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Western Growth and Sustainable Water Use: If There Are No "Natural Limits," Should We Worry About Water Supplies?

by

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Western Growth and Sustainable Water Use: If There Are No "Natural Limits," Should We Worry About Water Supplies?

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I. INTRODUCTION

> "People always ask me, when are we going to run out of water? As long as there are options available, we don't have to. It is a matter of going from your least expensive supply to your most expensive supply."
>
> - Patricia Mulroy, Southern Nevada Water Authority[3]

Do the West's variable climate and rugged landscapes pose any "natural" limits to the region's continued rapid urban growth? This question has emerged directly and indirectly since the exploration of the Trans-Mississippi West. A persistent theme in the history (and, indeed, our understanding of the prehistory) of the American West has been the question of what limits, if any, the region's arid and semiarid climates and harsh landscapes might impose on sustainable human settlement.

This article examines the various ways in which the water limits question has surfaced on the western political agenda; the reasons it is reemerging today; legal and planning responses to perceived limits; the barriers that water, public utility, and land use law pose to using water availability as growth limitation strategy; and the water-land use linkage programs currently emerging in the region. It ends with a brief look at four individuals who dissented from the idea that there no "natural limits" to western growth, and compares their thinking to the current efforts to factor limits into urban growth.

We conclude that the current limits debate continues to accept growth as inevitable and seeks only to accommodate it through conservation, reallocation of agricultural supplies, and possibly denser urban development. None-

3. Launce Rake, *Water Official: Drought Won't Stop Growth*, Las Vegas Sun A1 (June 9, 2004). The cost of this policy is not cheap. *See* Launce Rake, *Agency's Water Plans Pegged at $7.6 Billion: Officials Hope to Guarantee Supply over the Next 30 Years*, Las Vegas Sun A1 (May 24, 2005).

theless, the exit of the federal government from subsidizing regional development, along with state inaction, is forcing urban areas to begin linking land use and water resources planning for the first time. Western cities may not stop growing, but growth accommodation will be more difficult and more expensive than it has been in the past. Increasingly, some form of water supply planning will be necessary before growth can continue. Water will be more costly, and the trade-offs between growth and its alternatives will become more intense and obvious. Global climate change adds an additional wild card to the mix. We are still a long way from achieving sustainable human settlement in the American West.

II. THE PERSISTENT ISSUE OF NATURAL LIMITS

We have long recognized the challenges of putting people in generally warm but not naturally well-watered areas with poor soils. But, for over a century and a half, the West has resoundingly answered the limits question in a consistent fashion: "No; there are no climatic or landscape limits on our growth!"

This continues to be the dominant position, as illustrated by Las Vegas's drive to find the necessary water to sustain this most improbable international city built around a small desert watering hole.[4] However, the "limits" question is now once again the subject of serious, respectable debate as the role of the federal government as a promoter of regional growth recedes at the same time that population growth in many water-short areas continues to surge.[5] An understanding of today's debate requires several steps back to the beginning of this long and unresolved conversation.

Early explorers viewed the western landscape as uninhabitable and akin to the fearsome steppes of Central Asia and the deserts of Africa. In the official report of his exploration of the Upper Mississippi and Rocky Mountains, Major Stephen Long characterized the treeless Great Plains as the "Great American Desert," unfit for substantial human settlement.[6] This view soon became politically incorrect as the nation realized the many benefits of westward expansion.

The notion of a Great American Desert was displaced first by the "junk science" theory that the West was actually a Garden of Eden in waiting

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4. Published histories of Las Vegas include Hal Rothman, *Neon Metropolis: How Las Vegas Started the Twenty-First Century* (Routledge 2002); and Geoff Schumacher, *Sin & Suburbia: An Essential History of Modern Las Vegas* (Stephens Press 2004).

5. Western Water Policy Review Advisory Commission, *Water in the West: Challenges for the Next Century* 2-14 - 2-28 (U.S. Bureau of Reclamation 1998). The report outlines the stresses on water supply created by rapid urban growth. *See generally* American Bar Association, *Water Resources and Their Limits*, Natural Resources & Envt. 18 (Fall 2003).

6. *See* William Goetzmann, *Exploration and Empire: The Explorer and the Scientist in the Winning of the American West* 60 - 64 (W.W. Norton and Company 1966). For a good, new history of the settlement of the inhospitable Imperial Valley *see generally* Evan R. Ward, *Border Oasis: Water and the Political Ecology of the Colorado River Delta, 1940-1975* (U. of Ariz. Press 2003).

because "rain follows the plow."[7] When reality intruded in the 1880s, the progressive vision that science and technology could overcome whatever barriers nature throws at us and thus support unlimited growth provided a better theory to lure people to the region. Donald Pisani has described federal water policy between 1902 and 1935, built on this vision, as "an almost primal impulse to 'complete' the evolutionary process dictated by God and culture."[8] In short, the settlement of the West has often been cast in Old Testament terms. Its promoters harked back to the book of Genesis rather than the more skeptical Hebrew prophets and their modern scientific heirs.

Two wars destroyed our unbounded faith in the idea of scientific and technological progress. Nonetheless, faith in human ingenuity to outwit nature, supported by generous federal subsidies, still drives our natural resources and land use thinking. The great novelist Wallace Stegner reluctantly concluded that "the West is no more the Eden that I once thought it than the boosters and engineers tried to make it, and that neither nostalgia nor boosterism can any longer make a case for it as the geography of hope."[9] Still, for most westerners, the West remains a land of endless promise and potential and federal water policy has played a large role in enticing people to the region.

After the collapse of large-scale gold and silver mining, cattle ranching, and dryland farming in California, the arid West turned to irrigated agriculture and raw commodity production to sustain itself,[10] and the semiarid areas of the Great Plains turned to dryland farming. In the twentieth century, the constitutional formula of two senators per state allowed the West to build on the tradition of public land disposal to capture a disproportionately large share of federal monies to sustain settlement. As Gerald Nash has argued, during World War II, "[e]ssentially, the federal government promoted the restructuring of a natural resource-based colonial economy into a technologically oriented and service economy stimulated by massive federal expenditures."[11] Federal spending and subsidies, along with technologies such as air conditioning, helped the West to develop as a series of

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7. The idea is traced to one of the earliest and most enthusiastic promoters of the Great Plains, the Santa Fe trader Josiah Gregg, in his book, *Commerce on the Prairies* (J. & H.G. Langley 1844). The historian Frederick Merk attributes the spread of the theory to late nineteenth century railroad publicists. The financier of the Northern Pacific railroad also played a role in painting a false picture of the region's climate. Unintentionally anticipating the era of global warming, he published weather maps in the 1870s representing the area as one of warm winters. Frederick Merk, *History of the Westward Movement* 472-473 (Alfred A. Knopf 1978).

8. Donald J. Pisani, *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* 272 (U. of Cal. Press 2002).

9. Wallace Stegner, *The American West as Living Space* 60 (U. of Mich. Press 1986).

10. *See generally* Donald Pisani, *To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902* (U. of N.M. Press 1992); Donald Pisani, *Water, Land and Law in the West: the Limits of Public Policy, 1850-1920* (U. Press of Kan. 1996).

11. Gerald D. Nash, *The Federal Landscape: An Economic History of the Twentieth-Century West* 52 (U. of Ariz. Press 1999).

industrial, federal and military,[12] and distribution urban oases. These have now morphed into more widespread archipelagos, increasingly less dependent on the traditional commodity production activities.

The idea that there are no limits to human settlement was reinforced by the decline of German geographical determinism.[13] Historians have long speculated about the relationship between climate and social organization.[14] At one time, geographical determinism allowed historians to explain the distinctive cultural and economic patterns which developed in particular regions, and theories of environmental determinism posited that climate controlled a region's culture and society. However, this simplistic cause and effect relationship was rejected in the United States in the 1920s, and it died after World War II. Nazi Germany used earlier geographical determinism theory by German scholars to support racial explanations for the alleged superiority of northern European culture. As a result of this misuse of science, the emphasis on human adaptation to climate and the landscape gradually receded from the story of "civilization,"[15] although it has begun to reappear in a more humble, complex and non-deterministic form.[16]

There have always been dissenters from faith in science and technology to render climate and landscape irrelevant but the triumph of technological optimism marginalized those who questioned this dogma and argued that the West should develop more modestly and compactly, following the Native American and Spanish models, adapting to the reality of aridity. Dissenters have ranged from angry observers such as Carrie McWilliams to the quiet resignation of Wallace Stegner. In his history of the Los Angeles basin, McWilliams noted that "the region is a paradox: a desert that faces an ocean"[17] and "[t]he absence of local water resources is, indeed, the basic weakness of the region—its eternal problem."[18] The more earnest John Wesley Powell spent much of his professional career trying to convince the federal government to promote rational, science-based western irrigation and ranching settlement. We address the concerns of renegade dissenters in Part VI.

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12. Gerald D. Nash, *The American West Transformed: The Impact of the Second World War* 75- 87 (U. of Neb. Press 1985).

13. *See* Richard Peet, *The Social Origins of Environmental Determinism*, 73 Annals of the Am. Assn. of Geographers 309 (1985).

14. *E.g.* Norman Pounds, *An Historical and Political Geography of Europe* (George G. Harrap & Co. 1947).

15. I.G. Simmons, *Environmental History: A Concise Introduction* 178-179 (Blackwell 1993).

16. *E.g.* W. Gordon East, *The Geography Behind History: How Physical Environment Affects Historical Events* (W.W. Norton 1965). *See also* Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (Viking 2005).

17. Carey McWilliams, *Southern California Country: An Island on the Land* 6 (Duell, Sloan & Pearce 1946). McWilliams' spirit lives on in Kevin Starr's multi-volume history of California, which describes the Palm Springs area as "a network of desert cities wrung from resistant nature by sheer force of will." Kevin Starr, *Coast of Dreams: California on the Edge, 1990- 2003* 322 (Alfred A. Knopf 2004).

18. McWilliams, *supra* n. 17, at 183.

In the late 1990s, the limits question began to reappear, driven by the growing realization that the Reclamation Era is over[19] and many urban areas will have to live within more limited water budgets because the ever-present promise of a federal and state bailout is less likely to materialize. The Department of Interior's decision to limit California to its Colorado River Compact entitlement and to encourage the use of the Imperial Valley irrigation as a water supply for urban Southern California aptly illustrates the end of the era.[20] The federal government's withdrawal from its 150-year role as western settlement promoter comes as the West is experiencing the usual frequent drought cycles in addition to the fears of extended cyclical mega-droughts or a permanent change in regional precipitation and stream-flows due to global warming.

In Arizona, California, New Mexico, and Nevada the projected gap between growing urban demands and available supplies is now high on the political agenda.[21] In addition to drought fears, other problems such as air pollution and urban sprawl contribute to the revival of interest in the limits question. Many states and local governments are starting to link water supply and urban growth. These developments place water supply squarely in the context of the fractious problem of growth management, or the current term "smart growth."

Recent arguments for smarter growth have occasionally raised water issues, but—as we describe in Parts IV and V *infra*—the link between water availability and urban growth is a new development in land use law. Indeed, water supply has seldom been a factor in local government land use

19. The idea that the Reclamation Era has ended remains heresy in many parts of the West, but the reality is that the 1968 defeat of the two cash register dams at either end of Grand Canyon and the passage of the Wild and Scenic Rivers Act in that same year marked its demise. The era lingered for another twenty years in theory, but President Carter's 1977 federal dams hit list became reality in the domestically fiscal conservatism of the Reagan years, and in 1986 the Bureau of Reclamation—in a move analogous to the fall of the Soviet Union in 1989—renounced state capitalism and took on the role of resource manager rather than regional developer.

20. For background on the complicated history of the Law of the River, see Charles J. Meyers, *The Colorado River*, 19 Stan. L. Rev. 1 (1966) and David H. Getches, *Competing Demands for the Colorado River*, 56 U. Colo. L. Rev. 413 (1985). California has consistently diverted about 5.2 million acre-feet (maf) of Colorado River water annually, compared to the 4.4 million acre feet to which the state is legally entitled. The three lower basin states and the Department of Interior agreed to a curtailment plan allowing California at least fifteen years to reduce its diversions to 4.4 maf, premised on the transfer of 200,000 acre feet of water from the water-rich Imperial Irrigation District to San Diego (which has the lowest claim to the Metropolitan Water District's Colorado River entitlement). The agreement also allows California and Las Vegas to tap into Arizona's unused Colorado River entitlement. The Department of Interior's final rule allows state entities in the three lower basin states to store unused entitlements in off-stream reservoirs and aquifers. After surplus water has been offered to entitlement holders in the storing states, the Secretary of Interior may release the water pursuant a voluntary Interstate Release Agreement for use in another Lower Basin state. 43 C.F.R. 414.1 (1999); 64 Fed. Reg. 58986 (Nov. 1, 1999).

21. During the severe drought in 2003, for example, several powerful Las Vegas labor unions questioned the unlimited growth policy of the Southern Nevada Water Authority on the ground that controlled growth might provide steadier jobs. Dave Berns, *Unions Turn From Traditional Course, Work to Curb Growth*, Las Vegas Rev. J. 1A (Nov. 2, 2003).

planning and controls in the West and elsewhere. This reflects both the longstanding assumption that humans can and should overcome any natural constraints on progress and the availability of large blocks of stored, cheap federal water to buffer cities in times of shortage.[22] Cities without a federal reservoir to supply them often had an adequate state or local one at their disposal. As we describe in the next part, these assumptions are no longer valid today.

III. THE WEST AT RISK: PEOPLE KEEP COMING

The West's population is growing at the same time that water supplies face continued and new stresses. Contrary to any concerns about limits, people want to live in the West. It is beautiful; large parts of it enjoy mild or bearable winters; it offers a full range of "lifestyle" and outdoor recreation choices; and settlement is much less constrained than it was when the West was an eastern and European colony. The modern service economy,[23] combined with extensive (and federally subsidized) highway, air route, and electronic infrastructures, facilitate a greater range of location choices for individuals and business than did the "old" cowboy-commodity production economy, which remains politically powerful but economically less important. Also, air conditioning has made year-round desert living feasible for many who otherwise would not bear the discomfort of the Southwest's summers.[24]

What are the consequences of this surging human tide? Urban growth impacts four water-related commons both in the growth area and in areas where the water supply originates: (1) available surface and groundwater reserves; (2) community amenity levels; (3) the cultural commons represented by small ranch, farm, or raw commodity production communities[25]; and (4) water dedicated to aquatic ecosystem function support[26] or recovery.[27]

Increasingly, cities are asking what kind of physical and cultural landscape they want, and water provides a leverage point to facilitate more in-

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22. *See generally* A. Dan Tarlock, *From Natural Scarcity to Artificial Abundance: The Legacy of California Water Law and Politics*, 1 W.-N.W. J. Envtl. L. & Policy 71 (1994).

