET AL., WATER RESOURCE MANAGEMENT: A CASEBOOK IN LAW AND PUBLIC POLICY 112–13 (6th ed. 2009).

36. *See id.* at 156.

37. *See id.*

38. *See generally* SARAH F. BATES, DAVID H. GETCHES, LAWRENCE J. MACDONNELL & CHARLES F. WILKINSON, SEARCHING OUT THE HEADWATERS: CHANGE AND REDISCOVERY IN

State water administrators, or judicial officials, preside over complex systems of water rights. In some states (such as Colorado), these rights are fully quantified, but many states are a long way from completing their adjudication procedures, so holders of water rights are uncertain as to the amount of water they are legally entitled to use.[39] Federal agencies and tribal governments participate in state administrative processes through their assertion of reserved water rights—claims that date back to the establishment of national forests, national parks, and other federal reservations, as well as the recognition of Indian nations' sovereign authority over lands and waters within their territory.

Groundwater is an increasingly important source of water for growing cities in the urbanizing West. Groundwater laws vary by state, and—with a few notable exceptions—generally do not adequately regulate withdrawals or recognize the connection between aquifers and surface water.[40] In addition to large public water providers that depend on finite aquifers to provide long-term water supplies, a virtual explosion of private domestic wells raises concerns about impacts on surface water supplies, water quality, and public safety.[41]

In most cases, private domestic wells are exempt from any state controls, other than a requirement that the state be notified when a well is drilled.[42] This lack of regulation—and, frequently, lack of information about the extent of groundwater extraction—is a concern especially in rapidly growing rural and exurban areas throughout the country, many of which depend on individual wells rather than public water systems. In some cases, county officials continue to approve low-density housing developments in areas with limited or declining water tables, forcing homeowners to deepen their wells or face conflicts with senior water rights holders whose access to surface water is compromised by proliferating domestic "exempt" wells.[43] Although the connection between rivers

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WESTERN WATER POLICY 136–38 (1993) (providing additional information on the complex administration of water rights); Sarah Bates, *Water in the West: The Evolving Prior Appropriation Doctrine*, *in* WHOSE DROP IS IT, ANYWAY? LEGAL ISSUES SURROUNDING OUR NATION'S WATER RESOURCES 3–34 (Megan Baroni ed., 2011).

39. *See* TARLOCK ET AL., *supra* note 35, at 305–308 (summarizing western states' stream adjudication processes currently underway).

40. *See* A. Dan Tarlock & Sarah B. [Bates] Van de Wetering, *Western Growth and Sustainable Water Use: If There Are No "Natural Limits," Should We Worry About Water Supplies?*, 27 PUB. LAND & RESOURCES L. REV. 34, 51–53 (2006).

41. *See, e.g.*, Dave Wanzenreid, *Montana's Water Loophole*, HEADWATERS NEWS, Oct. 14, 2010, *available at* http://www.headwatersnews.org/p.MTwater101410.html.

42. Nathan Bracken, *Exempt Well Issues in the West*, 40 ENVTL. L. 141, 146 (2010).

43. *See, e.g.*, Montana Trout Unlimited v. Montana Dep't of Natural Resources and Conservation, 133 P.3d 224 (Mont. 2006) (involving a senior water rights holder seeking to halt interference of flows from nearby wells. *See also* SARAH BATES, BLUEPRINT FOR A

and the shallow aquifers typically tapped for domestic wells is not always obvious, the two sources of water usually share a hydrologic connection; thus, drawing water from one most likely affects the other eventually.

Water is a quintessentially public resource. State constitutions provide that the water itself remains the property of the State, and water rights guarantee only the right to use it under particular conditions.[44] Regardless of this, water use is loosely managed in a highly decentralized aggregation of mostly private decisions. State officials, who legally operate as trustees for the public's resource, exercise limited authority over the allocation and use of water.[45] They generally step in only when there is a proposed change in the use of a water right, which requires state approval, or when there is a conflict between several existing water users requiring a determination of whose rights will prevail.[46]

States historically administered water rights separately from water quality protection.[47] On the one hand, polluted water is less useful for domestic supplies, irrigation, and recreation, so all water users have a clear stake in maintaining safe and sanitary water supplies. On the other hand, water diversions themselves may lead to the concentration of natural salts and chemicals, resulting in subsequent water quality problems—a fact that the legal system recognizes poorly, if at all.[48] Despite the physical realities connecting water use and water quality, California is the only western state with a single administrative body (the State Water Resources Control Board) that considers the two together.[49]

In addition to minimizing the discharge of pollutants into surface waters, resource managers may seek to dilute contaminants through

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GROUND WATER MITIGATION PILOT PROJECT IN MONTANA (2009), *available at* http://www.tu.org/sites/www.tu.org/files/documents/GroundwaterBlueprintSept2009.pdf (discussing regulatory options to address approval of small wells in areas with limited or declining water tables).

44. TARLOCK ET AL., *supra* note 35, at 399.

45. TARLOCK ET AL., *supra* note 35, at 415.

46. *See generally* David H. Getches & Sarah B. [Bates] Van de Wetering, *Integrating Environmental and Other Public Values in Water Allocation and Management Decisions*, *in* IN SEARCH OF SUSTAINABLE WATER MANAGEMENT: INTERNATIONAL LESSONS FOR THE AMERICAN WEST AND BEYOND 69 (Douglas S. Kenney ed., 2005); Douglas Grant, *Public Interest Review of Water Rights Allocation and Transfer in the West: Recognition of Public Values*, 19 ARIZ. ST. L.J. 681 (1987).

47. *See generally* DAVID H. GETCHES, LAWRENCE J. MACDONNELL & TERESA RICE, CONTROLLING WATER USE: THE UNFINISHED BUSINESS OF WATER QUALITY PROTECTION (1991).

48. *Id.* at 4.

49. *Id.* at 97. *But cf. id.* at 95 (noting that Washington State administers water allocation and water quality protection in a single executive department under the same director).

streamflow protection measures.[50] Recreationists and other instream users benefit when streamflows are maintained for water quality protection. Yet, water quality is a benefit not often recognized when justifying environmental flow protection programs for fish, wildlife, recreation, and scenic purposes.

State agencies responsible for water rights administration often engage in planning efforts to balance long-term supplies for their residents with protection of the public's water resource in its rivers, lakes, and aquifers. State water planning emphasizes infrastructure development and broad projections of demands, an outgrowth of the highly decentralized system of prior appropriation as the framework for water allocation.[51] Some states do not conduct statewide water planning at all. Maryland, for example, leaves long-term water supply planning to its river basin commissions, which only cover portions of the state.[52] Significantly, whatever the degree of statewide water planning, states rarely consider the value choices inherent in choosing among competing demands for water, nor do they allow for dialogue about the desired future conditions of public resources affected by water use.[53]

In a promising move to encourage dialogue about water use and planning, Colorado convened nine Basin Roundtables in 2005, involving diverse local leaders and stakeholders in a statewide conversation about water choices.[54] This collaborative approach emerged from a Statewide Water Supply Initiative, and aimed at involving diverse groups of people to learn about and provide input on water planning.[55] The legislation[56] also created a 27-member Inter-Basin Compact Committee to facilitate conversation within and among the state's river basins.[57] The Roundtable process is a work in progress, and some are frustrated by the lack of concrete outcomes, but it offers a starting point for a dialogue and shared learning process that is lacking in most states.

Importantly, many critical water decisions occur at the local level, as municipal and regional water suppliers seek and hold water rights

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50. *Id.* at 107.

51. *See generally* David H. Getches, *Water Planning: Untapped Opportunity for the Western States*, 9 J. ENERGY L. AND POLICY 1, 25 (1988).

52. *See* JAMES R. COHEN, WATER SUPPLY AS A FACTOR IN LOCAL GROWTH MANAGEMENT PLANNING IN THE U.S.: A REVIEW OF CURRENT PRACTICE, AND IMPLICATIONS FOR MARYLAND 71 (2004), *available at* http://www.smartgrowth.umd.edu/pdf/Cohenwater.pdf.

53. Getches, *supra* note 51.

54. *See generally Colorado's Water Supply Future: Cooperation vs. Competition*, HEADWATERS (Spring 2009), *available at* http://www.cfwe.org/flip/catalog.php?catalog=hw19.

55. *Id.* at 11.

56. H.R. 05–1177, 65th Gen. Assemb., 1st Reg. Sess. (Colo. 2005).

57. COLO. REV. STAT. § 37-75-105 (2011).

that enable them to ensure consistent deliveries into the future. While state agencies may be responsible for large-scale planning, the long-range plans of these local water suppliers play a key role in determining where water will come from and where it will be used in the future. This jurisdictional proximity to local land use planners offers the opportunity for more coordinated efforts, but such collaboration has not been uniformly pursued.

B. Land Use: A Local Concern

In contrast with state-led water rights administration, land use decisions occur at the local level, though often under the guidance of state law. Unlike water law, land use planning explicitly embraces public values beyond a single resource use. Land use regulations significantly restrict the exercise of private property rights in favor of benefiting the public interests identified in a comprehensive plan and in other public documents.

A community's long-term vision is set out in its comprehensive plan (Plan), a policy document intended to guide specific land use regulations and development decisions in the future, consistent with state law.[58] The Plan thus provides a blueprint for growth, defining the parameters within which development should be allowed and articulating priorities for community amenities.

Several aspects of a typical Plan relate closely to water planning. First, the Plan typically assumes full build-out of available land in predicting population numbers, which are in turn used by water suppliers to forecast future demands.[59] Second, the Plan includes a water infrastructure element, looking at the facilities necessary to serve projected development.[60] This element typically does not include a broad assessment of alternative sources of water or of development patterns that might minimize impacts on aquatic resources.[61]

The Plan is implemented through land use decisions specific to particular areas and proposed developments. Typically a development permit is conditioned on a certification of water availability, which may be issued by the local utility or a state agency administering water rights.[62] In some cases, development is allowed even in the face of uncer-

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58. *Cf.* WASH. REV. CODE. § 36.70A.130 (2011).

59. SCOTT E. COULSON, LOCALLY INTEGRATED MANAGEMENT OF LAND-USE AND WATER SUPPLY: CAN WATER CONTINUE TO FOLLOW THE PLOW? 92 (2005).

60. *Id.* at 18.

61. *Id.* at 67–70.

62. *See, e.g.*, WASH. REV. CODE § 19.27.097 (2011) (requiring applicant for a building permit to provide evidence of an adequate supply of potable water).

tain water supplies. For example, outside the highly regulated "Active Management Areas" of Arizona's most developed cities are numerous fast-growing communities in which development is proceeding in spite of documented insufficient groundwater to serve their domestic wells.[63]

As described in more detail later, in Part IV.A.1, some states and local governments are requiring more rigorous assessments of the reliability of water necessary for new development. Although an encouraging trend, such "show me the water" requirements occur late in the land use planning process.[64] Accordingly, some land use experts are now calling for a more meaningful assessment of water resources earlier in the process, at the comprehensive planning stage.[65]

C. The Federal Overlay: Federal Environmental Laws

Local land use and water decisions take place under the umbrella of federal environmental statutes in addition to the state and local laws described above. The two most influential legal mandates with respect to local land and water decisions are the Endangered Species Act (which prohibits anyone from "taking" a listed species, including destruction of habitat necessary for the species' survival)[66] and Section 404 of the Clean Water Act (which requires a permit for dredging and filling waters of the United States).[67] These laws, enacted by Congress to provide a base level of protection for aquatic and other resources, mandate standards and processes with which local decisions must comply.

For example, in 1990, the EPA vetoed a federal permit for the proposed Two Forks Dam on Colorado's South Platte River,[68] intended to augment long-term water supplies for Denver and surrounding communities.[69] EPA Administrator William K. Reilly determined that there were other more acceptable sources of water that would not destroy valuable wetlands, wildlife areas, and a scenic canyon in a gold-medal trout stream.[70] The dam was never built, and Denver-area water providers

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63. *See* McKinnon, *supra* note 1.

64. *See* Lincoln L. Davies, *Just a Big, "Hot Fuss"? Assessing the Value of Connecting Urban Sprawl, Land Use, and Water Rights Through Assured Supply Laws*, 34 ECOLOGY. L.Q. 1217 (2007) [hereinafter *Hot Fuss*].

65. *See, e.g.*, Lucero, *supra* note 4, at 6–7.

66. 16 U.S.C. §§ 1531–43 (2006).

67. 33 U.S.C. § 1344 (2006).

68. *Recommended Determination to Prevent Construction of Two Forks Dam and Reservoir, Pursuant to Section 404c of the Clean Water Act*, EPA (1990), *available at* http://water.epa.gov/lawsregs/guidance/wetlands/upload/TwoForksRD.pdf. [hereinafter *Two Forks Dam Determination*].

69. *See* BATES, *supra* note 38, at 83.

70. *Two Forks Dam Determination*, *supra* note 68, at 55.

have implemented aggressive water conservation and reuse measures,[71] water purchases and leases from farmers,[72] and innovative arrangements to maximize coordination of surface and groundwater.[73]

In addition to this important regulatory role, federal agencies also provide incentives, in-kind support, and information to support sustainable land use planning and practices. For example, the EPA's promotion of a watershed approach includes extensive online resources such as a "Watershed Academy" and support for local governments, landowner groups, and nongovernmental organizations wishing to plan for watershed protection and restoration.[74]

D. Federal Public Lands

While this article focuses on public processes that influence decisions about water and private lands, it is important to bear in mind the importance of federally managed public lands—particularly national forests—in any discussion of the water-land linkage. After all, national forests account for, and protect, a large percentage of the West's water supply.[75]

Congress authorized the creation of the national forests more than a century ago, in part, "for the purpose of securing favorable conditions of water flows."[76] Today, the U.S. Forest Service (USFS) manages 193 million acres of public forestland, much of it in the high-country headwaters of our nation's major river systems.[77] National forests serve as water towers of the nation, providing water to 66 million people in the United States.[78] According to USFS data, national forests make up only 17 percent of the land in the eight Rocky Mountain states, but provide 62 per-

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71. *See* AURORA WATER PRAIRIES WATERS PROJECT, http://www.prairiewaters.org (last visited Nov. 23, 2011).

72. MARYLOU SMITH & JAMES PRITCHETT, AGRICULTURAL/URBAN/ENVIRONMENTAL WATER SHARING: INNOVATIVE STRATEGIES FOR THE COLORADO RIVER BASIN AND THE WEST, COLO. WATER INST. SPECIAL REPORT SERIES NO. 22, COLO. STATE UNIV. 25 (2010), http://www.cwi.colostate.edu/publications/sr/22.pdf.

73. *See* JOSH HAZARD & DAVID SHIVELY, CONJUNCTIVE MANAGEMENT OF SURFACE AND GROUND WATER RESOURCES IN THE WESTERN UNITED STATES, DEPT. GEOGRAPHY, UNIV. MONT. (Feb. 24, 2011), *available at* http://dnrc.mt.gov/wrd/water_mgmt/clarkforkbasin_taskforce/pdfs/conjunctive_watermgmt_western_us.pdf.

74. *Healthy Watersheds*, EPA, http://water.epa.gov/polwaste/nps/watershed/index.cfm (last updated on Nov. 2, 2011).

75. *Water*, USFS, http://www.fs.fed.us/water (last updated July 19, 2011).

76. 16 U.S.C. § 475 (2006).

77. *Water*, *supra* note 75.

78. *Id.*

cent of their water supplies.[79] Former USFS Chief Mike Dombeck described water as the "forgotten forest product,"[80] but that is beginning to change with a growing awareness of the critical importance of these watersheds.

In addition to providing the source of water to downstream water users, national forests furnish critical ecosystem services, such as preventing erosion, filtering sediment and pollutants, replenishing aquifers, moderating floods and high runoff flows, and protecting water quality.[81] Water flowing through national forests also supports ecologically valuable wetlands, meadows, and riparian corridors, as well as lakes and streams that provide economically important recreational opportunities. Some of these services can be quantified and assigned dollar values; others are less easy to measure. But, as described in more detail later, in Part IV.A.3, national forest managers are working together with municipal water suppliers to explore innovative partnerships to maintain and enhance these valuable services.

USFS's new draft planning rule, released for public comment in February 2011, requires national forest planners to identify priority watersheds for maintenance or restoration early in the assessment process.[82] The draft rule further requires each Forest Plan to include "components to maintain, protect, and restore public water supplies, groundwater, sole source aquifers, and source water protection areas" located on national forest lands.[83] Additionally, the Obama administration's "America's Great Outdoors" initiative[84] recognizes the critical role that public lands play in providing clean and sustainable water supplies, although the report summarizing the initiative's key features focuses far more on water's importance for recreation and fish and wildlife habitat. It urges a landscape-scale ("all-lands") approach to coordinated manage-

79. NATIONAL FOREST SHARE OF LAND AREA & WATER YIELD IN INLAND WEST STATES, U.S. FOREST SERV., https://fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5166259.pdf (last visited Oct. 29, 2011).