23. *See* Hal Rothman, *The Devil's Bargains: Tourism in the Twentieth Century American West* (U. Press of Kan. 1998).

24. *See generally* Gail Cooper, *Air Conditioning America: Engineers and the Controlled Environment, 1900-1960* (The John Hopkins U. Press 1998); Marsha Ackermann, *Cool Comfort: America's Romance with Air-Conditioning* (Smithsonian Institution Press 2002).

25. Gary Nabhan ,*Heat's On Agriculture,* Headwaters News Perspective, http://www.headwatersnews.org/p.nabhan052604.html (May 26, 2004).

26. Barton H. Thompson, *Water Management and Land Use Planning: Is It Time for Closer Coordination*?, in Craig Anthony Arnold, *Wet Growth: Should Water Law Control Land Use?* 95, 100-102 (Envtl. Law Inst. 2005).

27. The conventional term is "ecosystem restoration," but the terms "recovery" or "revival" are preferable because "restoration" is narrowly defined as the return to pre-human intervention conditions.

telligent choices about urban form and the society that it produces than have been made in the past.[28]

Some communities, not always confined to the arid West, do face supply constraints and must factor these into their growth policies. In other areas, continued urban growth may come at the expense of environmental restoration and the preservation of remnant areas of irrigated agriculture. Cities may wish (or be forced) to integrate their water demands with those of other users. Population booms also threaten to destroy the land and water base of many small communities[29] and landscapes with under-appreciated ecosystem services and other values.[30]

A. *The Numbers: Where People Cluster and the Water They Use*

Data and projections of the U.S. Census demonstrate what one can see when driving around the West: People like to live where it is warm or beautiful. Modern frontier people are not Jeffersonian farmers or the hardy pioneers who suffered great hardships in search of religious freedom or economic advancement. Most of us will not choose to live in remote areas, especially those with a harsh climate. Thus, western population growth is unequally distributed throughout the region.

Seven of the ten fastest-growing states in the country between 2000 and 2003 are in the West. Nevada leads the pack, with 12.2 percent growth in just three years, followed by Arizona (8.8 percent), Texas (6.1 percent), Colorado (5.8 percent), Idaho (5.6 percent), Utah (5.3 percent), and California (4.8 percent).[31]

Water use patterns are changing consistent with these trends. Nationwide, agriculture historically claimed the largest share of developed supplies, but this use is declining. The story is different for municipal and industrial uses. Nationally, domestic use withdrawals more than doubled between 1960 and 1990, while population only increased by seventy-five percent. Domestic use's growth reflects the new sprawling mosaic of office campuses, gated communities, and golf courses, as well as continued rapid U.S. population growth (and its verdant landscaping) in warm, water-

28. The best guide for the perplexed remains Kevin Lynch, *A Theory of Good City Form* (MIT Press 1982).

29. *See generally* Thomas Michael Power, *Lost Landscapes and Failed Economies: The Search for a Value of Place* (1996); A. Dan Tarlock, *Can Cowboys Become Indians? Protecting Western Communities as Endangered Cultural Remnants*, 31 Ariz. State L.J. 539 (1999); Lawrence J. MacDonnell, *From Reclamation to Sustainability: Water, Agriculture, and the Environment in the American West* (U. Press of Colo. 1999) (for analyses of the possibilities for conserving traditional landscapes in an era of rapid change).

30. The primary rationale for protecting biodiversity is that it conserves the socially useful functions that natural ecosystems provide. *See generally* Harold A. Mooney & Paul R. Ehrlich, *Ecosystem Services: A Fragmentary History*, in *Natures Services: Societal Dependence on Natural Ecosystems* (Gretchen C. Daily ed., Island Press 1997).

31. U.S. Census Bureau, *Statistical Abstract of the United States: 2004-2005* 21 (updated Oct. 1, 2005). The other three top-growing states are Florida, North Carolina, and Georgia. *Id.*

stressed areas. Nationally, domestic water demands rose from five percent of total use in 1960 to eight percent in 1990, and water used for thermoelectric power generation rose from four percent of the total in 1960 to nine percent in 1990.[32]

Cities are looking farther and paying more for the water to satisfy these growing needs. For example, a recent series in the *Denver Post* described the increasingly expensive means by which Front Range cities are obtaining water for future needs. The City of Aurora, for example, paid farmers to install highly efficient drip irrigation systems in exchange for access to the saved water, and spent nearly $4 million to transform 15,000 acres of irrigated farmland into grassland.[33] Acknowledging the local economic impacts of retiring productive farmland, the city committed to paying $1.6 million to make up for lost tax revenues, and supported an economic development study for the community.[34] Some experts estimate that water transfers for urban use will reduce farm acreage in Colorado's South Platte Basin by 30 percent within the next 25 years.[35]

B. *The Context: The West's Changing Political Landscape*

The federal government remains a pervasive presence in the West, based on land ownership and financial support, but the federal influence is diminishing in the region. During much of the last century, the federal government immunized the western states from most of the risks posed by a variable climate. In the twentieth century, the federal government built large-scale water projects, and with few exceptions, it deferred to state allocation law. This was the best of both worlds for the states. They were free to control water use, and the multiple-purpose federal reservoirs excused all but the most arid states from having to worry too much about competition among users and more efficient water use alternatives. A tight group of federal and state water officials, primarily engineers, controlled the water agenda and practiced the politics of distribution. Distributional politics was based on the pure doctrine of river basin management, which posited the need to construct and manage comprehensively planned, integrated federal projects on the nation's large rivers to promote regional development. Not a drop of water was to remain unused, and fish were not considered "users."

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32. Wayne V. Solley, et al., *Estimated Use of Water in the United States in 1995* 24 (U.S. Geological Survey, Circular 1200 1998).

33. David Olinger & Chuck Plunkett, *Suburban Aggression* Denver Post 1A (Nov. 22, 2005). The series, entitled "Liquid Assets: Turning Water Into Gold," ran in the Denver Post between Nov. 20-23, 2005.

34. *Id.*

35. Jerd Smith, *Plowed Under by Urban Thirst*, Rocky Mountain News 21A (Aug. 27, 2005). For another perspective on the reallocation of water from irrigated agriculture to urban use, see the two-part commentary by Hal Rothman on the New West Web Site: *Western Water: A Legend of Overallocation* (Jan. 31, 2006) (http://www.newwest.net/index.php/topic/article/5685/C73/L38) and *Western Water: Solutions to Overallocation* (Feb. 12, 2006) (http://www.newwest.net/index.php/main/article/6036/).

Proponents of comprehensive watershed and river basin planning promoted the efficient (non-wasteful) use of water through multiple-purpose water projects aimed at providing widespread benefits to the nation, or at least stimulating regional growth. The economic assumptions behind this model were always doubtful, and today water resource development no longer commands the widespread bi-partisan political support that it once did. The era of large-scale dam building appears to be over, [36] although vigorous proponents of the reclamation era remain. Some new "smarter" storage projects will be built, but they will be smaller and more environmentally friendly.[37] The United States is moving from the era of big dams to an era of reallocation of existing supplies and the sustainable management and restoration of previously modified aquatic ecosystems.[38] In the future, water resource policy will be an important component of a larger environmental-social equity agenda. The traditional government roles of flood control through dams and levees and supply augmentation remain important, but they no longer define the governmental interest in water resources use as they did in the past. These developments may not directly or immediately impact state water allocation law and policy, but ultimately they will exert considerable influence because they undermine many of the assumptions behind state water laws and will pressure states to become move proactive than they have been in the past.

The federal agencies have responded by changing their missions from project construction to "management," which increasingly means the restoration of stressed aquatic ecosystems. The U.S. Bureau of Reclamation has formally changed its mission from water development to water management, and budget priorities reflect this change.[39] The United States Army Corps of Engineers is undergoing a similar but more complex and uneven transition, and is pinning its hopes for future survival on playing a large role in restoring the aquatic ecosystems that it previously modified.[40] The federal government continues to operate and manage the infrastructure heritage of the twentieth century, but it does so with increasingly limited ability to augment supplies or control the allocation of the stored water. In the future,

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36. *E.g.* Peter M. Lavigne, *Dam(n) How Times Have Changed . . .*, 29 Wm. & Mary Envtl. L. & Policy Rev. 451 (Winter 2005). *See also* Marc P. Reisner, *Deconstruction in the Arid West: Close of the Age of Dams*, 1 Hastings W.-N.W. J. Envtl. Law & Policy 1 (Spring 1994).

37. World Commission on Dams, *Dams and Development* 236-39 (Earthscan Publications Ltd., 2000). Concerning the possible legal implications of the report, *see* A. Dan Tarlock, *What The Report of the World Commission on Dams Might Mean for the United States Water Community*, 5 U. Denv. Water L. Rev. 225 (2001).

38. *See* Western Water Policy Review Advisory Commission, *supra*, n. 5, at 3-51 to 3-52.

39. *See* U.S. Bureau of Reclamation, *Reclamation's Strategic Plan: A Long-term Framework for Water Resources Management, Development and Protection* (U.S. Dept. of the Int. 1992).

40. *See generally* National Research Council, *U.S. Army Corps of Engineers Water Resources Planning: A New Opportunity for Service* (Natl. Academies Press 2004). *See also* A. Dan Tarlock, *A First Look At A Modern Legal Regime for a "Post-Modern" United States Corps of Engineers*, 52 Kan. L. Rev. 1285 (2004).

the federal water agencies will function as project managers and as stakeholders in multi-party negotiations rather than as *the* major policy maker and distributor of federal largesse.

The force of the federal government's shrinking role is illustrated in public pronouncements by the U.S. Department of the Interior. In response to growing populations fighting for increasingly fixed supplies and the growing number of conflicts setting endangered species against farmers and cities, the Department issued a strategy entitled "Water 2025: Preventing Crisis and Conflict in the West."[41] The strategy proposes six principles for managing water in the future, including enhanced water conservation, the greater use of water markets, and improved treatment technology. The most striking features of the initiative are its failure to promise major new supply projects and its reliance on strategies involving a very limited federal role.[42]

The federal government's diminishing role in water resources management places new pressures and responsibilities on the states to manage their water resources without the level of federal support that was available in the past. In the future, allocation of scarce water supplies will be influenced more by water markets, stakeholder processes, municipal planning processes and litigation, than by federal and state water development projects.[43] Emerging water markets will be highly constrained or imperfect ones because of the complexity of legitimate alternative demands. Nonetheless, this scenario means that decision-making authority will migrate downward and diffuse outward, placing additional stresses on state water allocation laws.

C. *The Other Players: Fish and the Carbon Economy*

Two additional forces will influence water allocation choices in the coming decades: the rise of environmentalism and global climate change. The end of the dam-building era heightens rather than relieves competing demands for water. In addition to urban demands, more interests will compete for a relatively fixed—even, perhaps, diminished—resource. Western states and water rights holders are no longer immunized from the responsibility to make hard water use choices.

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41. U.S. Bureau of Reclamation, *Water 2025: Preventing Crises and Conflict in the West*, http://www.doi.gov/water2025 (Aug. 2005). Candor requires us to reveal that we played a major role in the preparation of a comprehensive look at the transition from the reclamation to the reallocation and restoration era as contributing authors noted in the report of the Western Water Policy Review Advisory Commission. Western Water Policy Review Advisory Commission, *supra* n. 5. The report, a product of the Clinton Administration, has been ignored by President George W. Bush's Interior Department, but "Water 2025" reflects many of the report's conclusions and analyses.

42. *See* Reed D. Benson, *The Interior Department's Water 2025: Blueprint for Balance, or Just Better Business as Usual?* 33 Envtl. L. Rep. 10837, 10837 (2003).

43. *See* Robert Glennon, *Water Scarcity, Marketing, and Privatization*, 83 Tex. L. Rev. 1873, 1888-1889 (2005).

1. *The New River Use Paradigm: Ecological Parity*

Today, two visions of a river are competing for dominance: the managed and the natural or "normative river."[44] From the nineteenth century to the mid-twentieth century, the dominant view of rivers was that they were imperfect examples of nature that could and should be improved by human intervention. We removed navigation impairments, confined and tamed the flow, and during the Reclamation Era, dammed many of them for irrigation and municipal supply, flood control, and the generation of hydroelectric power. In the process, we turned our rivers into a commodity.[45] This policy produced both great local and national benefits and substantial environmental and social costs. [46] The environmental movement triggered a comprehensive accounting of these costs.

United States water policy is slowly moving from the dominant twentieth century paradigm of multiple-purpose development through alteration of river hydrographs to a new, although less well articulated, one of the normative river, which seeks to use water in more environmentally sustainable ways and to respect the river's natural hydrograph.[47]

Science, environmental ethics, and economics have contributed to a new understanding of rivers. We now see rivers as integral parts of a natural landscape that can provide valuable ecosystem services[48] along with the historic benefits of water supply and hydroelectric power. A decade ago the eminent geographer Gilbert White observed, "[p]eople around the world . . . are perceiving the earth as more than a globe to be surveyed, or developed for the public good in the short term, or to be protected from threats to its well-being both human and natural. It is all of those in some degree, but has additional dimensions. People in many cultures . . . recognize a commitment to care for it in perpetuity."[49]

Rivers are also now seen not only as functioning ecosystems, but also as natural ribbons of awe and grandeur to be enjoyed in the wild or restored state. The passage of the Wild and Scenic Rivers Act in 1968[50] marked the

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44. *See generally* Jack A. Stanford et al., *A General Protocol for Restoration of Regulated Rivers*, 12 Regulated Rivers: Res. & Mgmt. 391 (1996).

45. The leading articulation of this thesis is William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (Hill and Wang 1983).