80. Mike Dombeck, *The Forgotten Forest Product: Water*, N.Y. TIMES, Jan. 3, 2003, http://www.nytimes.com/2003/01/03/opinion/the-forgotten-forest-product-water.html.

81. *See generally* LYNN SCARLETT & JAMES BOYD, ECOSYSTEM SERVICES: QUANTIFICATION, POLICY APPLICATIONS, AND CURRENT FEDERAL CAPABILITIES (2011), *available at* www.rff.org/RFF/Documents/RFF-DP-11-13.pdf.

82. National Forest System Land Management Planning, 76 Fed. Reg. 8480, 8491 (proposed Feb. 14, 2011) (to be codified 36 CFR pt. 219).

83. *Id.*

84. AMERICA'S GREAT OUTDOORS, http://americasgreatoutdoors.gov (last visited Oct. 29, 2011).

ment across jurisdictional lines to protect and restore healthy river systems.[85]

In summary, the legal regimes that guide land and water decisions in the western United States emerged from several directions and remain only incompletely integrated. The factors described in the preceding part necessitate closer coordination among land use and water planners, as well as new types of partnerships with federal agencies and nongovernmental entities.

IV. EMERGING STRATEGIES TO LINK LAND AND WATER

Despite the many disconnects between water and land use planners, there is now widespread recognition of the need to think about these resources in a more integrated way. For example, the U.S. Departments of the Interior and Agriculture have each announced national water initiatives linked to public land management, explicitly acknowledging the role of public lands as watersheds and calling for management practices aimed at ensuring sustainable supplies of clean water for downstream urban residents and others.[86] California has established the "First Stop Shop for Water Resources"[87] and British Columbia has created the 2008 "Living Water Smart"[88] and "Green Communities Initiative,"[89] all of which provide resources for local planners and elected officials wishing to factor sustainable water use into their land use planning and decision making. These public policy statements and actions illustrate how awareness of the importance of linking water and land use planning is emerging at many different levels of government.

Although these developments are encouraging, implementation remains a work in progress. This part suggests two broad components of a vision for integrated land use and water planning (the "toward what end?" question mentioned in Part I, *supra*), and highlights emerging

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85. A PROMISE TO FUTURE GENERATIONS, AMERICA'S GREAT OUTDOORS 56–57 (Feb. 2011), *available at* http://americasgreatoutdoors.gov/files/2011/02/AGO-Report-With-All-Appendices-3-1-11.pdf.

86. *See The President's Budget Request for the USDA Forest Service in Fiscal Year 2012: Hearing Before the Subcomm. on National Parks, Forests and Public Lands of the H. Comm. on Natural Resources*, 112th Cong. 2–3 (2011) (statement of Tom Tidwell, USDA Forest Service Chief), *available at* http://naturalresources.house.gov/UploadedFiles/TidwellTestimony03.08.11.pdf.

87. *First Stop Shop For Water Resources*, LOCAL GOV'T COMM'N, http://water.lgc.org/ (last visited Oct. 30, 2011).

88. LIVING WATER SMART, BRITISH COLUMBIA'S WATER PLAN, http://livingwatersmart.ca/ (last visited Oct. 30, 2011).

89. GREEN INFRASTRUCTURE, THE P'SHP FOR WATER SUSTAINABILITY IN BC, http://www.waterbucket.ca/gi/ (last visited Oct. 30, 2011).

strategies in two broad areas aimed at achieving this vision: (1) water-conscious land use planning, and (2) community-conscious water planning.

A. Water-Conscious Land Use Planning

> **Vision**: *Land use decisions take into account where the necessary water will come from, and at what economic, environmental, and social cost. Land use decisions are coordinated on a large-landscape scale across jurisdictional boundaries. Land use planning is mindful of water supply constraints, and prioritizes development that is most consistent with maintaining water quality and ensuring sustainable supplies.*

1. "Show Me the Water"

Before approving proposed development, many states and municipalities require assurance that water is available to meet projected demands. In many cases, this is a cursory "check-off" step, but sometimes this evaluation proves an important opportunity for local land use officials to take a hard look at development options and impacts. A survey conducted by the Western Water Assessment concluded that nine of the 11 western states have some form of these statutes, with Utah and Idaho addressing this issue only through local initiatives.[90] Further, only two states outside the West—Vermont and Florida—have such statutes.[91]

The goals of assured water supply statutes are relatively uniform, and include: (1) protecting homeowners by preventing "high and dry" subdivisions; (2) protecting taxpayers and other water customers by ensuring that developers cover the cost of new service; and (3) directing growth to minimize environmental impacts. However, states' approaches vary a great deal, as do their standards for what constitutes "adequate" water for new development.

Although many have written on this subject, University of Utah Law Professor Lincoln Davies provided the most comprehensive framework for comparing the various approaches, categorizing the laws by the following design elements:

> **Compulsory:** Whether there is a strict requirement for all development defined by the statute or an option for local governments to require such review;

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90. Bobbie Klein & Douglas Kenney, The Land Use Planning, Water Resources and Climate Change Adaptation Connection: Challenges and Opportunities—A Review 3–5, *available at* http://wwa.colorado.edu/water_management_and_drought/Land%20use%20water%20final.pdf (last visited Oct. 31, 2011).

91. Lincoln L. Davies, *East Going West? The Promise of Assured Supply Laws in Modern Real Estate Development*, 43 J. Marshall L. Rev. 319, 323 (2010).

Stringency: Whether the law requires substantial proof of "wet water" rather than paper rights, and whether it defines the scope of hydrological review;

Universality: Whether it applies statewide or just in particular designated areas;

Granularity: Whether the law applies to all development or only those exceeding a threshold size or category; and

Interconnected with other plans: Whether the required analysis must explicitly link to existing water planning processes or documents.[92]

No state in the country has enacted an assured water supply law that incorporates all these design elements. However, Davies noted that existing state statutes have succeeded in: (1) protecting consumers; (2) improving local planning by requiring consideration of water supplies; (3) encouraging coordination among water and land use planners; (4) providing valuable early warning of legal and other uncertainties that might make water supplies vulnerable in the future; and (5) promoting water conservation, as developers have an incentive to reduce projected demands by incorporating water saving measures into new homes.[93] Yet, Davies also strongly cautioned that such laws have little impact on sprawl and do not ensure meaningful consideration of environmental, equitable, or economic factors.[94] If poorly designed, Davies concluded, these laws could do more harm than good, by encouraging providers to turn to less-regulated groundwater supplies (and thus deplete natural sources),[95] and by misleading the public into believing that their community's water use is sustainable.[96]

The following examples illustrate the widely varying approaches among the states that have enacted some form of legislation to ensure adequate water for new development, and how each state's statute relates to Davies' criteria.

Arizona, which enacted the first such law in 1980,[97] provides the best example of a non-universal approach. There are vastly different requirements for development within or outside of the state's five major urban areas, which are designated as "Active Management Areas"

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92. *Hot Fuss*, *supra* note 64, at 1280–92.

93. Lincoln L. Davies, *Assured Water Supply Laws in the Sustainability Context*, 4 GOLDEN GATE U. ENVTL. L.J. 167, 177–78 (2010) [hereinafter *Assured Water Supply Laws*].

94. *Id.*

95. *Hot Fuss*, *supra* note 64, at 1278.

96. *Assured Water Supply Laws*, *supra* note 93, at 178, n.59.

97. ARIZ. REV. STAT. ANN. §§ 45–411, 45–411.03 (2011).

(AMA) for groundwater conservation.[98] Within an AMA, development must be conditioned on proof of an "adequate water supply" for 100 years.[99] In the many fast-growing communities outside the AMA, development may proceed in the face of a certification from the State Engineer's office that the water source is "not reliable" due to insufficient supplies.[100]

California has pursued an aggressive—but highly decentralized—approach. Legislation enacted in 2001 requires: (1) an "early warning" in the form of assessment of water supply reliability for large residential, commercial, and industrial development as part of the environmental impact reports at the initial stage of development approval, prepared under the California Environmental Quality Act (CEQA); and (2) later in the process, at the subdivision map stage, written verification of the availability of water for any project meeting these criteria and subject to CEQA.[101]

California does not prohibit developments from proceeding in the face of uncertain water supplies, but it does require rigorous assessment of water availability and impacts of necessary mitigation measures—essentially mandating a risk assessment as part of the development approval process.[102] This is a good example of Davies' "stringency" element, as the statute spells out fairly explicit criteria for assessing the actual availability of water required by the proposed subdivision "during normal, single-dry, and multiple-dry years within a 20-year projection."[103]

The California approach integrates land use decisions with water planning by explicitly referencing urban water management plans as part of the process—and thus has resulted in more effective communications among planners from these different sectors. The main objection to the state's approach is that too many projects escape scrutiny; and the 500-unit threshold means that it does not meet Davies' "granularity" ele-

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98. *See generally* Chris Avery, Carla Consoli, Robert Glennon & Sharon Megdal, *Good Intentions, Unintended Consequences: The Central Arizona Groundwater Replenishment District*, 49 Ariz. L. Rev. 340, 341–42 (2007) (discussing that regulation differs dramatically based on whether an area is a designated AMA).

99. ARIZ. REV. STAT. ANN. § 45-108 (2011).

100. McKinnon, *supra* note 1.

101. S.B. 221, ch. 642, 2001 Cal. Stat. 88; S.B. 610, ch. 643, 2001 Cal. Stat. 94. *See generally* Ellen Hanak, *Show Me the Water Plan: Urban Water Management Plans and California's Water Supply Adequacy Laws*, 4 GOLDEN GATE U. ENVTL. L.J. 69 (2010).

102. Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova, 150 P.3d 709, 718–23 (Cal. 2007), *analyzed in* James G. Moose, *The Relationship Between Water Supply and Land Use Planning: Leading Cases Under the California Environmental Quality Act*, 4 GOLDEN GATE U. ENVTL L.J. 27 (2010).

103. CALIF. GOV'T CODE § 66473.7(a)(2) (2011).

ment.[104] The water verification mandate also does not apply to such big water users as industrial parks, hotels, or office buildings.[105]

Some states with universal requirements, such as Nevada, require that a developer obtain certification of water availability from the appropriate state agency.[106] This is a more centralized approach than in California, but does not necessarily result in more rigorous analysis of water reliability or necessary mitigation. The New Mexico State Engineer examines proposed subdivisions in unincorporated areas to make sure that county plans will fulfill the anticipated maximum water requirements.[107] This review includes analysis of both anticipated water demand and water availability (including water rights and hydrology) over a 40-year planning period.[108]

Colorado's subdivision regulation statute[109] provided the authority for El Paso County (home of Colorado Springs) to enact a stringent regulation requiring developers to secure a 300-year water supply for each proposed subdivision.[110] Colorado municipalities lacked the authority to enact such requirements until 2008, when H.B. 1141 specifically granted municipal governments the same authority as counties to require that developers show an adequate water supply,[111] calling for professional assessment to "account for hydrologic variability."[112] H.B. 1141 also only applies to subdivisions exceeding 50 units, and local governments have complete discretion in their evaluation of water adequacy,[113] thus failing to satisfy both Davies' "granularity" and "compulsory" criteria.[114]

Florida incorporates water needs into local planning by requiring each municipality to adopt a 10-year Water Supply Facilities Work Plan (Work Plan). This Work Plan must: (1) project the local government's needs for the coming decade; (2) identify and prioritize the water supply facilities and source(s) of water that will be needed to meet those needs; and (3) include capital improvements identified as needed for the first

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104. *Hot Fuss*, *supra* note 64, at 1286–87.

105. *Id.* at 1249.

106. NEV. REV. STAT. § 278.377(1)(b) (2010).

107. N.M. STAT. § 47-6-11(2011).

108. Interview with New Mexico Office of the State Eng'r, in Albuquerque, N.M. (Apr. 8, 2011).

109. COLO. REV. STAT. § 30-28-133 (2011).

110. El Paso County Land Development Code, 8.4.7(b)(9) (2008), *available at* http://adm.elpasoco.com/Development%20Services/Documents/Land%20Development%20Code/ldc_chapter_8.pdf.

111. COLO. REV. STAT. § 29-20-303 (2011).

112. COLO. REV. STAT. § 29-20-302(1) (2011).

113. COLO. REV. STAT. §§ 29-20-103 and 29-20-305(1) (2011).

114. *Hot Fuss*, *supra* note 64.

five years.[115] This "concurrency" review requirement effectively integrates land use and water supply planning, although it does not impose as strict an evaluation or balancing requirement as the California model.

Importantly, assured supply laws are not the only approach to assessing the reliability and impacts of obtaining water for projected growth. State legislatures could encourage this analysis earlier in the process by strengthening the requirements for a water resources element in comprehensive plans. For example, they might require that such plans: first, identify the known supplies of water for future development; second, quantify the demand that would result from projected population growth; and third, analyze how demand will be met by available supplies (or what additional water will have to be obtained).

This level of analysis at the broader planning stage may prove more useful than asking for assurances that water is immediately available once a particular development is under consideration. It would be particularly useful if land use planners worked in close cooperation with water planners in this exercise in long-term thinking, and if the public were involved in a broad dialogue about the choices inherent in such planning.[116]

2. Limiting Growth

Water adequacy issues also arise when municipal growth outruns available water supplies or the infrastructure to deliver water to new users. In some instances, local governments have taken measures to slow or halt new development if water supplies are inadequate or if there is a direct impact on water quality that cannot be mitigated.[117] Courts will uphold a city's power to refuse service until an area is ready for development, as well as a city's power to deny subdivision approvals for new subdivisions with water and sewer service that are inconsistent with a county's land use plan.[118] However, these court imposed limits on municipal growth are generally temporary.[119]

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115. *See* COHEN, *supra* note 52, at 23–39.

116. *See* Julian Conrad Juergensmeyer, *Rainwater Recapture: Development Regulations Promoting Water Conservation*, 43 J. MARSHALL L. REV. 359, 369 (2010) (describing an impressively forward-looking water element in Yankeetown, Florida's, comprehensive plan). *See, e.g.*, SANTA FE COUNTY BOARD OF COUNTY COMMISSIONSERS, *Sustainable Growth Management Plan* (2011), *available at* http://www.santafecounty.org/userfiles/SGMP.pdf (explicitly links water infrastructure to desired growth areas).

117. Tarlock & Van de Wetering, *supra* note 40, at 56–57. *See generally* A. Dan Tarlock, *How California Local Governments Became Both Water Suppliers and Planners*, 4 GOLDEN GATE U. ENVTL. L.J. 7 (2010).

118. *Id.*

119. *Id.*

For example, in 2009, Washington's Department of Ecology placed a 120-day emergency ban on new wells in part of Kittitas County, responding to developers' practice of stretching the exempt-well rules to provide water for subdivisions without getting permits.[120] As described in Part III.A., most private domestic wells are exempt from any state controls, other than a requirement that the state be notified when a well is drilled. The number of such wells is growing quickly and creating tensions with senior water rights holders, particularly irrigators, as documented in a 2010 Western States Water Council report.[121] In fact, despite the State of Washington's bold action in this particular instance, the scope of environmental regulators' authority to regulate domestic wells remains unclear. The Washington State Attorney General issued an opinion recognizing the Department of Ecology's power to close over-appropriated basins to exempt wells, but not to change the terms of the exemption; only the legislature may change the exempt-well standards.[122]

In 2008, Washoe County, Nevada, passed a ballot measure directing city and county officials to revise growth plans to not exceed a total population of 600,000, a number based on evaluation of available water supplies.[123] In the following year, the state legislature considered, but did not enact, a bill that would have elevated this to state law and included stricter growth limits.[124] The subsequent economic slowdown reduced pressure on Washoe County's water resources, and a 2010 assessment concluded that sustainable water resources of approximately 183,200 acre-feet per year are more than adequate to serve a projected 2030 population of 590,500 based on the 2010 census forecast.[125]

3. Protecting and Restoring the Water Source

Planners and local government officials are taking steps to address the watershed-wide impacts of their land use decisions. Some ex-

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120. Press Release, State of Washington Dep't of Ecology, Emergency Rule Closes New Groundwater Withdrawals in Upper Kittitas County (July 16, 2009), *available at* http://www.ecy.wa.gov/news/2009news/2009-165.html.

121. *See* Bracken, *supra* note 42.

122. Cally Carswell, *Death by a Thousand Wells*, HIGH COUNTRY NEWS, Oct. 26, 2009, http://www.hcn.org/issues/41.18/death-by-a-thousand-wells/article_view?b_start:int=0&-C.

123. *Washoe County Voters OK Sustainable Growth Measure,* ASSOC. PRESS, Nov. 5, 2008, *available at* http://www.kolotv.com/news/headlines/33897709.html.