46. *See* Richard N.L. Andrews, *Managing the Environment, Managing Ourselves: A History of American Environmental Policy* 189-91 (Yale U. Press 1999); MacDonnell, *From Reclamation to Sustainability: Water, Agriculture, and the Environment in the American West*, *supra* n. 29, at 153-157.

47. *See generally* Chris Bromley, *A Political and Legal Analysis of the Rise and Fall of Western Dams and Reclamation Projects*, 5 U. Denv. Water L. Rev. 204 (2001); Christine A. Klein, *On Dams and Democracy*, 78 Or. L. Rev. 641 (1999).

48. *See e.g.* National Research Council, *The Missouri River Ecosystem: Exploring the Prospects for Recovery* 58-62 (Natl. Academies Press 2002), for a description of the ecosystem benefits provided by the flood pulses on the Missouri prior to the construction of six mainstem dams from the 1940s through the 1960s.

49. Gilbert F. White, *Reflections on Changing Perceptions of the Earth*, 19 Annual Rev. Energy & Env. 1, 9 (1994).

50. 16 U.S.C.A. §§ 1271-1287 (West Supp. 2003).

beginning of the end of the Big Dam era by withdrawing many of the best remaining dam sites and ushering in a new era of resource stewardship and a recognition that free-flowing rivers are important aesthetic and economic resources.

The newer ecological integrity vision is less clearly articulated than the multiple use one because it rests on a more complex view of the human role in the functioning of natural systems. It starts from the premise that we must try to integrate human uses of a river system with the maintenance of its natural environmental sustainability, both in the design of new projects and in the re-engineering and operation of existing facilities. The current focus is on restoration, because even modified river systems are dynamic, ever-changing, functioning ecosystems that serve a variety of functions from the maintenance of consumptive uses to the production of ecosystem services.

This emerging vision is not a simple river preservation concept because it will be realized, if at all, within the broader framework of environmentally sustainable use and development.[51] River use must always accommodate a sustainable, non-wasteful level of consumptive use,[52] but the conservation of species and of the ecosystem services that rivers and lakes provide must be recognized as being of equal importance as traditional water uses, and in many cases their value may be greater than existing or proposed consumptive uses.[53]

Federal and state environmental laws are slowly redressing the historical neglect of the aquatic environment, but in a very ad hoc, piecemeal, and unsatisfactory fashion. The Endangered Species Act (ESA) can preempt pre-existing federal and state entitlements, [54] but it is not a comprehensive biodiversity statute. Efforts to stabilize or restore aquatic ecosystems create substantial pressures to leave water in place, often quite far down the river reaches. In the end, states will bear the primary responsibility to do this because they have the primary responsibility to create and administer water rights.[55] The demand to dedicate more water for ecosystem maintenance and recovery is likely to increase in the future, and could constrain the tra-

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51. *See* John Passmore, *Man's Responsibility for Nature* 32 (Duckworth 1974) (identifying stewardship as the opposite of nature domination and arguing that it demands "an active concern for the earth's fertility").

52. This concept was endorsed in Western Water Policy Review Advisory Commission, *supra* n. 5, at 3-2 to 3-3.

53. The Klamath River Basin in southern Oregon has been the scene of an intense conflict between the preservation of endangered species and the support of a traditional but economically marginal irrigation community. *See* Holly Doremus & A. Dan Tarlock, *Fish, Farms, and the Clash of Cultures in the Klamath Basin*, 30 Ecology L.Q. 279, 295-300 (2003).

54. *See* Holly Doremus, *Water, Population Growth, and Endangered Species in the West*, 72 U. Colo. L. Rev. 361, 378-98 (2001) (noting that the ESA may require water to be left in streams to conserve listed species during periods of peak summer irrigation and municipal demands).

55. *See* David H. Getches, *The Metamorphsis of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role?* 20 Stan. Envtl. L. J. 3, 23-24 (Jan. 2001) (arguing that states have failed to assert their purported leadership in western water policy).

ditional ability of cities to dewater watersheds, put pressures on existing entitlement holders, and, more generally, increase the need for more active state water management.

2. *The New Reality: Global Climate Change*

Global climate change further complicates the competition for the West's variable supplies by increasing the inherent risks in water rights and hydrologic forecasts. In the water community, global climate change has been a subject of intense discussion but limited action. States are, however, slowly beginning to take the possible hydrologic consequences of global climate change more seriously[56] as recent weather patterns lend credence to scientists' modeling projections.

There are two basic policy options to deal with the possibility of substantially and adversely altered weather patterns. First, we can mitigate the cause by reducing greenhouse gas emissions and taking measures to sequester carbon from the atmosphere. Second, we can adapt to adverse consequences. The current United States policy rejects global mitigation in favor of adaptation. This strategy will have major implications for western water management.

Adaptation is a daunting task because the hydrological, economic, and political consequences of global climate change in a given watershed or river basin are uncertain.[57] No consensus exists about long-term effects at the regional level. Some models predict that global climate change may alter precipitation and runoff patterns throughout the world. One possible scenario is increased extremes of wet and dry years.[58] Another is that the West may be facing a long period of mega-drought.[59]

There is considerable consensus that global climate change's adverse impacts are likely to be most severe in arid and semi-arid areas because historically variable rainfall patterns may be altered; increased precipitation during the wrong time of year may actually exacerbate efforts to provide reliable water supplies. Warmer average temperatures may cause spring runoffs to come earlier and evaporate faster, snow packs to melt earlier, and

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56. In 2002, the California Department of Water Resources became the first state water resources agency to include potential global climate change impacts in its forecast. *See* Cal. Energy Commn., *California State Climate Change Activities* , http://www.climatechange.ca.gov/policies/state_roles.html# (last accessed May 1, 2006). Western municipal governments - including Boulder, Colorado, and Seattle, Washington - have recently announced sweeping "greenhouse gas-neutral" emission goals.

57. There is a gap between what we know and need to know about the relationships between climate change and human and natural systems. *See* Comm. on Global Climate Change Research, *Climate Change Science: An Analysis of Some Key Questions* (Natl. Research Council 2001).

58. Joel B. Smith et al., *Potential Consequences of Climate Variability and Changes for the Western United States*, in Natl. Assessment Synthesis Team, *Climate Change Impacts on the United States: Potential Consequences of Climate Variability and Change* ch. 8, 225 (U.S. Global Change Research Program 2001) (available at http://www.usgcrp.gov/usgcrp/Library/nationalassessment/foundation.htm).

59. Edward R. Cook et al., *Long-Term Aridity Changes in the Western United States,* 306 Science 1015, 1016-1017 (Nov. 5, 2004).

more precipitation to fall as winter rain rather than snow. Wetter, warmer weather could increase flooding and strain storage systems that currently provide reliable regional water supplies. Existing reservoirs may not be able to capture the increased winter runoff, causing serious shortages in the summer when water is needed for power generation and irrigation.

Although the precise impacts of climate change on the West's waters, communities, and economy are not known, the threat of long-term water shortages transcends political boundaries. In its 2005 summary of international disputes, the Central Intelligence Agency concluded that, "prolonged drought, population growth, and outmoded practices and infrastructure in the [U.S.-Mexico] border region have strained water-sharing arrangements with the U.S."[60]

To date, the preferred approach for adaptation is the technical fix—consistent with the traditional attitude toward overcoming nature in the arid and semi-arid West. Ambitious plans for desalinization of ocean water, cloud-seeding, new offstream dams, and expensive pipelines to move water from agricultural areas to growing suburbs continue to dominate discussions about drought response.[61]

IV. BARRIERS TO LINKAGE: WATER AND LAND USE POLICIES FUEL UNLIMITED GROWTH

In light of the changing demographic, political, and physical realities of the region, western states and local governments can scarcely avoid taking a more coordinated approach to water and land use planning. Historically, however, water and land use planners have worked at different levels of government (water managers reporting to state agencies; land use planning revolving around local government authorities) and have little reason to talk to one another. [62] Today, land use planners are increasingly interested in water supply issues,[63] although water managers show less interest in delving into local planning.[64]

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60. Central Intelligence Agency, *The World Fact Book*, http://www.cia.gov/cia/publications/factbook/geos/mx.html#Issues (last updated Jan. 10, 2006).

61. *E.g.* Shaun McKinnon, *Shrinking Water Supply Spurs States' Creativity*, The Arizona Republic (Dec. 12, 2005) (describing proposals to deal with water shortages in the Colorado River system through augmentation of supply).

62. The reasons for the historic disconnect between water and land use planning are explored in A. Dan Tarlock & Lora A. Lucero, *Connecting Land, Water, and Growth*, 34 The Urban Lawyer 971, 972 (2002); 54 Land L. & Zoning Dig., No. 4, p. 3 (April 2002); *see also* Lora A. Lucero & A. Dan Tarlock, *Water Supply and Urban Growth in New Mexico: Same Old, Same Old, or a New Era?* 43 Nat. Resources J. 803 (Summer 2003).

63. Interest among professional planners has accelerated as communities face real or perceived shortages. For example, the 2006 annual conference of the American Planning Association includes a separate track for planners interested in focusing their training in land and water issues.

64. There is some evidence to the contrary. For example, the November 2005 issue of *Water Resources IMPACT*, a publication of the American Water Resources Association, focused exclusively on "Water as a Growth Tool." Several references to articles in this publication appear in notes within this article, http://www.awra.org/impact.0511imp_toc.pdf (last accessed May 1, 2006).

States have four options to link water and land use policies: (1) capping growth; (2) continuing unlimited growth accommodation; (3) shifting the burden of supply acquisition to local governments and developers; and (4) constraining growth to match available and projected supplies. In this section we discuss the legal barriers that complicate states' decisions to choose among these strategies.[65] The subsequent section examines linkage programs that western states and cities are beginning to adopt.

A. *Water Law: The Municipal Super-Preference*

Water law has consistently supported unrestrained, sprawling urban growth. Water law has served as one of the drivers of suburbanization because all doctrines—the common law of riparian rights, prior appropriation, and the law of groundwater capture—contain a super-preference for growth accommodation. This is not a condemnation of urban growth or water law generally. The dedication of water to urban use is consistent with the long-established scheme of preferences for utilitarian applications of water, and is economically rational. Our point is simply that in major water fights, cities almost always win. We have detailed this super-preference in previous writings[66] so we offer here selected examples of the super-preference. This discussion assumes a basic understanding of the variations on water allocation systems adopted by the western states.[67]

1. *The Common Law of Riparian Rights*

The common law of riparian water rights is a land-based water allocation system which in theory, but not in practice, makes it difficult to use water on land that is not adjacent (riparian) to a stream or within its watershed as well as discouraging substantial reduction in streamflow. In theory, the law of riparian rights should make it difficult for cities to thrive away from rivers or to take water from distant watersheds. The watershed rule requires that water be used within the watershed to protect the rights of downstream riparian landowners, and generally cities cannot claim a domestic preference on behalf of their citizens.

Urban growth has not, in fact, been retarded in states following the riparian water rights doctrine because the law of riparian rights has undergone a substantial modification in response to industrialization and urbanization.

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65. For an excellent summary of the issues facing Colorado water managers in the face of rapidly growing population and ongoing drought, see Peter D. Nichols, Megan K. Murphy & Douglas S. Kenney, *Water and Growth in Colorado: A Review of Legal and Policy Issues* (U. of Colo. School of L., Nat. Resources L. Center 2001).

66. *See* A. Dan Tarlock & Sarah B. Van de Wetering, *Growth Management and Western Water Law: From Urban Oases to Archipelagos*, 5 Hastings W.-N.W. J. Envtl. L. 163 (Winter, 1999).

67. For an overview of these doctrines and their implications for water rights holders, see A. Dan Tarlock, James N. Corbridge & David H. Getches, *Water Resources Management: A Casebook in Law and Public Policy* (Found. Press 1993).

The common law has been modified to allow water to be used consumptively and in some cases away from the river corridor and watershed when there is no substantial injury to other users. The watershed rule has further been progressively softened in the last century by transforming it from a property rule to a liability rule, making it compatible with the reasonable use rule that is at the core of riparian water law. Uses outside the watershed are no longer per se non-riparian, and are allowed absent a showing that other riparian landowners suffered substantial injury.[68]

California is the classic case study of this change. The merits of riparian rights were extensively debated in California in the late nineteenth and early twentieth centuries as the state's irrigation economy developed and threatened to block industrial and urban development. For many years, California courts vacillated between the reasonable use and natural flow theories and ultimately adopted natural flow as the guiding principle.[69] Upstream users, especially electric utilities, as well as cities understood that the natural flow theory would block access to water by preventing the construction of dams and reservoirs and contribute to the monopolization of the resource by downstream users. Consequently, California voters eventually amended the state's constitution to adopt the reasonable use theory.[70] This allowed the appropriation of surplus water (water beyond that used by riparian landowners) for storage and use outside the watershed, to the benefit of distant cities.[71]

Thus, the doctrine of riparian rights has not blocked access to consumptive uses by urban users. As a last resort, municipalities have exercised the power of eminent domain to condemn water rights outside of their territorial limits to transfer water to areas of demand.[72]

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68. *E.g. Pyle v. Gilbert*, 245 Ga. 403, 407-408, 265 S.E.2d 584, 587-588 (1980). However, the watershed rule continues to surface in new contexts. In 1994, Florida created a commission to review its water management law, which has liberal transbasin transfer rules. Water-rich counties convinced the commission to recommend to the legislature that local sources be favored. Before a transbasin diversion could be authorized, the water management district with authority to authorize the transfer would have to consider the proximity of the source to the proposed destination and the availability of alternative sources of water. Two commentators have characterized the recommendation as "a partial revival of the common law rule that prohibited the diversion of water for use on nonriparian lands." Marcia Penman Parker & Sally Bond Man, *Water Management: Mission Impossible?* 70 Fla. Bar J. No. 9, 20, 28 (1996).

69. *Herminghaus v. S. Cal. Edison Co.*, 200 Cal. 81, 102-103, 252 P. 607, 616 (1926).

70. Cal. Const. art. X, § 2.

71. *See* Clifford W. Schultz and Gregory S. Webber, *Changing Judicial Attitudes Towards California Water Resources: From Vested Rights to Utilitarian Reallocations*, 19 P. L. J. 1031 (July 1988). For an example of how the constitutional amendment benefited a city, see *Peabody v. City of Vallejo*, 2 Cal.2d 351, 369, 40 P.2d 486, 492 (1935) (riparian has no right to flood flows).