124. A.B. 119, 75th Gen. Ass., Reg. Sess. (Nev. 2009), *available at* http://www.leg.state.nv.us/75th2009/Reports/history.cfm?ID=261.

125. Jess Traver, *Western Regional Water Commission Approves 2030 Sustainable Water Forecast*, BUILDERS MAG., July–Aug. 2010, *available at* http://buildersmagazine.com/2010/ja/water.htm.

amples include zoning and subdivision rules aimed at protecting sensitive stream corridors,[126] aquifer recharge initiatives,[127] and clustered development to minimize impervious surfaces (streets, parking lots, and other hard surfaces that prevent precipitation from soaking into the soil).[128] These measures protect water quality and supply, and also provide enhanced public safety, community open space and greenways, and other ancillary benefits.

Protecting a local water source usually requires reaching well beyond municipal boundaries, forming partnerships with people and agencies that own the lands that provide valuable watershed services. For example, in 1997 New York City entered into an agreement with regional partners to protect its 2,000-square-mile watershed, which extends 125 miles north and west of the city.[129] Collaborative work with a regional forum called the Watershed Protection and Partnership Council protects the city's drinking water quality and avoids the estimated $8 billion price tag for a new filtration system, plus $300 million in annual operating costs.[130] The partnership also emphasizes economic opportunities for residents in the upstate watershed communities.[131]

Other cities are working directly with public land managers to protect their watersheds. In Colorado, Denver's "Forest to Faucet" initiative[132] is the largest example of such an approach. Large wildfires on national forests in Denver's watershed in 1996 and 2002 led to erosion and sedimentation in Denver Water's mountain reservoirs, forcing the municipal supplier to spend $30 million to dredge the muck from just one reservoir.[133] To prevent such expensive impacts in the future, Denver

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126. *See* SETH J. WENGER & LAURIE FOWLER, CARL VINSON INST. OF GOV'T, UNIV. OF GEORGIA, PROTECTING STREAM AND RIVER CORRIDORS 59–66 (2000), *available at* http://www.cviog.uga.edu/free-downloads/57.pdf.

127. In Washington State, local governments can designate "areas with a critical recharging effect on aquifers used for potable water" as Critical Aquifer Recharge Areas, which are subject to extra regulation to protect drinking water supplies and quality. Washington State Dep't of Ecology, *Growth Management Act Information*, http://www.ecy.wa.gov/programs/wq/grndwtr/cara/gma.html#cara (last updated Aug. 2007).

128. The relationship between paved surfaces and water runoff is illustrated at *Low Impact Dev. (LID)*, MASSACHUSETTS EXEC. OFFICE OF ENERGY AND ENVTL. AFFAIRS, http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-lid.html (last visited Nov. 2, 2011).

129. *See Watershed Protection and Partnership Council*, NEW YORK DEP'T OF STATE, http://www.dos.state.ny.us/watershed/index.html (last visited Nov. 2, 2011).

130. *Id.*

131. *Id.*

132. *From Forests to Faucets: U.S. Forest Serv. and Denver Water Watershed Mgmt. P'ship*, DENVER WATER, http://www.denverwater.org/SupplyPlanning/WaterSupply/PartnershipUSFS (last visited Nov. 2, 2011).

133. *Id.*

Water partnered with USFS to assess and prioritize threats to the watersheds that supply the city's water. In August 2010, the two agencies signed a memorandum of understanding in which they agreed to equally share the $32 million price tag of on-the-ground treatment projects over five years.[134]

Most of the projects contemplated by the "Forest to Faucet" agreement are aimed at reducing the risk and severity of wildfires on lands owned by the USFS and Denver Water, largely by thinning and prescribed burning.[135] Additional measures may include road and culvert removal.[136] Denver Water intends to pay for its share of the work with a modest rate increase for water customers, and has reported that it does not expect significant customer resistance.[137] Indeed, considering that the annual value of water produced by USFS lands alone is estimated at nearly $4 billion,[138] the trend toward "payment for watershed services" (or, as Carpe Diem West describes it, "user contribution programs")[139] illustrates a partnership model that is mutually benefical for municipalities, municipal water customers, and federal land agencies.

In New Mexico, Santa Fe's, watershed protection program emerged in the wake of the Cerro Grande Fire in 2000. That fire, and projections of more frequent "megafires" in a warmer, drier future, prompted Santa Fe officials to address the vulnerability of water sources on national forest land in the Santa Fe River watershed.[140] Using a $50,000 grant from USFS's Collaborative Forest Restoration Program, the city developed a comprehensive watershed plan addressing water and vegetation management, education, and funding.[141] The plan calls for a phased-in "ecosystem services" fee (about $0.54 per month for the average water customer) assessed to water customers to support this work.[142] Public support for the concept appears strong. A poll conducted by The

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134. *Id.*

135. *Id.*

136. *Id.*

137. *Id.*

138. USFS, WATER AND THE FOREST SERVICE ii (2000), *available at* http://www.fs.fed.us/publications/policy-analysis/water.pdf.

139. CARPE DIEM WEST, LINKING UPSTREAM WATERSHED HEALTH TO THE HEARTS, MINDS & WALLETS OF DOWNSTREAM WATER USERS 1 (Oct. 2010), *available at* http://carpediemwest.org/sites/carpediemwest.org/files/UCPReportFINALOctober2010_0.pdf.

140. *See* Phil Taylor, *Forests: To Protect Tap Water, Cities Sharing Costs of Slowing Wildfires*, GREENWIRE, Aug. 17, 2011, *available at* http://www.eenews.net/public/Greenwire/2011/08/17/4.

141. *Id.*

142. View the full plan at SANTA FE WATERSHED ASS'N ET AL., SANTA FE MUNICIPAL WATERSHED PLAN, 2010–29 (Feb. 18, 2009), *available at* www.santafenm.gov/documentview.aspx?DID=4354.

Nature Conservancy and the Santa Fe Watershed Association in the spring of 2011 found that 82 percent of ratepayers were willing to pay a charge of $0.65 per month to protect the city's water supply from the risk of catastrophic wildfire.[143]

The nonprofit National Forest Foundation (NFF) pioneered such programs by encouraging voluntary water user fee programs throughout the country.[144] For example, in 2006 Snowbird Resort in Utah initiated an opt-out program that adds a one-dollar charge to each guest's bill to pay for watershed projects that will benefit the Little Cottonwood Canyon watershed.[145] No guest has ever opted out of the charge.[146] A three-member board (representing Snowbird Resort, USFS, and NFF) determines how to spend the funds raised through this fee.[147] Additionally, NFF offers a 25 percent match for watershed protection funds raised through such partnerships.[148]

However, river and watershed protection cannot be achieved solely by regulations and intergovernmental partnerships; thousands of individual residents' choices and land use practices are equally important for the protection of any given watershed. Accordingly, agencies and nongovernmental groups direct a wide range of educational campaigns at landowners and urban residents to urge better practices—not dumping oil and other pollutants into stormwater drains, avoiding construction within an active river channel, and a variety of "water smart" landscaping practices to minimize runoff and contamination.[149]

4. Reducing Our Water Footprint

We are coming to understand that our patterns of water use are not sustainable over the long run. Journalist Marc Reisner made a compelling case for the political folly of overreaching water projects and

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143. Fairbank, Maslin, Maullin, Metz & Assoc., *Findings from Recent Survey of City of Santa Fe Voters* 3 (Mar. 28, 2011), http://www.santafenm.gov/DocumentView.aspx?DID=8950.

144. Meeting Summary, Carpe Diem West, Healthy Headwaters Project 3 (Mar. 25, 2011), *available at* http://www.carpediemwest.org/sites/carpediemwest.org/files/HHDenverMeetingSummaryFinal_0.pdf.

145. Meeting Summary, Carpe Diem West, Healthy Headwaters Project 4 (Sept. 16, 2011), *available at* http://www.carpediemwest.org/sites/carpediemwest.org/files/SLC%20Meeting%20Summary%20FINAL%2011.4.10.pdf.

146. *Id.*

147. *Id.*

148. *Id.*

149. Clark Fork Coalition, Stream Care Guide: A Guide for Property Owners in the Clark Fork Watershed (Oct. 28, 2010), http://issuu.com/clarkforkcoalition/docs/cfc_stream_care_guide. *See also Watersheds*, EPA (Oct. 3, 2011), http://water.epa.gov/type/watersheds/index.cfm.

growth premised on a limited and declining resource in his 1986 book, *Cadillac Desert*.[150] A quarter-century later, a group of 15 scientists revisited and applied quantitative measures to Reisner's major observations, and found them prescient and accurate today.[151] These experts concluded that the key action step for "reclaiming freshwater sustainability" in the arid parts of the country is to reduce regionwide human appropriation of streamflows by 16 percent, suggesting that significant gains could be achieved through improved urban and agricultural water use efficiency.[152]

Local officials are increasingly incorporating conservation and efficient use requirements in building codes and similar measures. In some cases, the goal is "no net increase" in water demand through mandatory offsets for new uses. The city of Santa Fe's Water Budget Program, for example, requires that the impact of proposed new development be offset either through conservation in existing development or transfer of water rights to the city.[153] In general, new development projects with lower water use may offset demand through transfer of water rights and/or through conservation achieved in existing development.[154] New development projects with higher demand are only allowed to offset demand through transfer of water rights.[155]

It is not surprising that the strictest water conservation ordinances match up with the driest part of the country. For example, the high-desert city of Prescott, Arizona, enacted mandatory standards for new construction and replacement fixtures in existing homes.[156] The city's ordinance mandates certain types of urinals, showerheads, and faucets to be installed in new buildings, and requires strict water conservation guidelines for bathrooms in commercial buildings used by the general public.[157] The city offers substantial incentives (monetary awards reflected as credits on homeowners' water bills) for homeowners installing

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150. MARC REISNER, CADILLAC DESERT: THE AMERICAN WEST AND ITS DISAPPEARING WATER (Penguin Books 1993) (1986).

151. John L. Sabo et al., *Reclaiming Freshwater Sustainability in the Cadillac Desert*, 107 PROC. OF THE NAT'L ACAD. OF SCI., EARLY EDITION 21263, 21269 (2010), *available at* http://www.pnas.org/content/107/50/21263.full.pdftml.

152. *Id*.

153. Kyle Harwood, *Santa Fe Water Resources and Policy: Evolving "Wet Growth Regulations"* 36 WATER REP. 22, 26 (Feb. 15, 2007).

154. *Id*.

155. This includes commercial projects that require 5 acre-feet per year or more, residential projects that require 10 acre-feet per year or more, or mixed use projects that require 7.5 acre-feet per year or more. *Id.*

156. Julian Conrad Juergensmeyer, *Rainwater Recapture: Development Regulations Promoting Water Conservation*, 43 J. MARSHALL L. REV. 359, 365 (Winter 2010).

157. Prescott, Ariz. Code, §3-10-3(A) (2010).

more efficient fixtures and water saving systems such as rainwater cisterns.[158]

Indeed, providing incentives for homeowners and businesses to install water-saving systems is becoming a common means by which municipalities seek to reduce their water footprint. Communities are updating building codes to encourage people to capture rainfall in order to reduce storm-water runoff (a major source of pollution) and store water for landscape irrigation.[159] Rainfall harvesting is growing quickly in popularity throughout the country, with practices ranging from simple home rain barrels to elaborate catchment systems on commercial buildings, as well as "green roofs" capable of absorbing rainfall and storing it for later use.[160] The city of Portland, Oregon, paid incentives to residents who disconnected their home's downspouts and redirected rainwater from the storm sewer to their gardens instead; after achieving 56,000 disconnects between 1993 and 2011, the city discontinued the financial incentives but continues to provide public education on the benefits of redirecting rainwater to yard irrigation.[161] Albuquerque, New Mexico, requires new homes to be constructed with rainwater collection systems.[162]

Outside of the West, other parts of the country are feeling the water pinch as well, and many are taking steps to reduce water demand through building codes and other local ordinances. For example, in 2008 the City Council of Alpharetta, Georgia, mandated a 10 percent reduction in water use, which has since been implemented through water conservation permit requirements.[163] A commercial developer must submit a water reduction plan with the application for a construction permit, referencing a matrix to determine the amount of water normally consumed by a commercial building (including landscaping).[164]

Conservation and "smart growth" groups provide many suggestions for how to incorporate water saving measures into new construction,[165] and the U.S. Green Building Council's Leadership in Energy and

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158. *Water Smart—Water Conservation*, CITY OF PRESCOTT, ARIZONA, http://www.cityofprescott.net/services/water/conservation.php (last visited Nov. 9, 2011).

159. Juergensmeyer, *supra* note 156.

160. *Id.* Seattle has one of the most advanced Green Roofs programs in the country. *See Department of Planning and Development,* http://www.seattle.gov/dpd/GreenBuilding/Resources/DesignToolsStrategies/DPDS_009485.asp (last visited Nov. 10, 2011).

161. *Downspout Disconnection Program*, PORTLAND BUREAU OF ENVTL. SERVS., http://www.portlandonline.com/bes/index.cfm?c=54651 (last visited Nov. 10, 2011).

162. ROBERT GLENNON, UNQUENCHABLE: AMERICA'S WATER CRISIS AND WHAT TO DO ABOUT IT 191 (2009).

163. Juergensmeyer, *supra* note 156, at 366–67.

164. *Id*.

165. *See, e.g.*, W. RES. ADVOCATES, NEW HOUSE, NEW PARADIGM: A MODEL FOR HOW TO PLAN, BUILD, AND LIVE WATER-SMART (2009), *available at* http://www.westernresourceadvo-

Environmental Design certification includes a prerequisite of a 20 percent reduction in aggregate water use.[166] Sometimes, the key is removing obstacles to water conservation, such as homeowner covenants that require minimum lawn sizes or restrictions on gray water reuse. Colorado amended its state law to allow rainwater harvesting in 2009,[167] but the bill has serious limitations that do not allow this practice in urban settings or on commercial buildings.[168]

B. Community-Conscious Water Planning

> **Vision**: *Water planning and development decisions acknowledge that infrastructure availability often sparks growth ("build it and they will come"), and thus incorporate deliberative public dialogue about long-term land use priorities. Water suppliers seek to make the best use of limited resources, minimizing demands and ensuring that the impacts of water development on highly valued landscapes are acknowledged and taken into account before final decisions are made. Residents are aware of the source of their water and the benefits of conservation and efficient use.*

1. Regional Water Planning and Collaboration

Very few river basins exist within a single political jurisdiction. More commonly, waterways traverse counties, states, and sometimes nations. Thus, water is shared among people living in places with different rules, visions, and practices. Water can be a source of extreme conflict or a connection that unifies people across these artificial lines.[169]

Water and growth related challenges in places as diverse as Atlanta and Las Vegas illustrate the need for solutions that transcend jurisdictional boundaries. In some places, diverse groups of stakeholders and government officials have invented new forms of governance based on

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cates.org/water/newparadigm/NewParadigmReport.pdf; THE ROCKY MOUNTAIN LAND USE INST., SUSTAINABLE COMMUNITY DEVELOPMENT CODE FRAMEWORK (2009), *available at* http://law.du.edu/index.php/rmlui/rmlui-practice/code-framework/model-code.

166. Once this prerequisite is met, the developer may earn additional points for planting water-efficient landscaping, using innovative wastewater technologies, and reducing water below the initial 20 percent threshold. U.S. GREEN BLDG. COUNCIL, LEED 2009 FOR NEW CONSTRUCTION AND MAJOR RENOVATIONS 26 (2009), *available at* http://www.pp.okstate.edu/arch/PDFWORD/LEED%20-NC%20v3%20Rating%20System%20Booklet.pdf.

167. COLO. REV. STAT. § 37-90-105(f) (2011).

168. *See* Juergensmeyer, *supra* note 156.

169. *See* Jerome Delli Priscoli & Aaron T. Wolf, *Managing and Transforming Water Conflicts,* 176 GEOGRAPHICAL J. 180 (June 2009) (providing a thoughtful exploration of this concept, drawing upon experience in transboundary river basins throughout the world).

river basin and watershed coordination.[170] Such initiatives range from informal cooperative partnerships to entities authorized by federal legislation, and often focus on endangered species recovery or other large-scale restoration goals.[171]

Parties engage in collaboration for the very practical reason that it often leads to better decision-making with greater likelihood of implementation than more traditional approaches (e.g., notice-and-comment rulemaking, litigation, etc.). Regional collaborative initiatives respond to gaps in governance—situations in which no single entity has the full range of legal authority and political capital necessary to address difficult cross-boundary issues.

On the one hand, regional collaboration provides an opportunity for people to integrate the interests and concerns of multiple jurisdictions, government agencies, and public stakeholders to address complex regional issues. On the other hand, focusing entirely on building relationships will not restore a compromised river ecosystem or recover an endangered species. A successful regional initiative should articulate clearly the measures by which success will be judged, and should be prepared to adapt practices if necessary to achieve its goals.[172] Merely applying scientific or technical knowledge to address economic, social, or environmental concerns cannot close the governance gap that prompts these initiatives. Nor is the answer simply a matter of managing land or water more efficiently.