72. *See generally* Richard Harnsberger, *Eminent Domain and Water Law*, 48 Neb. L. Rev. 325, 366-69 (1969); Thomas Ziegler, *Acquisition and Protection of Water Supplies by Municipalities*, 57 Mich. L. Rev. 349 (1959).

2. *The Law of Prior Appropriation*

Prior appropriation promoted the West as a democratic, irrigated society. This dominant rule of water allocation in the West also turns out to be an ideal law for urban expansion because it is a use-based rather than land-based system of property rights. Detaching water from land allows the entire flow of a stream to be diverted far from the watershed of origin to serve growing cities, as demonstrated in California and Colorado. Cities have thrived under prior appropriation, although in any given situation the doctrine can be invoked by agricultural water right holders with senior rights, and a municipality may bear the cost.[73]

Cities benefit from special rules that allow them to acquire water rights in advance of demand. Two special doctrines largely exempt cities from the anti-monopoly principle that water rights cannot be held for speculative purposes. Cities enjoy an exemption from the anti-speculation principle under the "growing cities" doctrine, which allows cities to perfect a water right to the amount of water that they will need in advance of demand.[74] There are few exceptions.[75] Under the related "progressive growth" doc-

73. *City of Barstow v. Mojave Water Agency*, 24 Cal.4th 224, 5 P.3d 853 (2000), is an example of the potentially adverse impact of priority enforcement on urban areas. In brief, the Mojave River basin in southern California is a severely overdrafted groundwater basin. After a lengthy negotiation, the trial court imposed a physical solution (much like compulsory unitization is imposed on holdout oil and gas pumpers) on all pumpers after over 80 percent of the basin water users agreed to it. Under the solution, pumpers were assigned a free production allowance; pumping in excess of the allowance was subject to a charge dedicated to the purchase of replacement water. *Id.* at 300-303, 5 P.3d at 858-861. For a prescient defense of the California Supreme Court's holding see Rebecca Sugerman, *The Mojave Basin Physical Solution: It's a Good Idea, But Is It Good Law?* 6 Hastings W.-N.W. J. Envtl. L. & Policy 307 (2000). For a summary of California groundwater law, see n. 82, *infra*.

74. *E.g. City and County of Denver v. Sheriff*, 96 P.2d 836, 841-842 (Colo. 1939); *City and County of Denver v. Northern Colorado Water Conservancy Dist.*, 276 P.2d 992, 1020-1022 (Colo. 1954; Moore, J., dissenting); *Thornton v. Bijou Irrigation Co.*, 926 P.2d 1 (Colo. 1996); *Reynolds v. City of Roswell*, 654 P.2d 537, 540 (1982); *State, Department of Ecology v. Theodoratus*, 135 Wash.2d 582, 614-16, 957 P.2d 1241, 1257-1258 (1998) (Sanders, J., dissenting). *See generally* Janis Carpenter, *Water for Growing Communities: Refining Tradition in the Pacific Northwest*, 27 Envtl. L. 127 (1997); Dennis J. Herman, *Sometimes There is Nothing Left to Give: The Justification for Denying Water Service to New Customers to Control Growth*, 44 Stan. L. Rev. 429 (1992); and Tarlock & Van de Wetering, *supra* n. 66.

75. The Washington Supreme Court limited the reach of this doctrine by holding that actual application to beneficial use rather than capacity of a private municipal water system is the measure of the water right. *State Department of Ecology v. Theodoratus*, 135 Wash.2d 582, 589-590, 957 P.2d 1241, 1245 (1998). The court left open the issue of whether the holding applies to municipal water suppliers. The "growing communities" doctrine was strongly endorsed in the dissenting opinion. *Id.* at 614-16, 1257-1258 (Sanders, J. dissenting), and the legislature quickly reversed the result. For another example of judicial willingness to limit water rights to actual use see *San Carlos Apache Tribe v. Superior Court*, 972 P.2d 179, 201-202 (Ariz. 1999) (statute that mandates the use of maximum theoretical capacity violates the doctrine of separation of powers because it prevents a court from basing a decree on a factual determination of the amount of water actually diverted or stored and applied to beneficial use). *See also Waterwatch of Oregon, Inc. v. Water Resources Commission*, 193 Or.App. 87, 113, 88 P.3d 327, 341 (2004) (read a public interest standard into the state's due diligence statute, O.R.S. 537.230, and held that the issuance of a permit for a proposed municipal diversion that would not apply the water to beneficial use until long after, if ever, the five year statutory period was not in the public interest). The power of cities to obtain the water that they think they need to grow is illustrated by the aftermath of the case. The legislature quickly extended the time in which water must be put to a beneficial use to

trine, a claimant can perfect a water right based on expected anticipated need for the water.[76]

3. *Groundwater: Pumps Have No "Off-Switch"*

Groundwater law is even more favorable to cities because it imposes fewer legal restraints on water use than the laws governing surface waters. In many parts of the country, accelerating groundwater pumping by municipal suppliers and unregulated private wells is causing water tables to drop and land to subside.[77] Courts have refused to recognize a right to lift,[78] and neither judicial decisions nor state statutes do a good job of integrating surface and groundwater rights.[79] Cities have benefited from this lack of coordination.

The right to extract groundwater is controlled by the common law rule of capture, while surface water use is controlled by prior appropriation or dual riparian-appropriative regimes. For example, the reasonable use rule that (loosely) controls groundwater appropriation in places like rural Arizona is a modified rule of capture requiring only that municipalities compensate injured overlying owners when water is transported to non-overlying land.[80]

California and Nebraska replaced reasonable use with the correlative rights rule to bring groundwater closer to the common law of riparian rights, but at most these rules simply impose additional financial burdens on cities who wish to acquire new groundwater supplies. The California correlative rights rule posits that all overlying owners have a right to a proportionate share of the basin and that any surplus waters are subject to appropriation by non-overlying landowners.[81] Once the "basin" is defined, this rule formally puts non-overlying municipalities at a disadvantage because in-basin users have preferential rights.[82] New Jersey dealt with this problem

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20 years. *See generally* Michelle Henrie, *Oregon's Municipalities Can Take the Time They Need to Grow*, 7 Water Resources IMPACT 12 (Nov. 2005).

76. *E.g. State ex rel. Crider*, 431 P.2d 45, 49 (N.M. 1967); *St. Onge v. Blakeley*, 245 P. 532, 539 (Mont. 1925).

77. *See* Robert Glennon, *Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters* 32-34 (Island Press 2002).

78. *Wayman v. Murray Corp.*, 458 P.2d 861 (Utah 1969).

79. *See e.g.* Robert J. Glennon & Thomas Maddock III, *In Search of Subflow: Arizona's Futile Effort to Separate Groundwater from Surface Water*, 36 Ariz. L. Rev. 567 (Fall 1994).

80. *Higday v. Nickolaus*, 469 S.W.2d 859, 866 (Mo. 1971); *City of Blue Springs v. Central Dev. Assn.*, 831 S.W.2d 655, 658-659 (Mo.App. W.D. 1992); *Forbell v. City of N Y.*, 58 N.E. 644, 646 (1900); *Canada v. City of Shawnee*, 64 P.2d 694, 699-700 (Ok. 1936) (injunction conditioned on city's institution of condemnation action).

81. *Katz v. Walkinshaw*, 74 P. 766, 771 (Cal. 1902).

82. California groundwater law divides rights among overlying, appropriative, and prescriptive holders. Overlying owners have priority over non-overlying users; non-overlying users may obtain appropriative rights only if there is surplus water- water in excess of safe yield. *Wright v. Goleta Water Dist*, 174 Cal. App. 3d 74, 85-89 (1995). Non-overlying pumpers can also obtain prescriptive rights. These rules are difficult to administer, in large part because most groundwater basins are overdrafted, and in the past the courts have preferred basinwide solutions that equitably distribute the burdens of limiting ground water use to safe yield among all basin users.

by allowing municipalities to pump without compensating injured small well owners.[83]

California has developed special rules for municipalities which insure that the state's correlative rights rule does not cut off access to needed supplies. The famous case of *City of Pasadena v. City of Alhambra*[84] invented a new way to divide basins among municipalities, holding that overlying owners and appropriators have equal rights when they pump in excess of the safe annual yield. The mutual prescription rule tends to confirm municipal uses or to promote large-scale regional solutions.[85] It has been limited to conflicts between overlying and non-overlying water rights holders.[86]

Some states, such as New Mexico and Colorado, allow the State Engineer to deny a groundwater appropriation that would impair senior surface rights, or to condition a new appropriation on the retirement of senior surface rights.[87] This level of integration has not, however, ended groundwater mining.[88] Colorado's rococo groundwater rules rank among the marvels of modern water law, but the net result is a strong preference for Front Range growth. For example, a special statutory system for Denver's "not nontributary" deep aquifer[89] provides for minimal augmentation of streamflow and thus promotes use on new subdivisions on overlying land.[90] The statute mentions four aquifers by name but the Colorado Supreme Court has held that the legislative history of the statute supports the conclusion that it applies only to those portions of the four named formations that are located in the Denver basin.[91]

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83. *E.g. Woodsum v. Pemberton*, 412 A.2d 1064, 1078 (N.J.Super. 1980) (correlative rights rule does not include a right to lift).

84. 207 P.2d 17, 33 (1949).

85. The doctrine of mutual prescription ignored the California Code section that prohibited prescription against municipalities. *City of L.A. v. City of San Fernando*, 537 P.2d 1250, 1304-1306 (Cal. 1975), corrected this error, but went on to create a series of favorable rules for Los Angeles. It held that a non-municipal pumper may not prescribe against the state, but a municipal pumper may prescribe against a non-municipal one. *Id.* at 1305-1306 In addition, it announced a liberal safe yield test which will delay the start of any prescriptive period. *Id.* at 1309, and confirmed Los Angeles' pueblo rights as successor to the Pueblo of Los Angeles. *Id.* at 1277. Pueblo rights have been questioned as a historically inaccurate reading of Spanish colonial law. *See generally* Peter L. Reich, *Mission Revival Jurisprudence the Pueblo Rights Doctrine Meets Prior Appropriation: State Courts and Hispanic Water Law Since 1850*, 69 Wash. L. Rev. 869 (1994). Nonetheless, these rights operate in California as a super-preference for cities. New Mexico has rejected them for cities.

86. *Tehachapi- Cummings Water Dist. v. Armstrong*, 122 Cal. Rptr. 918, 1001 (Cal. App. 1975).

87. *E.g. City of Albuquerque v. Reynolds*, 379, 439-440 P.2d 73 (N.M. 1962). The impact of New Mexico's tight groundwater management policies on urban growth is explored in Lucero & Tarlock, *Water Supply and Urban Growth in New Mexico: Same Old, Same Old or a New Era?* , supra n. 62.

88. Alletta Belin, Consuelo Bokum & Frank Titus, *Taking Charge of Our Water Destiny: A Water Management Policy Guide for New Mexico in the 21st Century* 25 (1000 Friends of N.M. 2002).

89. Colo. Rev. Stat. § 37-90-103(10.7) (2005).

90. *See generally Chatfield East Well Co. v. Chatfield East Property Owners Assn.*, 956 P.2d 1260 (Colo. 1998).

91. *In Re Application of Water Rights of Park County Sportsman's Ranch LLP.*, 986 P.2d 262, 268-274 (Colo. 1999).

Arizona has the most aggressive groundwater conservation regime, but it too allows cities to prosper when water is limited. Arizona is gradually switching from relying primarily on groundwater to obtaining supplies from the Central Arizona Project and recycled water, and water use appears to have leveled off even as population continues to increase. The 1980 Arizona Groundwater Management Act requires that the state establish safe yield limits in designated Active Management Areas. But the Phoenix Active Management Area may exceed safe yield by 251,000 acre feet and the state estimates that this overdraft will continue until the 2025 safe yield target date.[92] Smaller deficits have long been projected for Tucson, but the same result is likely; the 2025 safe yield goal will not be met.[93] Similarly, New Mexico's long history of groundwater mining to support the Albuquerque corridor is beginning to catch up with it. To meet its downstream Rio Grande compact and treaty obligations, all new uses must be offset by existing ones.[94]

Local governments have long assumed that they do not control access to water located within their boundaries because water rights are created and controlled by state law. They have also assumed (and been told) that water rights can be detached from the area of origin and moved to areas of demand. However, these assumptions are eroding in ways that may adversely impact cities. For example, California counties have the legal right to prevent groundwater exports beyond their borders. California has no statewide regulation of groundwater use, and state law allows local agencies to adopt groundwater management plans.[95] An intermediate appellate court opinion held that state law does not preempt a county ordinance from prohibiting withdrawals in excess of a safe yield, or protecting preexisting and reasonable foreseeable overlying beneficial uses.[96] The court dismissed the argument that the ordinance was intended to "hoard" water by protecting projected agricultural growth, invoking the principle that courts do not probe lawmaker motivation.[97]

B. *Land Use Law: Growth Management = Growth Accommodation*

The rate and degree to which cities must accommodate growth has long been a divisive land use issue. Growth management first emerged as a discrete local land use objective in the late 1960s as post-World War II sub-

92. Arizona Department of Water Resources, *Phoenix Active Management Area,* http://www.water.az.gov/watermanagement_2005/Content/AMAs/PhoenixAMA/default.htm.

93. "Safe Yield Goal Proving Elusive," 7 Ariz. Water Resource 1 (Sep.-Oct. 1998), http://ag.arizona.edu/AZWATER/awr/sept98/feature1.html. Skyrocketing urban growth and severe and perhaps more frequent droughts have undermined the initial AMA planning assumptions. *See gen*erally Matt Jenkins, "Arizona Returns to the Desert," *High Country News* (March 21, 2005).

94. Lucero & Tarlock, *supra* n. 62, at 805-806.

95. Cal. Water Code §§ 10750 - 10753.9 (2005).

96. *Baldwin v. County of Tehema*, 36 Cal. Rptr. 2d 886, 893-895 (Cal. App. 3d Dist. 1994).