Historically, federal efforts to encourage river basin-scale planning have not been successful, but a number of people are calling for a return to a more formal approach to watershed planning and coordination.[173] Legal scholar Janet Neuman, for example, proposed a planning framework that would start with a realistic assessment of sustainable water supplies and new sources, and would aim at producing more informed public decisions on water use.[174] Such hydrologically shaped governance processes promise the possibility of more rational, sustaina-

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170. For details on the examples listed here, *see* CENTER FOR NATURAL RESOURCES & ENVTL. POLICY, UNIVERSITY OF MONTANA, FEDERAL-STATE COLLABORATIVE INITIATIVES FOR RESOURCE MANAGEMENT AND RESTORATION (2009), *available at* http://cnrep.org/documents/montana_policy_reports/Federal-State-Collaborative-Initiatives-12-2-09.pdf

171. *See Id.*

172. *Id*. at 10–11.

173. *See* W. WATER POLICY REVIEW ADVISORY COMM'N, WATER IN THE WEST: CHALLENGE FOR THE NEXT CENTURY (1999), *available at* http://www.preventionweb.net/files/1785_VL102318.pdf; *See also* Peter Lavigne, *Watershed Councils East and West: Advocacy, Consensus and Environmental Progress*, 22 UCLA J. ENVTL. L. & POL'Y 301 (2004).

174. Janet C. Neuman, *Dusting Off the Blueprint for a Dryland Democracy: Incorporating Watershed Integrity and Water Availability Into Land Use Decisions*, 35 ENVTL. LAW REPORTER 10236, 10251 (2005).

ble water management decisions, especially if integrated with a broadly participatory model of land use decisions, as this article advocates.

2. Projecting Ahead

The population projection process, as a critical intersection of land use and water planning,[175] is a limited, but potentially powerful, tool for water providers and state water agencies to help integrate land use and water planning. This process has been recognized as an unrealized opportunity to question the assumptions that often lead to aggressive pursuits of water with little or no considerations of the tradeoffs of growth, alternative future scenarios, or whether residents are willing to pay for the infrastructure to support projected growth.[176]

A California study of water and growth highlighted the importance of coordinated infrastructure planning that includes accurate population projections.[177] That state's mandatory Urban Water Management Plan[178] offer a promising model for water and land use planners in other parts of the country, especially when their demand projections look at both land use patterns and accurate population projections.[179]

In a decision published in 2007, the Colorado Supreme Court considered the role of population projections in relation to rules that allow cities to claim "conditional" water rights to meet reasonably projected needs in the future.[180] The court questioned the reliability of a planning period that exceeds 50 years, noting that projecting water needs over such a long period may lead to speculation.[181] The court's opinion was significant, in that it said that a city's water right is measured not by the capacity of its infrastructure, but by evaluating a combination of factors: (1) what a reasonable water supply planning period is; (2) what the substantiated population projections based on a normal rate of growth for that period are; and (3) what amount of available unappropriated water is reasonably necessary to serve the reasonably anticipated needs of the

175. COULSON, *supra* note 59, at 68–69.

176. COULSON, *supra* note 59, at 68–69.

177. Hanak, *supra* note 101.

178. California's Urban Water Management Plan requires the state's 400 largest wholesale and retail municipal suppliers (those with at least 3,000 connections or delivering at least 3,000 acre-feet per year to prepare a 20-year Urban Water Management Plan every five years.) *Id.* at 70–71.

179. *Id.*

180. Pagosa Area Water & Sanitation Dist. v. Trout Unlimited, 170 P.3d 307 (Colo. 2007) (en banc).

181. *Id.* at 317–19.

governmental agency for the planning period, above its current water supply.[182]

It is encouraging to see judicial recognition of the role that population projections play in calculating water demands and thus informing water supply planning. As discussed previously, in Part II.B, water demand is not necessarily directly correlated to population growth. Nonetheless, this calculation, combined with *Pagosa's* more nuanced standard of "reasonably necessary to meet reasonable anticipated needs" offers a useful handle for public deliberations of the choices inherent in water supply planning.

3. Limiting and Mitigating for Water Use

It is no longer possible to "build our way out" of complex water disputes, but we can reduce or avoid some conflicts by reducing demand, and by ensuring more sustainable long-term water supplies. State water laws have evolved to recognize the value of encouraging more efficient uses of water (e.g., salvage laws, conjunctive management of surface water and groundwater, water banking, tiered pricing).[183] Economic and environmental concerns are encouraging a great deal of movement in this direction.[184]

Since conservation is the cheapest source of new water,[185] municipal and other suppliers find it worthwhile to provide direct incentives to reduce customer demand and thus alleviate the need for costly new infrastructure.[186] For example, the Southern Nevada Water Authority's "Cash for Grass" program pays $1.50 per square foot of irrigated lawn converted to less water consumptive landscaping.[187] In 2007, nearly 5,400

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182. *Id. See* Casey S. Funk & Daniel J. Arnold, Pagosa–*The Great and Growing Cities Doctrine Imperiled: An Objective Look from a Biased Perspective*, 13 U. DENV. WATER L. REV. 283, 307–10 (2010) (discussing *Pagosa Area Water & Sanitation Dist. v. Trout Unlimited*).

183. *See* David H. Getches, *Water Use Efficiency: The Value of Water in the West*, 8 PUB. LAND L. REV. 1 (1987).

184. *Id.* Many conservation groups have focused on the potential for water conservation and efficiency improvements and are providing sophisticated analyses of the potential cost savings for municipal water providers. *See, e.g.*, *The Smart Water Project*, W. RES. ADVOCATES, http://www.westernresourceadvocates.org/water/wateruse.php (last updated May 8, 2008).

185. Although a broad statement, this assessment is widely acknowledged by water providers. *See, e.g.*, SAN DIEGO COUNTY WATER AUTH., BLUEPRINT FOR WATER CONSERVATION 2 (2007), *available at* http://www.sdcwa.org/sites/default/files/files/blueprint-for-water-conservation.pdf.

186. *See* examples cited in GLENNON, *supra* note 162, at 171–81.

187. Phoebe Sweet, *Cash for Grass Program Taking Steps to Entice More Businesses*, LAS VEGAS SUN, June 17, 2008, http://www.lasvegassun.com/news/2008/jun/17/offered-more-money-homeowners-respond-taking-out-m.

homeowners converted 6.5 million square feet of grass under this program, while 468 businesses removed more than 12 million square feet of grass.[188] Clearly, this type of land use incentive has the potential to greatly reduce water consumption, thus conserving limited water resources, although some resist such efforts as merely freeing up more water for unsustainable growth.

In some instances, water providers have responded to limited water supplies by pursuing much stricter limits on water use—essentially declaring "no net increase" in water usage, regardless of expanded demand.[189] California's East Bay Municipal Utility District (EBMUD) considered the likely increased uncertainties of its water sources and determined that all new service would be conditioned on "water-neutral" development, achieved by developer-paid investments in water conservation, both on-site and off-site.[190]

In the first development approved under this provision, EBMUD required the developer to demonstrate that "twice as much water would be conserved through various efficiency measures as would be required to serve the development's needs."[191] Developers achieved on-site water saving with efficient appliances, water-efficient landscaping, and recycled water for common areas.[192] Developers also paid a "Water Mitigation Fee" (which was approximately $8,600 in 2009) to finance off-site conservation measures.[193]

A similar program in Washington State requires homeowners in certain heavily used groundwater basins to purchase a "groundwater mitigation credit" prior to building a home that depends on a shallow domestic well.[194] Monies generated by this fee go toward acquisition of senior water rights to enhance instream flows that otherwise would be impacted by the cumulative impact of multiple "exempt" wells, described previously, in Part III.A.[195]

Far more aggressive means of stretching limited water supplies will become attractive as supplies tighten. Tucson, Arizona, has been

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188. *Id.*

189. *See* discussion of similar goals set by local land use officials in communities such as Santa Fe, *supra* Part IV.A.4.

190. For more information on the EBMUD experience, *see* Randele Kanouse & Douglas Wallace, *Optimizing Land Use and Water Supply Planning: A Path to Sustainability?*, 4 GOLDEN GATE U. ENVTL. L.J. 145 (2010).

191. *Id.* at 158.

192. *Id.* at 159–60.

193. *Id.* at 160.

194. For information on the pioneering program in Walla Walla County and several others emerging in the region, see BATES, *supra* note 43, at 9–11.

195. *Id.* at 12.

treating and reusing wastewater for landscape irrigation for more than two decades, and other cities are following suit: San Diego, Long Beach, and Los Angeles, California; San Antonio, Texas; Boca Raton and St. Petersburg, Florida; and parts of New York City, New York.[196] Some communities are experimenting with programs to treat this water to a high enough quality to supply indoor use, including for drinking water.[197] In California, Orange County's "Groundwater Replenishment System" recharges the groundwater basin with 70 million gallons per day of highly purified recycled water for storage and reuse that otherwise would be discharged to the ocean.[198]

Finally, water providers can reduce overall water usage using pricing mechanisms (such as tiered pricing or rebates for conservation) that provide penalties for profligate use and incentives for reduced consumption. Studies of existing programs indicate that price signals need to be strong enough to encourage new behavior;[199] people will save water if it saves them money.

Marc Reisner observed that, "[i]n the West, lack of water is the central fact of existence,"[200] yet the region has developed as if water would not be a limiting factor. The emerging policies and incentives to encourage water conservation and more efficient use of existing supplies described here represent positive movement toward a recognition of water as a precious and limited resource.

4. Moving Water to Meet New Needs

Not only do we need to reduce our overall water demands, but we also need to recognize the value of transferring water when those demands shift over time. Water managers face many challenges today: recurrent drought and projected impacts of climate change;[201] fierce and diverse challenges to new dams, pipelines, and other infrastructure;[202] and rising costs for the energy necessary to move water from its source

196. *See* GLENNON, *supra* note 162, at 161–70.

197. *Id.* at 165–66.

198. *About GWRS: World's Largest Wastewater Purification System for Indirect Potable Reuse*, GROUNDWATER REPLENISHMENT SYSTEM, http://www.gwrsystem.com/about-gwrs.html (last visited Nov. 4, 2011).

199. GLENNON, *supra* note 162, at 227.

200. REISNER, *supra* note 150, at 12.

201. *See* A. Dan Tarlock, *How Well Can Water Law Adapt to the Potential Stresses of Global Climate Change?*, 14 U. DENV. WATER L. REV. 1 (2010).

202. *See* Peter M. Lavigne, *Dam(n) How Times Have Changed*, 29 WM. & MARY ENVTL. L. & POL'Y REV. 451 (2005).

to where it is needed.[203] In response, it simply makes good sense to explore flexible, cooperative, institutional arrangements to ensure reliable water supplies.

Water banks, water leasing arrangements, regional drought contingency plans, and other initiatives suggest that measures encouraging voluntary transfers of water from lower to higher-valued uses may provide an important means of ensuring sufficient water supplies over time. And, as legal scholar Robert Glennon puts it, "water marketing lessens the pressure to build new dams, divert additional surface water, and drill more wells."[204] Glennon also notes, however, that, "[r]esistance to water marketing is visceral in some quarters, an ideological response rooted in opposition to markets, especially for water."[205]

Given the large proportion of water commanded by irrigators in the western United States, transfers from agricultural to urban uses are likely to continue and expand as urban population increases. Historical bad practices—such as the "buy and dry" strategy of acquiring and then fallowing vast tracts of farmland for its water—left a deep distrust among many rural residents and environmentalists.[206] New approaches that respect these concerns include dry-year lease options, "smart fallowing," and requirements that any transfers include dedication of water for instream flows.[207]

Moreover, the market serves environmental interests by allowing state agencies and nongovernmental groups to purchase or lease senior water rights and convert those diversions to instream flows, restoring important fisheries or recreational rivers.[208] These voluntary transactions often involve relatively small amounts of water, but this can make a tremendous difference to the viability of a tributary stream that otherwise would be dried up during peak irrigation season. Montana's Clark Fork

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203. *See* RONNIE COHEN, BARRY NELSON & GARY WOLFF, NAT. RESOURCES DEF. COUNCIL, ENERGY DOWN THE DRAIN: THE HIDDEN COSTS OF CALIFORNIA'S WATER SUPPLY (2004), *available at* http://www.nrdc.org/water/conservation/edrain/edrain.pdf.

204. GLENNON, *supra* note 162, at 313.

205. GLENNON, *supra* note 162, at 313.

206. GLENNON, *supra* note 162, at 313.

207. There is a large and growing body of literature describing the important role that water transfers will play in meeting future water demands. *See* ARIZONA WATER POLICY: MANAGEMENT INNOVATIONS IN AN URBANIZING, ARID REGION (Bonnie G. Colby & Katharine L. Jacobs eds., 2007); NAT'L RES. COUNCIL, COMM'N ON GEOSCIENCES, ENV'T & RES., WATER TRANSFERS IN THE WEST: EFFICIENCY, EQUITY, AND THE ENVIRONMENT (1992); Jedidiah Brewer, Robert Glennon, Alan Ker & Gary Libecap, *Transferring Water in the American West: 1987–2005*, 40 U. MICH. J.L. REFORM 1021 (2007); Robert Glennon, *Water Scarcity, Marketing, and Privatization*, 83 TEX. L. REV. 1873 (2005).

208. *See* Lawrence J. MacDonnell, *Environmental Flows in the Rocky Mountain West: A Progress Report*, 9 WYO. L. REV. 335 (2009).

Coalition—an advocacy group whose focus includes clean-up and protection of impaired waterways—recognized several years ago that full restoration often includes a "just add water" step, and thus expanded its toolkit to include water leasing and flow restoration.[209]

As noted by Colorado Supreme Court Justice Greg Hobbs, one of the advantages that the prior appropriation system of water rights has in the western United States is the opportunity it provides to move water from one use to another: "[f]lexibility emanates from the fact that the right of use can be transferred to another, subject to the requirement that other appropriators not be injured by the change."[210] This flexibility offers an important tool to address the challenges of matching water demand with sustainable supplies, especially in the arid western United States, and the laws and policies described here offer one important means of matching water to changing land uses in this dynamic region.

V. CONCLUSION: POLICY CHANGES TO BRIDGE THE GOVERNANCE GAP

This article describes the historical disconnect between water supply planning and land use decision processes. This disconnect has represented a governance gap of significant relevance to the future of the West. The strategies profiled in this article offer ideas on how to integrate consideration of water resources into land use planning, and provide examples of water and land use policy reforms that may encourage more integrated approaches in the future. Despite the obvious relationship between where and how people live and the amount of water they need, our institutions have been slow to encourage decision-makers to think about land and water use together and to engage in a dialogue with affected publics about the consequences of those decisions. The dual pressures of population growth and climate change (along with impacts of energy production) are prompting a more urgent look at this connection.

Fortunately, interest is growing in this subject and there are many new initiatives aimed at overcoming the disconnect between land and water planning. Five key policy changes would encourage better overall integration of water and land use planning. Planners and lawmakers should: (1) evaluate broad questions related to water supplies and quality early in the planning process (e.g., in a community's comprehensive

209. *See* Clark Fork Coalition, *Working with Water: Tools for Landowners*, CLARK FORK COALITION: VITAL RIVERS INITIATIVE, http://www.clarkfork.org/stream-renewal-initiative/flow-restoration.html (last visited Nov. 4, 2011).

210. GREG HOBBS, THE PUBLIC'S WATER RESOURCE: ARTICLES ON WATER LAW, HISTORY, AND CULTURE 66 (2007).

plan), and require a hard look at the sustainability of anticipated water sources for proposed new development prior to approval; (2) tighten the exempt-wells loophole to discourage its use in subdivision development, and implement appropriate measures to mitigate for the impacts of groundwater pumping on streams and aquifers; (3) value and protect the ecosystem services of key watershed lands, source aquifers, and other landscape components that enhance water supplies and quality; (4) evaluate development implications of alternative water supply scenarios, and ensure consistency with land use priorities; and (5) reduce overall demands and stretch existing supplies by mandating and providing incentives for conservation and efficiency throughout the water and energy sectors.

Facing the consequences of well-established growth patterns is not an easy proposition, but it is a necessary step in moving toward a sustainable future. We can no longer be indifferent to the environmental and other costs of our land use and water management practices, and we must think broadly about limits—not in a simple physical sense, but as a collective societal choice about how large a footprint we wish to have on the landscape. To rather broadly paraphrase Aldo Leopold, land and water stewardship is a job not of building more dams and pipelines into lovely country, but of building receptivity (awareness, caring, and restraint) into the still unlovely human mind. Emerging strategies to integrate water and land use decisions encourage optimism, but the task at hand is large and challenging.