97. *Id.*

urbs expanded into farming areas near urban areas. Eventually, these issues were partially folded into the environmental movement.[98] Since the 1960s, some local governments—generally smaller, affluent suburbs—began to question whether they had to accommodate all growth, and growth control and management emerged on the agenda. A series of precedent-setting cases gave communities considerable discretion to deflect and coordinate growth through their urban service capacity. Growth management also allowed growth to be deflected through low-density zoning, especially in the West where courts have not followed New Jersey, New York, and Pennsylvania in adopting strong anti-exclusionary or inclusionary doctrines.[99]

"Growth management" as an explicit objective went somewhat out of favor when challenged by arguments that it raised the cost of housing for many moderate and low income families.[100] "Smart Growth" is the post-1980s growth management strategy, but the objectives are the same: the encouragement of denser, less automobile-dependent communities, and the preservation of open space within an urban region.[101]

As generally practiced today, growth management is little more than a sophisticated unlimited growth accommodation strategy. Cities generally accept growth levels as a given and seek to accommodate it by channeling development within urban growth boundaries and by using subdivision exactions to force new residents to pay directly the costs of new public services. A recent analysis concluded that "growth management efforts remain acceptable only if they are limited to programs designed to channel growth to appropriate locations or minimize negative impacts associated with ongoing growth."[102] The law of growth management supports the long history of market preference: Americans have a persistent preference for low-density development.[103]

When water limits issues surface, they are closely tied to the debate about urban sprawl, now recast as "smart growth." The hope, however misplaced, is that limited water availability can be an effective anti-sprawl

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98. *See generally* Rockefeller Fund Task Force, *The Use of Land: A Citizen's Policy Guide to Urban Growth* (1973).

99. Robert C. Ellickson & Vicki L. Been, *Land Use Controls*, ch. 9 (Aspen Publishing, Co. 2005) (provides an extensive survey of the duty of cities to consider regional needs).

100. Center for Environmental Justice, *Smart Growth and Its Effects on Housing Markets: The New Segregation* iv, http://www.nationalcenter.org/NewSegregation.pdf (Natl. Center for Public Policy Research 2002) ("had Portland [Oregon's urban growth boundary]'s policies been applied in major metropolitan areas nationwide over the last 10 years, over a million young and disadvantage families, 260,000 of them minority families, would have been denied the dream of home ownership").

101. *Id.*

102. Gabor Zovany, *Growth Management for a Sustainable Future* 37 (Greenwood Publishing Group 1997).

103. *See generally* Kenneth T. Jackson, *The Crabgrass Frontier: The Suburbanization of the United States* (Oxford Press 1985). *The Crabcrass Frontier* has spawned a new generation of students of suburbia who are increasingly reacting against what they see as the elite bias against sprawl. *See e.g.*, Jennifer Howard, *Revising the Suburbs, A New Wave of Scholars Challenges Common Assumptions About Sprawl and Urban Growth*, 52 Chronicle of Higher Education 29 (March 24, 2006).

strategy. Much of the smart growth debate is driven by aesthetic and economic arguments against urban sprawl. Opponents counter that however ugly and bland a landscape it produces, sprawl is both democratic and socially progressive.

Urban sprawl has immediate water supply consequences in areas that depend on groundwater. A recent report by American Rivers and other water and environmental nongovernmental organizations documents how urban sprawl reduces aquifer recharge by paving over recharge areas. [104] The report confirms another important facet of recent growth trends: land consumption rates in this country far exceed the rate of population growth. Atlanta led the nation in the 1990s by increasing its land consumption 81 percent while sustaining a 41 percent population growth increase. Boston, the Washington D.C. metro area, Dallas, and Houston followed.[105] Thus, the new concern and formal linkage between water supply and urban sprawl is not simply a western issue.

The core economic case against sprawl is that low-density development creates higher urban service costs, higher energy costs because of increased travel, and more external costs such as automobile exhaust emissions. For example, Kenneth Jackson celebrated the suburbs in his classic book *The Crabgrass Frontier*, but he predicted that "[b]y 2025 the energy-inefficient and automobile dependent suburban system of the American Republic must give way to patterns of human activity and living structures that are energy efficient."[106] There is no single, simple solution, but the important point is that more efficient sustainable land use patterns exist and ought to be considered.

The economic case for sprawl—or, more neutrally, the continuation of the current outward expansion of cities—is that efficiency must always be balanced against equity, and equity concerns often cut in favor of sprawl. Low and moderate income families often, on balance, benefit from sprawl, especially as changing social mores and anti-discrimination laws open more suburban areas to minorities. Low-density development exerts a downward pressure on housing prices. Some of the highest housing prices are found in areas with the most admired growth control programs: Boulder, Colorado; Portland, Oregon; and the San Francisco Bay Area.[107]

In addition, the regional impacts of individual municipal growth management decisions are often ignored. Growth controls tend to produce more European style cores, with many amenities and more massed, usable open

104. *See generally* American Rivers et al., *Paving Our Way to Water Shortages: How Sprawl Aggravates the Effects of Drought* (2002). *See also* Sid Perkins, *Paved Paradise: Impervious Surfaces Reduce a Region's Hydrology, Ecosystems—Even Its Climate,* 166 Science News Online No. 10, 152, http://www.sciencenews.org/articles/20040904/bob8.asp (Sep. 4, 2004).

105. *See* American Rivers, supra n. 104.

106. *See* Jackson, *supra* n. 103, at 304.

107. *See* Mary Gail Snyder, *Opportunity for All: Growth, Equity and Land Use Planning for California's Future*, http://www-iurd.ced.berkeley.edu/pub/WP-2001-05.PDF (last accessed May 15, 2006).

space, but they do so only by pushing low-density growth far into adjacent areas. If water is used as a growth control lever, the tension between growth control and affordable housing will be exacerbated. Lawyers and planners who must work with California's new water supply planning and certification requirement (described at part V (B) below) justifiably complain that the water mandates are inconsistent with other statutes mandating affordable housing components in city plans.

C. *The Limited Power to Use Water to Restrict Growth*

1. *Growth Moratoria*

Cities have some authority to defer growth until water and sewer capacity is adequate to serve the new residents.[108] Growth moratoria are a long-established land use planning device to freeze development for a limited period of time to allow cities to formulate permanent land use plans for an area slated for development. The extra time is supposed to allow cities to secure water supplies, obtain financing, and construct the necessary infrastructure.[109]

Cities may impose moratoria on water service,[110] but if a moratorium is a de facto permanent freeze on development, the city may be held responsible for an unconstitutional taking of property.[111] In 1987, the Supreme Court held that a landowner could recover damages for a temporary taking of property, and suggested that courts must now distinguish between unconstitutional temporary takings and "normal delays" in obtaining development permissions.[112]

After *Lucas v. South Carolina Coastal Council*,[113] landowners argued that there was no justification for a temporary suspension of the right to develop, but in 2002 the Supreme Court refused to apply the *Lucas* rule to moratoria and endorsed them as a legitimate planning tool. In *Tahoe-Sierra*

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108. *E.g. San Mateo Coastal Landowners' Assn. v. County of San Mateo*, 45 Cal. Rptr. 2d 117, 136-137 (Cal. App. 1st Dist. 1995); *First Peoples Bank of N. J. v. Township of Medford*, 599 A.2d 1248, 1254 (N.J. 1991). *C.f. Neenah Sanitary Dist. v. City of Neenah*, 647 N.W.2d 913, 917-18 (Wis. App. 2002) (city need not give objective reasons for refusal to extend sewer service and absent showing of bad faith implied contractual duty of good faith and fair dealing not violated); *Bailey v. City of Goodman*, 69 S.W.3d 154 , 158 (Mo. App. S.D. 2002) (City has discretion not extend water service to new area in its service area).

109. *See* Diane Albert, *Building Moratoria: Strategies and Tools for Governing Bodies*, 7 Water Resources IMPACT 16 (Nov. 2005).

110. *Swanson v. Marin Municipal Water Dist.*, 128 Cal. Rptr. 485, 490-491 (Cal. App. 1976); *McMillan v. Goleta Water Dist.*, 792 F.2d 1453, 1457 (9th Cir. 1986), *cert. denied*, 450 U.S. 906 (1987).

111. *Lockary v. Kayfetz*, 917 F.2d 1150, 1155-1156 (9th Cir. 1992). *See* Dennis J. Herman, *Sometimes There is Nothing Left to Give: The Justification for Denying Water Service to New Consumers to Control Growth*, 44 Stan. L. Rev. 429, 443-446 (1990).

112. *First English Evangelical Lutheran Church of Glendale v. County of L.A.*, 482 U.S. 304, 314-322 (1987).

113. *Lucas v. S.C. Coastal Council*, 505 U.S. 1003 (1992).

Preservation Council, Inc. v. Tahoe Regional Planning Agency,[114] the Court characterized the potential taking as regulatory as opposed to a physical taking, and applied the *Penn Central* balancing test to uphold a 32-month moratorium.[115]

Thus, the *First English* compensation rule only applies after the court has determined that the moratorium is not a proportional, reasonable, and good faith response to threats posed by development. *Tahoe-Sierra Preservation Council* can best be characterized as an application of the precautionary principle because it allowed a public agency a reasonable period of time to respond to a substantial risk of an adverse impact. The case does not afford cities an excuse to delay developing new supplies unless they can demonstrate that development poses environmental issues that need to be studied and mitigated.

Judicial treatment of water moratoria is consistent with this analysis. Courts have approved water service moratoria but have suggested they are valid only so long as a true supply deficit lasts; cities cannot use moratoria permanently to limit growth.[116] One of the problems of a moratorium is calculating when there is a shortfall. A drought will satisfy this requirement, but the return of a "normal" wet year may eliminate the supply deficit.

2. *Growth Caps*

Capping urban growth is assumed to be off the policy agenda. Although the idea surfaces periodically, no area of the West has tried to stop growth or even cap it. The reasons are economic and political, but the lack of interest in this option reflects the widespread assumption in land use law that a community cannot isolate itself from the rest of the world.

The constitutional right to travel prohibits a state from barring the entry of new residents. The legality of a community to impose a flat cap on growth has been invalidated,[117] although the courts have rejected the argument that the right to travel applies to intrastate growth management pro-

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114. 535 U.S. 302 (2002).

115. *Id.* at 334-35. *See generally* Matthew G. St. Amand & Dwight H. Merriam, *Defensible Moratoria: The Law Before and after the Tahoe-Sierra Decision*, 43 Nat. Res. J. 703 (2003).

116. See cases cited *supra* nn. 111-115.

117. *City of Boca Raton v. Boca Villas Corp.*, 371 So.2d 154, 157 (Fla. Dist. Ct. 1979). Several cases have upheld caps for resource-constrained areas. *See generally City of Hollywood v. Hollywood, Inc.*, 432 So. 2d 1332 (Fla. Dist. Ct. App. 1983), *petition for review denied*, 441 So. 2d 632 (1983) (3,000 unit density cap for small strip of land on the Atlantic coastline), and *Home Builders Assn. v. Cape Code Commn.*, 441 Mass. 724, 808 N.E. 2d 315 (2004) (building permit cap valid to protect sole source aquifer on town of Barnstable on Cape Cod). For an effort to revive the population-environmental quality link in the context of sustainable development, see generally Tom Pierce, Student Author, *A Constitutionally Valid Justification for the Enactment of No-Growth Ordinances: Integrating Concepts of Population Stabilization and Sustainability*, 19 Haw. L. Rev. 93 (1997).

grams.[118] Subsequent cases have held that the right is one of entry, not location: there is no right to locate in a particular community within the state.[119] Thus, communities retain considerable discretion to use their land use powers to decide where and under what conditions they will accommodate the growth.[120] However, the current "smart growth" movement is too incoherent to serve a compelling state interest should a court revisit the issue.

3. *Service Denials*

Many cities may wish to tie the rate of growth to reliable, available "wet" water. The power of a city to defer growth puts it at the vortex of two potentially inconsistent doctrines: public utility law's "duty to serve" and land use law's authority for local governments to regulate the timing and manner of development on private land. Municipal water suppliers are generally either public utilities under state law or subject to judicially imposed public utility duties.[121]

Public utilities have a duty to serve all customers within a service area, provided that the system as a whole can absorb the cost and still yield a reasonable rate of return. A leading California case extended the duty to serve to include a duty on water providers to acquire the necessary supplies to meet projected demands.[122] The rationale for this rule is ultimately based on basic ideas of fairness and estoppel. It is designed primarily to protect those who have entered into a service relationship with a common carrier or are within the service area of a public utility but are denied service when the carrier or the utility is able or should be able to provide service, at least in the short run.

The acquired water has often been sold to consumers at average or other marginal cost so there has been little, if any, incentive to conserve, although

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118. *Construction Industry Assn. v. City of Petaluma*, 522 F.2d 897, 906-909 (9th Cir. 1975), *cert. denied*, 424 U.S. 934 (1976). *See also Village of Belle Terre v. Borass*, 416 U.S. 1, 7 (1974). *But cf. United Building & Construction Trades Council v. Mayor and Council of Camden*, 465 U.S. 208, 216 (1984).

119. *Cf. e.g. Tobe v. Santa Ana*, 892 P.2d 1145, 1161-1166 (Cal. 1995) (city has no duty to provide camping space to facilitate the homeless' right to travel). *See* Robert Ellickson, *Controlling Chronic Misconduct in City Spaces: Of Panhandlers, Skid Rows, and Public-Space Zoning*, 105 Yale L.J. 1165, 1239- 1242 (1996).

120. *Construction Industry Assn. v. City of Petaluma, supra* n. 113, remains the leading case upholding phased growth but suggesting there are limits on the city's accommodation strategy. Courts have invalidated phased growth ordinances if the rate is substantially less than the actual rate of growth in the community. *Stoney-Brook Development Corp. v. Town of Freemont*, 474 A.2d 561, 563-564 (N.H. 1984). The leading cases upholding a growth cap for a resource-constrained area is *City of Hollywood v. Hollywood, Inc.* 432 So.2d 1332 (Fla. Dist. Ct. App. 1983), *pet. for rev. denied*, 441 So.2d 632 (3000 unit density cap for small strip of land on the Atlantic coastline) and *Home Builders Assn. v. Cape Code Commission*, 441 Mass. 724, 808 N.E.2 315 (2004) (building permit cap valid to protect sole source aquifer on town of Barnstable on Cape Cod).

121. *Reid Development Co. v. Township of Parsipanny Troy Hills*, 89 A.2d 667, 670-71 (N.J. 1952).

122. *Lurawka v. Spring Valley Water Co.*, 146 P. 640, 645-646 (Cal. 1915).

pricing practices are slowly changing as energy security and treatment costs increase.[123] The duty to serve has been criticized as out of step with the modern land use cases that allow cities to control the rate and location of new development short of totally deflecting it to other communities in the region.

In response, courts have held that the duty to serve does not prevent municipalities from subordinating utility service to land use plans both within and without the territorial limits of the city. This includes the power to refuse service until an area is ready for development[124] and to deny subdivision approvals for new subdivisions with water and sewer service that is inconsistent with a county's land use plan.[125] Modern courts have recognized that a contrary rule would undermine the ability of cities to control their growth rates and their discretion to distribute the growth.

Indeed, a number of cities already limit service extensions as a de facto growth control tool. For example, Half Moon Bay in California has done this because of limited available supplies and a lack of sewage treatment

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123. Anne Gonzales, *Liquid Gold*, Sacramento Business Journal (March 14, 2003). An intermediate California court of appeals has refused to accept this as the inevitable fate of California. Portions of the 2000 Bay-Delta Programmatic EIS were found to be inadequate because of its failure to identify potential sources of water for ecosystem restoration and its failure to consider the alternative of reduced water exports. *In re Bay-Delta Programmatic Environmental Impact Coordinated Proceedings*, 34 Cal. Rptr. 3d 696 (Cal. App. 3d Dist. 2005), *rev. granted*, ___ P.2d ___ (2006) (intermediate appellate decision depublished). The court held that the EIS did not have to identify the ultimate sources of water, but it could not simply list potential sources of water, especially "given today's climate of antipathy toward massive water storage projects and recent efforts to decommission existing dams and reservoirs," but had to include a full analysis of supplying water "from whatever the source." *Id.* at 757. On the issue of reduced water exports, the court refused to accept the conclusion that this was not a feasible alternative because southern California was continuing to grow. "Taking an assumed population as a given and then finding ways to provide water to that population overlooked an alternative that would provide less water for population growth leaving more water for other beneficial uses." *Id.* at 774. The California Supreme Court's decision to accept review voids the intermediate court of appeals' opinion, but the breadth of the court's holding illustrates that one can rely less and less on "conventional wisdom" of the inevitability of unrestrained growth in water-stressed areas.

124. *Dateline Builders, Inc. v. City of Santa Rosa*, 194 Cal. Rptr. 258, 266 (Cal. App. 1983); *Moore v. City Council of Harrodsburg*, 105 S.W. 926, 926 (Ky. 1907) ("In the absence of fraud, corruption, or arbitrary action, the judgment of city officials as [to extension of water service is] beyond judicial control."); *County of Del Norte v. City of Crescent City*, 84 Cal. Rptr. 2d 179, 186 (Cal. App. 1 Dist. 1999) (municipal supplier is not held to the same duty as a private utility to serve the present and prospective needs of the service area).

125. *Serpa v. County of Washoe*, 111 Nev. 1081, 1083-84, 901 P.2d 690, 691-692 (1995), holds that Washoe County (Reno) can prohibit five acre or less subdivisions "until a new water source is available," and the county's action do not impair state water rights because the power to define rational growth "includes the ability of a county government to determine water availability for itself." *Accord Schfield v. Spokane County*, 980 P.2d 277, 281 (Wash. App. 1999) (county has power to deny rezoning for riparian land because no central sewer system existed to serve proposed ranchettes); *City of Attalla v. Dean Sausage Co., Inc.*, 889 So.2d 559, 569 (Ala. Civ. App. 2003), *cert. denied*, as to one party (state order to financially strapped city to improve antiquated sewage sufficient reason to terminate previously extraterritorial service); and *Gould v. Santa Fe County*, 37 P.3d 122, 127 (N.M. App . 2001) (county improperly granted variance to allow subdivision of 20 acre minimum lot in water stressed area to permit extended family to live together because it was personal rather than statutory factors; the ordinance allowed family transfers for cultural reasons but limited them to lots no smaller than half of the minimum lot size). *Cf. Wilson v. Hidden Valley Municipal Water Dist.*, 63 Cal. Rptr. 889, 897-898 (Cal. Ct. App. 1967) (water district may be formed to preserve agriculture community).

capacity.[126] Another community, that of Rockville, Utah, opted not to build a new water treatment plant explicitly because its leaders do not want to entice more residents to move there.[127] As described above in the discussion of moratoria, the power to coordinate is generally limited to the time necessary to secure the necessary supplies or infrastructure.

V. THE EMERGING LINKAGE OF WATER AND LAND USE POLICIES IN THE WEST

All over the West, cities are beginning to realize that new municipal water supplies must be addressed in the context of other competing uses in the watershed or basin, and that there may be limits to the amount of available water to support new growth. This recognition takes many forms.

The most modest step is to incorporate water supply planning into land use planning. For example, water conservation is an element in the emerging "Envision Utah" regional planning process.[128] Some states have taken the additional step of giving local governments more discretion to coordinate water service and urban growth. Several have taken the more far-reaching step of conditioning new development on an adequate water supply. A few states are moving to require that "wet" water be in place before new developments can be approved, and many other states are imposing greater water assessment and planning duties on local governments. Some water-stressed cities, such as Santa Fe, have developed innovative conservation measures. An even more extreme step would be to close an area to urban development, but this is a step that all states and local governments seek to avoid.

A. *Municipal Water Supply Planning*

The most common strategy to link water and land use planning is to require water supply elements in comprehensive plans. The link with the most bite places the responsibility for supply acquisition on local governments and developers. This form of growth management pressures municipal water suppliers to acquire the necessary supplies or to devise an alternative strategy to meet future water demands because the issue is only where, not whether, the demand will exist. In many western states, however, water planning elements are integrated weakly if at all in the larger public plan-

126. Half Moon Bay, CA, *Measure D Implementing Ordinance* (Aug. 8, 2005).

127. Rockville is nestled in a scenic pocket of Utah's canyon country, just outside Zion National Park and within rapidly growing Washington County. As Rockville's mayor told a reporter, "The people here have elected to stay little, and we can benefit from the growth of the other communities. We just have to travel there to take advantage of it." Christopher Leonard, *Hot Spots of U.S. Population Growth* Christian Science Monitor (June 7, 2005). (available at http://www.csmonitor.com/2005/0607/p03s01-ussc.html).

128. *See* Environmental Protection Agency, *Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies* 9-11, www.epa.gov/smartgrowth/pdf/growing_water_use_efficiency.pdf (last accessed May 1, 2006).

ning process.[129] These new planning mandates build on the old water resources planning framework. Until the 1980s, water resources planning meant primarily project planning. Water supply retains that focus- more available water- but expands it to consider a wide range of supply options. The possibility of limiting growth to conserve alternative uses of water is seldom one of those options.

Cities facing more immediate shortages continue to rely on a mix of supply acquisition options, giving increased weight to conservation as opposed to a simple reliance on the acquisition of new water. Of course, the balance between the two strategies varies from city to city, and conservation cannot carry the entire burden of supplying new growth.[130]

San Diego illustrates one possible new growth accommodation model. The growing city faces the double problem of limited natural surface and groundwater supplies and a low-priority Colorado River entitlement. The city has linked water supply and growth as part of its ongoing growth management program with a six-part strategy. In the future, in addition to possible water transfers from the embattled and divided fiefdom known as the Imperial Irrigation District, San Diego will depend on a combination of: (1) more efficient use of existing supplies; (2) demand management; (3) reallocation of existing supplies through water marketing; (4) more limited new storage and distribution facilities; (5) desalination; and (6) greater conjunctive surface and groundwater use.[131] This strategy has allowed it to add some 300,000 new residents since 1990 without increasingly its water use during that period.[132]

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129. A recently completed Master's thesis examining the potential links between water and land use noted that, "Unlike land-use planning . . . water supply 'planning' does not generally provide explicit opportunities for public involvement by current city water users who have ownership in the process, or sourcewater communities who are not part of the municipal electorate. Most importantly, alternative policy scenarios for obtaining the necessary water supplies are not subject to broad evaluation and public participation." Scott Coulsen, *Locally Integrated Management of Land-Use and Water Supply* 19 (U. Colo. Dept. of Urban and Regional Planning 2005). The author goes on to recommend coordination of water servicing by adopting comprehensive plans that are consistent with water supply constraints, including public information on the costs of future water supplies.

130. For two examples of cities securing future water supplies by building offstream storage facilities, see Tarrah Henrie, *Why Some Water Districts Decided to Dam It*, 7 Water Resources IMPACT 9 (Nov. 2005). For an overview of options for integrating water into land use decision making, see Environmental Protection Agency, *Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies*, *supra* n. 122.

131. *See e.g.* San Diego County Water Authority, *2005 Urban Water Management Plan*, http://www.sdcwa.org/manage/pdf/2005UWMP/FinalDraft2005UWMP.pdf (Dec. 2005). *See also* Barton H. Thompson Jr., *Water Management and Land Use Planning: Is It Time for Closer Coordination? In Wet Growth: Should Water Law Control Land Use?* 95, 106- 117 (Environmental Law Institute 2005) (exploring the limitations of this strategy including a backlash against stringent use limitations).

132. Editorial, *Lakes Saved*, The San Diego Tribune (Jan. 19, 2002).

B. *State-Municipal Duty to Assure Adequate Drought-Proof Water Supplies*

Arizona and California view the existence of an adequate, long-term, drought-proof supply of water as an urban consumer entitlement. This entitlement is unconnected to any idea of water as a limit on urban growth, as the Arizona experience illustrates. As the price for construction of the federally funded Central Arizona Project (CAP), Arizona had to agree to stop mining its aquifers to support urban growth. Accordingly, in 1980, the state adopted the 1980 Groundwater Management Act.[133] Despite intense opposition, rules adopted pursuant to the Act imposed a duty on all new developments in the four groundwater basins included within the designated Active Management Areas, and thus on their municipal suppliers, to establish "a sufficient supply of water which will be physically available to satisfy the applicant's 100 year projected water demand."[134] The rules are structured to eliminate reliance on continued groundwater mining to establish an assured water supply.

Initially, the rules set off a scramble to acquire agricultural water rights in remote counties, but more recently municipal suppliers began paying the high CAP rates for Arizona's underused Colorado River entitlement. This price shock was alleviated by the creation of the Central Arizona Groundwater Replenishment District, which allows members to secure and withdraw groundwater.[135] As Phoenix and Tucson have used more surface (CAP) water, municipal water use has started to decline in part because of a wetter than average cycle, groundwater conservation, and increasing reliance on recycled ("gray") water for turf irrigation.

Importantly, growth is expanding outside the metropolitan areas, beyond the reach of the Groundwater Management Act,[136] and there is no consensus as to how to address the environmental impacts of the growth. The State Department of Water Resources reviews building plans to determine whether the water supplies will last 100 years, but their determination has no legally binding effect. A review of state records in 2005 revealed that 35 percent of the applications reviewed by the state since 2001 were returned with an "inadequate water supply" finding, but most of those projects proceeded nonetheless. [137] As a result, many subdivisions in rural Arizona are constructed with tenuous and unreliable water sources.

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133. Ariz. Rev. Stat. § 45-401 et seq. (2006).

134. Ariz. Dept. of Water Resources, R12-15-703(b) (February 7, 1995).

135. Katherine L. Jacobs & James Holway, *Managing for Sustainability in an Arid Climate: Lessons Learned from 20 Years of Groundwater Management in Arizona, USA*, 12 Hydrology J. 52, 58-60 (2004).

136. Populations outside AMAs have doubled since the passage of the Act in 1980, now totaling more than one million people. Shaun McKinnon, *Solutions to Water Concerns a Hard Sell to Rural Residents*, The Arizona Republic (June 28, 2005).

137. Shaun McKinnon, *Developers Cashing in on Weak Water Laws*, The Arizona Republic (June 27, 2005).

California's approach shifts more responsibility directly to developers to find adequate supplies. The policy change began in 1993, when the then "green" board of the East Bay Municipal Utility District (EBMUD), which serves the booming East Bay region of the San Francisco Bay Area, opposed an 11,000-unit development in Contra Costa County. EBMUD obtained a trial court verdict that the county had to consider the availability of an adequate water supply, but the case was settled on appeal.[138]

In 1995, California enacted legislation, primarily in response to the rapid and dispersed urban growth and conversion of prime agricultural land in northern California and the San Joaquin Valley. The legislation requires cities to have a firm water supply plan in place before large, new developments are approved. Unlike Arizona, the statute does not impose a de facto duty on cities to acquire sufficient water rights, and it was initially not enforced.[139]

The state legislature tightened the law in 2001, prohibiting approval of tentative subdivision maps, parcel maps, or development agreements for subdivisions of more than 500 units unless there is a "sufficient water supply."[140] Sufficient supply is defined as the total supply available during a "normal, single-dry, and multiple dry years within a 20-year projection."[141] To calculate this, the supplier must include a number of contingencies such as the availability of water from water supply projects, "federal, state, and local water initiatives such as CALFED," and water conservation.[142] Enforcement is tied to the duty of water suppliers to prepare urban water management plans.[143] Water supply assessments must either be consistent with these plans or meet the available water supply criteria. Assessments may trigger a duty to acquire additional water supplies.[144]

These duties will be enforced primarily under the California Environmental Quality Act (CEQA).[145] The process, provided it is in fact honest, will allow objectors to probe the underlying assumptions and reliability of the data on which the assessments are made. This could be a serious impediment to business as usual, as evidenced by recent CEQA litigation on the subject.

In 2000, an intermediate appellate court invalidated the environmental impact report (EIR) prepared in connection with the renewal of the Califor-

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138. *See generally* Ryan Waterman, *Addressing California's Uncertain Water Future by Coordinating Long-Term Land Use and Water Planning: Is the Water Element of the General Plan the Next Step?* 31 Ecology L.Q. 117, 125-131 (2004).

139. *Id.* at 129.

140. Cal. Gov. Code § 66473.7(b)(1) (2005). However, if the supplier has less than 5,000 connections, the adequate supply requirement applies to any subdivision that will amount to a 10 percent increase in service connections. *Id.* at § 66473.7(a)(1).

141. *Id.* at § 66473.7(a)(2).

142. *Id.* at § 66473.7(a)(2)(D).

143. Cal. Water Code § 10910(c) (2005).

144. *Id.* at § 10911(a).

145. Cal. Pub. Res. Code § 21000 et seq. (2005).

nia State Water Project contracts and the subsequent Monterey Water Users Agreement.[146] The court determined that the state drought delivery projections were "paper" water, and that reliance on this phantom entitlement could seduce local jurisdictions to approve developments in excess of the actual guaranteed supply. In 2003, to settle the suit, the state agreed, inter alia, to drop the word "entitlement" from state contracts and to prepare more accurate supply and delivery forecasts.[147]

Similarly, an intermediate court of appeals invalidated an EIR for a 2,555-unit housing and mixed use project in the Santa Clarita Valley north of Los Angeles.[148] The court found that the EIR was not sufficiently detailed because it did not include a discussion of the serious risks of reliance on less-than-projected State Water Project supplies.[149]

For its part, Florida passed new coordinating legislation in 2002, although it is a water supply planning rather than assessment statute.[150] In 2002, the legislature expanded the local government comprehensive plan requirements to strengthen coordination of water supply and local land use planning. One of the most significant new requirements is a ten-year Water Supply Facilities Work Plan, which must project the local government's needs for at least a ten-year period, identify and prioritize the water supply facilities and source(s) of water that will be needed to meet those needs, and include capital improvements identified as needed for the first five years.[151] Each listed capital improvement must identify a financially feasible revenue source, none of which is speculative or contingent. Each year during the annual update to the five-year schedule, a new fifth year will be added, and capital improvements identified in the ten-year work plan will be incorporated. Initially, only those local governments with responsibility for all, or a portion of, their water supply facilities and located within a Regional Water Supply Plan (RWSP) area must prepare and adopt a ten-year water supply work plan[152].

These examples of new state legislation and local initiatives illustrate the extent to which the federal government and state governments are devolving much of their historic responsibility for water resources planning to local governments. Throughout the United States, local governments are assuming broader water supply planning duties. The focus on water planning remains the location of new, drought-proof supplies, but planning is

146. *Planning & Conservation League v. Dept. of Water Resources*, 83 Cal. App. 4th 892, 926 (Cal. App. 2000), *appeal denied.*

147. Settlement Agreement, http://www.montereyamendments.water.ca.gov (May 5, 2003).

148. *Santa Clarita Organization for Planning the Environment v. County of L. A.*, 106 Cal. App. 4th 715, 724 (Cal. App. 2d Dist., 2003) (certified for partial publication).

149. *Id.*

150. For a summary of Florida's program, 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* 23-39 (U. of Md., Urban Studies and Planning Program 2004).

151. *Id.* at 38.

152. *Id.*

being expanded to include greater consideration of the impacts on existing users, watersheds of origin, alternative sources of supply and demand management-conservation. In addition, these plans can no longer be projected wish lists or hydrologically weak assumptions about supply availability. Plans must be realistic assessments of what water will be available under worst case conditions.

C. *Water-Constrained Growth*

Truly supply constrained cities may be able to permanently limit development for water-related reasons. Courts have upheld communities' discretion to deny development permission in areas or developments with inadequate water supplies. Courts have also held that landowners have no constitutional right to use groundwater if individual well use poses public health risks or if a conservation regime has been put in place.[153] There is also no constitutional right to develop land in such a manner that will endanger future residents.

Santa Fe, New Mexico, is coming close to making water availability the primary determinant of growth.[154] The city first restricted new water connections outside city limits unless the customer had a valid, preexisting agreement for water service. Next, the city's Water Budget Administrative Ordinance, enacted in 2003, required all new projects within the city to offset a project's water budget by retrofitting existing toilets with high-efficiency units.[155] The 2005 Water Rights Transfer Ordinance requires new, large construction projects to transfer water rights to the city prior to issuance of building permits.[156]

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153. Courts have consistently held that there is no fundamental right to use water from a particular source. The usual rationale is the protection of public health. Thus, a city may prohibit well use and require public water supply hookups. *E.g. Stern v. Haligan*, 158 F 3d. 719 (3d Cir. 1998). *Johnson v. Township of Plumcreek*, 859 A.2d. 7, 13 (Cmmw. Ct. 2004) rejected the argument that post 9/11 terrorist threats dictate a different result. No imminent risk was found and a city does not have a duty to guarantee that terrorists, who are private actors, will not contaminate a water system. Prior cases may be qualified by the Supreme Court's decision in *Village of Willowbrook v. Olech*, 528 U.S. 562, 564-565 (2000) (per curiam) which held that discrimination against a class of one can be the basis for an equal protection challenge to a municipal action. The Village denied the Olechs' request to connect to the city's water system because they refused to dedicate a 33-foot easement. Other property owners had been asked only to dedicate 15 feet. The Supreme Court held that a class of one could support an equal protection claim if a municipality acted arbitrarily or wholly arbitrarily. The Seventh Circuit has since required either a showing of ill-will or intentional differential treatment. The former is a much higher standard than the latter. The more recent cases treat these as alternative standards, *e.g. Nevel v. Village of Schaumburg*, 297 F.3d 673, 680 (7th Cir 2002), but other circuits continue to require ill-will. *E.g. Bryan v. City of Madison*, 213F.3d 267, 277 (5th Cir. 2000), *cert. denied*, 121 S.Ct. 2081 (2001).

154. *See* Kyle Harwood, *The Evolution of Wet Growth Regulations: City of Santa Fe,* 7 Water Resources IMPACT 5 (Nov. 2005). Santa Fe County faces a dilemma of inadequate supplies to meet projected demands, leading officials to consider whether to continue supplying water on a first-come, first-served basis or to pursue a more comprehensive approach to link water supply to comprehensive plan priorities. *See also* Julie Ann Grimm, *County Wades Into Long-Range Planning for Water Allocation,* The New Mexican (March 1, 2006).

155. Harwood, *supra* n. 154, at 6.

156. *Id.*

Real water shortages may end up constraining growth in the area surrounding Prescott, Arizona. The groundwater within the designated Prescott Active Management Area (AMA) is in overdraft, but public and private water providers have continued to issue assured water supply commitments for subdivisions. The net result is that "even with maximum reuse of effluent, demands would outstrip supplies through the year 2025," according to a forecast by the Arizona Department of Water Resources. [157]

The problem is exacerbated by the fact that Prescott has very limited surface water supplies to turn to for augmentation. Before the Arizona Department of Water Resources could approve a management plan for the Prescott AMA, a land rush of subdivision applications sent the city searching for alternative supplies. One potential source is the Big Chino Valley north of Prescott, which provides the source of water for the Verde River, a rare semi-arid perennial stream, rich in biodiversity and an important cultural, recreational, and scenic resource.

What are the reasonable expectations of those settling in areas such as the Prescott Valley in reliance on dependable water supplies? How about those living above groundwater being eyed by thirsty growing communities? Water rights are property rights, but they differ significantly from land rights. A long history running from the Roman Empire to post-colonial America limits property rights to the continued beneficial exploitation or use of the property.[158] This tradition has died out in land law, but it is at the heart of western water law. All water rights are based on the application of water to beneficial use. It is the *use* of water that triggers a constitutionally-protected investment-backed expectation. Thus, there is no constitutional right to the future use of groundwater.

The leading case establishing this principle is *Town of Chino Valley v. City of Prescott.*[159] Arizona groundwater law allows water to be transported within sub-basins of AMAs. The community from which the water was being exported argued that the law took property without due process of law. Invoking the scientifically unsound analogy to things *ferae naturae*, the court held that "there is no right of ownership of groundwater in Arizona prior to its capture and withdrawal from the common supply and . . . the right of the owner of the overlying land is simply to the usufruct of the water."[160]

This statement may not hold in all states. For example, states have recognized that groundwater is a component of the value of land taken by emi-

157. Arizona Department of Water Resources, *Prescott Active Management Area*, http://www.azwater.gov/WaterManagement_2005/Content/AMAs/PrescottAMA/default.htm (last accessed March 2006).

158. *See generally* John Hart, *Land Use in the Early Republic and the Republic and the Original Meaning of the Takings Clause*, 94 Nw. U.L. Rev. 1099 (2000); John Hart, *Colonial Land Use Law and Its Significance for Modern Takings Doctrine*, 109 Harv. L. Rev. 1252 (1996).

159. 131 Ariz. 78, 638 P.2d 1324 (1981), *cert. denied*, 457 U.S. 1101 (1982).

160. *Town of Chino Valley*, 131 Ariz. at 82, 638 P.2d at 1328.

nent domain.[161] Nonetheless, states hold the power to conserve groundwater by deciding how much will be used by whom under what conditions and that use - not abstract claims of ownership - is the basis of constitutionally protected investment-backed expectations.

The Supreme Court's decision in *Lucas v. South Carolina Coastal Council* (which held that a beach erosion protection ordinance that prevented the construction of a house was a per se taking) may seem inconsistent with this assertion.[162] The Court clearly held that if there is a total deprivation of all development potential, the state cannot justify a regulation on either consumer protection or resource conservation grounds.[163]

Lucas, however, is not applicable to the denial of development permission to inadequately served land on the fringe of an urban or suburban area for two reasons. First, the state action in *Lucas* eliminated all development value on the property. Second, in addition to some minimum rate of return on investment in land, the Supreme Court requires equal treatment. Courts are more likely to balance the public benefit against an individual loss which falls short of a total deprivation if: (1) the area selected for non-development is relatively large; (2) the selected area is not part of an already developed area; and (3) the government's rationale is grounded on adequately documented scientific grounds.[164]

Any land use which limits urban expansion runs the risk of being invalidated as a taking. However, land use policies that link growth restraints to water availability do not raise the unfairness concerns that the Supreme Court's recent taking jurisprudence has identified. Courts have long recognized that the police power can be used to protect land use consumers against risks that they may not fully understand.[165] The police power cannot be used to strip value from property simply by enacting legislation which limits the use of land, but over time the police power can be used to dampen expectations and force land owners to adjust to new regulatory environments.[166] As the Supreme Court made clear in *Lingle v. Chevron, USA*[167] and *Tahoe-Sierra*, the primary function of the takings doctrine is to compensate land owners who have been unfairly singled out to bear a bur-

161. *Sorenson v. Lower Niobrara Natural Resources Dist.*, 221 Neb. 180, 192, 376 N.W.2d 539, 548 (Neb. 1985). Nebraska has since moved from its longstanding opposition to groundwater transfers to acceptance of regulated transfers.

162. 505 U.S. at 1028-29.

163. *Id.*

164. See, e.g. *Tahoe-Sierra*, 535 U.S. 302.

165. *See generally* Alison Dunham, *Flood Control via Police Power*, 107 U. Pa. L. Rev. 1098 (1959).

166. *Palazzolo v. R.I.*, 533 U.S. 606, 633 (2001) ("regulatory regime in place at the time the claimant acquires the property at issue helps to shape the reasonableness of those expectations.") (O'Connor, J. concurring.)

167. 125 S.Ct. 2074, 2080 (2005).

den that should be borne by the public.[168] Comprehensive water supply-based urban limits are not such a case.

VI. NO NATURAL LIMITS? FOUR DISSENTERS

Although the common theme of western political agendas has been one of can-do boosterism, the occasional dissenter has suggested more modest settlement patterns in the region, questioning our unlimited faith in technology to overcome nature. We consider here the continuing relevance of the ideas of four dissenters: John Wesley Powell, Morris Cook, Thomas Griffith Taylor, and Wallace Stegner.[169]

A. *John Wesley Powell*

"If John Muir is the patron saint of modern environmentalism, John Wesley Powell is the patron saint of the idea that western settlement should be adapted to the region's climate and soil rather than vice versa."[170] Today, Powell is best known as the first person to navigate the Colorado through the Grand Canyon[171] and for his unsuccessful efforts to design a rational land and water policy around the fact of aridity or, more accurately, highly variable water supplies.[172]

As Powell's biographer Wallace Stegner observed:

> Almost alone among his contemporaries, he looked at the Arid Region and saw neither desert nor garden. What he saw was the single compelling unity that the region possessed: except in local islanded areas its rainfall was less than twenty inches a year, and twenty inches he took, with slight modifications for the peculiarly concentrated rainfall of the Dakotas, to be the minimum needed to support agriculture without irrigation.[173]

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168. 535 U.S. at 321-322 (2002).

169. This description of dissenters first appeared in a slightly different form in A. Dan Tarlock, *A Brief Examination of the History of the Persistent Debate About Limits to Western Growth*, 10 Hastings W.-N.W. J. Envtl. L. & Policy 155, 157-166 (Spring 2004).

170. *Id.* at 159.

171. The most gripping account of the journey remains Wallace Stegner, *Beyond the Hundredth Meridian: The Exploration of the Grand Canyon and the Second Opening of the West* (Penguin 1953). Powell's writings (from the Colorado River explorations through the subsequent published works described here) are collected in *Seeing Things Whole: The Essential John Wesley Powell* (William deBuys, ed., Island Press 2001).

172. John Wesley Powell, *Report on the Lands of the Arid Region of the United States* (Wallace Stegner ed. 1962). Powell's latest biographer, the noted environmental historian Donald Worster, argues that Powell was impressed and influenced by the Mormon communitarian society that flourished in Utah in the 1870s. Donald Worster, *A River Running West: The Life of John Wesley Powell* 337-380 (Oxford U. Press 2001).

173. Stegner, *supra* n. 171, at 223-224.

Powell's famous *Report on the Lands of the Arid Region* concluded that only a small percentage of the West was irrigable, and thus settlements should be concentrated and organized by cooperative irrigation districts. He pressed this claim at the Second Irrigation Congress in 1893 to the disgust and boos of the faithful.

The federal government and the West rejected Powell's effort to promote a rational and ultimately modest settlement policy based on the division of the West into hydrologic basins and irrigation colonies. His efforts to use science "to break down tradition and the feeling that it was unpatriotic in a Westerner to admit that his country was dry"[174] were rebuffed by Congress. Nonetheless, Powell's proposals for western land and water policy present the first serious effort to propose a "sustainable" settlement policy, and thus they remain the model for sustainable alternatives to the historic encouragement of unlimited and unplanned growth. His legacy was carried forward by Walter Prescott Webb[175] and Wallace Stegner,[176] and is at the core of the modern environmental thinking and rhetoric of resource limits.[177]

Powell's thinking remains additionally relevant today because some of his predictions are beginning to materialize. Irrigation is not the foundation of much of the West; it is becoming a steady-state or niche culture. In 1991, for example, only Montana and Washington State had more then 10 percent of their land in crop production. Only three states—California, Colorado, and Idaho—had more than a million hectares under irrigation.[178] The amount of land dedicated to irrigated agriculture is shrinking in almost all western states, including California, Colorado, Kansas, Oklahoma, and Texas.[179] Irrigated agriculture will eventually have to make hard choices about its future survival in the face of powerful counter domestic and international market trends, including the prospect of occupying a more limited, concentrated space in the West—as Powell envisioned.

B. *Morris L. Cooke*

The windstorms that caused widespread erosion in the Great Plains were *the* environmental disaster of the 1930s. President Franklin D. Roosevelt responded by appointing Morris L. Cooke (a protégé of Gifford Pinchot) to head the Great Plains Drought Area Committee. The committee's 1936

174. *Id.* at 321.

175. Walter Prescott Webb, *The Great Plains* (Ginn & Co. 1931).

176. Wallace Stegner, *The American West as Living Space* (U. of Mich. Press 1989).

177. J. Donald Hughes, *An Environmental History of the World: Humankind's Changing Role in the Community of Life* 209-211 (Routledge 2001). *See also* Charles Sokol Bednar, *Transforming the Dream: Ecologism and the Shaping of the Alternative American Vision* (State U. of N.Y. Press 2003). This thinking can be traced in New Mexico water publications. *See e.g.*, New Mexico Environmental Law Center, *Living Within Our Means: A Water Management Policy for New Mexico in the 21st Century* (1992); Designwrights Collaborative, Inc., *Water & People in New Mexico* (1984).

178. Dick A. Auld, *Development of New Crops in the Western United States* 95, in *New Crops* Table 17 (J. Janick and J.E. Simon eds. 1993).

179. *Id.*

report addressed the issue of the Great Plains' carrying capacity with a frankness that would be hard to find in its today's government reports: "Whether or not the region can support adequately the population now residing within its limits is a question which cannot at present be answered. In the long run a transfer from cropping to grazing would undeniably reduce the population of some areas."[180]

This bold diagnosis of the inherent limitations of the region with respect to intensive agriculture and irrigated agriculture was too far ahead of its time. Rather than address the root problem, the Roosevelt Administration (and subsequent leaders) implemented a rural welfare program that sought progress through incremental measures—planting shelter belts, fallowing, diversify crops, contouring, and retaining field stubble.

Almost seventy years later, the bill for this timidity has come due, and Morris Cooke's ideas have gained new traction. The depopulation of the Great Plains (and other rural areas) has emerged as a major social issue.[181] In the 1980s, two geographers, Frank and Deborah Popper, applied Frederick Jackson Turner's frontier methodology and found that much of the Great Plains was reverting to frontier status. They proposed that the Great Plains accept depopulation and the withdrawal of settlement and become a "buffalo commons."[182]

The Poppers' idea was too radical for its time. Nonetheless, much of the Great Plains is in fact reverting to frontier status. A combination of government policies, globalization (out-migration of manufacturing and crop production), and market forces are combining to make dispersed settlement unsustainable in one-sixth of the United States' land mass. The Poppers now describe their proposal as a metaphor rather than a prescription, and have become more nuanced in their articulation of the idea. As a new variation on Morris Cooke's thesis, the Buffalo Commons' fundamental argument that the Great Plains accept limits on human settlement is slowly progressing through the stages of most powerful, innovative ideas.

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180. Morris Cooke et al., *Report of the Great Plains Drought Area Committee* 14 (Hopkins Papers FDRL 1936).

181. The New Mexico-based nonprofit Frontier Education Center defines a frontier county as one with less than seven persons per square mile. Montana has 47 such counties; South Dakota, 39; and North Dakota; 37. Kansas and Nebraska also have large numbers of frontier counties but much less of the population lives in these areas due to the urban areas in the semi-humid eastern areas of these states. *See* Frontier Education Center, *2000 Update: Frontier Counties in the United States*, http://www.frontierus.org/index.htm?p=2&pid=6003&spid=6018. The concept of frontier is being defined by professionals seeking to understand the diversity of rural areas, but the continued rural-to-urban migration in the northern Great Plains, high drug use in rural areas, the inability to attract recreation-oriented in-migration in comparison to the Intermountain West, and the region's increasing poverty rates all point to a need to revisit the New Deal's focus on these areas.

182. The original article is Deborah E. Popper & Frank Popper, *The Great Plains: From Dust to Dust*, Planning 12 (Dec. 1987). The Poppers restated and updated their thesis in *The Buffalo Commons, Then and Now*, The American Geographical Society/Focus 16 (Winter 1993). The idea has spawned an extensive literature: *e.g.* Ernest Callenbach, *Bring Back the Buffalo! A Sustainable Future for America's Great Plains* (U. of Cal. Press 1996); Daniel Litch, *Ecology and the Economics of the Great Plains* (U. of Neb. Press 1997); Richard S. Wheeler, *The Buffalo Commons* (A Forge Book 1998).

C. *Thomas Griffith Taylor*

Since the 1970s, any form of gross national population limitation has been off the table as a matter of national policy.[183] States cannot deflect population to other states because the implied Constitutional right to travel prohibits states from limiting growth by refusing entry to new residents. Just as states cannot hoard natural resources,[184] they cannot close their borders to interstate migration.[185] Since California tried to bar "Dust Bowl" migrants, no state has tried to directly halt migration, although they have attempted other indirect means, such as welfare denial, to deter migration by the poor.[186]

Australia provides a different model for the population debate, in the audacious and controversial work of Thomas Griffith Taylor, the first professor of geography at Sydney University and a leading proponent or geographical or environmental determinism.[187] Taylor made his mark by applying scientific methods similar to those used by John Wesley Powell to undermine the Australian government's "white only" population and settlement expansion policies.

At the beginning of the twentieth century, births and immigration levels began to fall in Australia. Between 1907 and 1922, Great Britain developed a Dominion emigration policy. The Empire Settlement Act of 1922 led to bilateral programs with Australia and New Zealand to encourage immigration from Great Britain. Proponents of a white, Anglo British Empire such as the feisty premier Billy Hughes projected an Australian population of 100 million by the end of the century.

Taylor emerged as the leading scientific critic of these estimates through his argument that the country had already occupied the territory best suited to human settlement. Using his training in geology and meteorology, he initially argued that Australia could only support 60 million and would only have about 20 million people by the end of the twentieth century because of its limited water resources and fragile, old soils.[188] He developed a series of

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183. In his inaugural lecture for the Stanford Environmental initiative, the leading population alarmist Paul Ehrlich described population control as "off the political radar screen." A summary of the lecture is available at http://news-service.stanford.edu/news/2003/december10/ehrlich-1210.html. For an effort to revive the population-environmental quality link in the context of sustainable development see William S. Richardson, Student Author, *A Constitutionally Valid Justification for the Enactment of No-Growth Ordinances: Integrating Concepts of Population Stabilization and Sustainability*, 19 Haw. L. Rev. 93 (1997).

184. *E.g. New England Power Co. v. N.H.*, 455 U.S. 331 (1982).

185. *Edwards v.People of the State of California.*, 314 U.S. 160, 177 (1941) (state cannot bar entry of "indigent" non-residents).

186. *See Saenz v. Roe*, 526 U.S. 489 (1999).

187. The only available biography is a short lecture text, J.M. Powell, *Griffith Taylor and "Australia Unlimited"* (U. of Queensland Press 1993). Tim Flannery, *The Future Eaters: An Ecological History of Australian Lands and People* (Grove 1994) contains a full account of the controversy and Taylor's decision to leave the place that he always regarded as home.

188. *See* Jonathan Stone, *Empty or Full? The Debate Over the Population of Australia* (1995), http://www.ndf.org.au/stone.rtf (last accessed May 15, 2006).

"hythergraphs" which indicated the rainfall and temperature parameters for the major crops.[189] A decade later, he dropped the maximum figure to 20 million based on maintaining a high average standard of living. The most controversial aspect of his theory was the suggestion that the areas marked for settlement expansion would be more suitable for non-white emigration.[190] Thus, if white-only settlement was desired, it would be modest, gradual, and should be based on scientific planning.

In his major geographical study of Australia, Taylor summed up his argument: "For twenty years the present writer endeavored to inform the Australian public in regard to these important aspects of settlement. He stoutly maintained that it was useless to try and fill up the arid and more northern tropic lands as long as there was better land not fully utilized in the south and east. The argument holds good to-day."[191]

The reaction to this heresy was fierce. For example, the state of Western Australia banned his textbook because it contested the prevailing view that Australia's capacity to support people was unlimited. In 1928, Griffith threw in the towel, resigned his position at Sydney University, transferred to the University of Chicago, and eventually settled in the more British environment of the University of Toronto.

Unlike some prophets, Taylor's legacy is very much alive in Australia. The question of the country's carrying capacity is the subject of a lively continuing debate, and the idea that people should adapt to a place rather than adapt the place to them is taken more seriously in Australia than it is in the United States.[192] Australia is a spectacular but often unforgiving landscape. Taylor argued that a sustainable population level for Australia was both a function of climatic limitations that control available water supplies and of the opportunity costs of growth. These lessons apply directly to the challenges facing today's American West.

D. *Wallace Stegner*

Perhaps no westerner has thought more deeply about what it means to live in an arid, non-northern European landscape than Wallace Stegner. His novels, histories, and polemics against public land decisions invoke the West from settlement to the present and stress the continuities between landscape and character. Stegner, more than anyone, helped popularize John Wesley Powell's argument that resource management and land use policies should be based on the region's arid and variable climate rather than on subsidy and an uncritical notion of scientific and technological pro-

189. Powell, *supra* n. 187, at 21-22.

190. *Id.* at 25.

191. Thomas Griffith Taylor, *Australia: A Study of Warm Environments and Their Effect on British Settlements* 410 (5th ed., Methuen and Co. 1949).

192. *See* Stone, *supra* n. 188; Doug Cocks, *Population-Immigration Policy in Australia*, http://www.lapshop.com.au/dougcocks/abernethyfinal.htm (1998).

gress. He also sought to trace the connections between the myths of the West as a "geography of hope" and the reality of the West as it actually exists.

In 1986, Stegner summed up his experience in a series of lectures at the University of Michigan, later published as *The American West as Living Space*.[193] He argued that the West had used the benefits of western civilization and technology to create a society largely disconnected from its landscape and climate – with clear fiscal, environmental, and social costs.[194] Through generous federal subsidies we have created an irrigation society and later a universal urban society that eschewed any idea of adaptation to the landscape.

Among many influenced by Wallace Stegner, western scholar Charles Wilkinson carries forward most effectively his thoughtful criticism of the region's destructive historical policies (which Wilkinson terms the "lords of yesterday") and their impacts on its lands, waters, and communities. In *Crossing the Next Meridian*, Wilkinson exhorts western communities to adopt meaningful growth control, based explicitly on the sustainable use of resources such as groundwater. "If we decide to listen," he writes, "our lands and waters will tell us what our population can be."[195]

VII. CONCLUSION

The first lesson that the dissenters teach us is that the West's climate and landscapes do not pose insurmountable barriers to large-scale urban settlement. Toward the end of his life, Wallace Stegner said, "California . . . has the water and the climate and the soil to support a population like Japan, if it has to."[196] This lesson reflects the hard truth that, thanks to technology, we can put a great many people in most of the West. The real question, of course, is whether this is a future we wish to embrace.

The second and deeper lesson is that resource constraints do, in fact, pose real limits on settlement. As population increases and conurbations spread ever outward, the resource use choices facing the West become tougher because their opportunity costs increase. Those who have thought deeply about limits in the past help us understand the continuing consequences of the resource use choices that we have made and the possibility of alternative choices in the future.

The late David Gaines, who led the fight to save Mono Lake, understood this. As he put it, his:

193. Wallace Stegner, *The American West as Living Space* (U. of Mich. Press 1989).

194. *Id.*

195. Charles F. Wilkinson, *Crossing the Next Meridian: Land, Water, and the Future of the West* 305 (Island Press 1992).

196. Wallace Stegner and Richard W. Etulain, *Conversations with Wallace Stegner on Western History and Literature* (U. of Utah Press, Revised ed. 1990).

> aim was to make people throughout California realize what would be lost if the lake continued to sink. If Californians, and particularly Angelenos, weighed those values, understood them deeply, and decided to sacrifice them for a convenient and inexpensive water supply, Gaines would (so he said) accept the choice. But it had to be a knowing choice.[197]

The third lesson is that limits manifest themselves through subtle combinations of political choices, market forces, and climatic factors, rather than in a more dramatic apocalyptic fashion that grabs the public's attention. The early environmental movement was filled with gloomy predictions of an immediate cataclysm which has not come to pass. Whether the impacts of global climate change will manifest themselves in such a fashion remains a matter of speculation (and Hollywood dramatization). In the meantime, we can recognize many signals that we are testing the limits of water in the West: declining and disappearing stocks of anadromous fish and their food webs; escalating economic and political costs of water service for new development; bitter and prolonged legal battles for over-allocated river systems; and desperate attempts to build uneconomical and arguably unnecessary water projects in order to convert "paper" water rights to "wet" water.

The solution, of course, is far more complex than linking water and land use planning. The United States is still a growing country premised on a wider range of opportunities compared to most countries of the world. Thus, water availability will never be used as a tool to choke off growth. However, we can no longer be as indifferent to the environmental and other costs as we once were. In taking that first step and thinking more deliberately about the consequences of growth, cities facing water supply constraints may, by default, begin to alter our course toward a more sustainable way to live in and with this landscape.

197. John Hart, *Storm Over Mono: The Mono Lake Battle and the California Water Future* 184 (U. of Cal Press 1996).