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Embracing Watershed Politics

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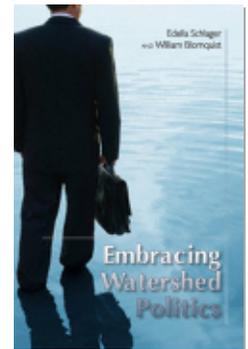
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Multiple Goals, Communities, and Organizations

A WATERSHED POLITICAL ECONOMY

As we have mentioned in previous chapters, the popularity of watershed management has grown as other values and goals have emerged alongside more traditional ones, such as water supply development and flood control. In this chapter, we draw together those goals and values for a closer look and focus on some organizational issues associated with the effort to pursue multiple goals and values simultaneously.

Managing a watershed conveys an incorporation of several considerations, including those shown in Box 5.1 and described below. The relative significance of each will vary according to location characteristics and residents' values.

Box 5.1. Watershed Management Goals

Water supply reliability
Drought protection
Flood hazard reduction and flood response
Water conservation and reuse
Sustainable economies
Water quality protection
Water-based recreation
Instream flows
Habitat protection and species recovery
River restoration

Water supply reliability involves reducing risks of interruption or loss of supplies currently relied upon for human activities and other uses in the watershed. Distinguishable from the earlier water management goal of supply development (bringing more water to a location to provide for growing consumptive demands), the emphasis of water supply reliability is securing a supply and distribution infrastructure that is likely to be able to sustain current or foreseeable demand levels with reduced risk of significant economic losses and/or health risks associated with supply interruptions. In addition to traditional practices, such as storing water to guard against seasonal shortages, this goal encompasses activities such as guarding against the failure of facilities like treatment plants and distribution pipelines, acquiring option contracts for supplemental supplies to use in the event of emergencies, cooperative agreements with neighboring jurisdictions for emergency water transfers, and so forth.

Drought protection is distinct enough to treat as a separate goal, although it is obviously related to the goal of water supply reliability. Depending on the climatologic and hydrologic characteristics of a particular location, drought protection may include measures such as construction and maintenance of larger-scale water storage facilities, long-term underground storage of recoverable water, a plan for informing water users about escalating drought conditions, and a plan for reducing usage based on some assigned priorities among categories of use.

Flood hazard reduction and flood response are distinguishable components of flood protection. Flood hazard reduction is not exactly the same as flood prevention, which traditionally connotes the construction and maintenance of barriers such as dams and levees. Flood hazard reduction may include such structures, of course, but also land-use policies that locate interruptible land uses (parks and outdoor recreation facilities, for example) in floodplains for the purpose of accommodating some seasonal flooding. As the name implies, flood hazard reduction focuses primarily on minimizing the risks of significant losses of life and property from flooding rather

than on trying to prevent any flooding from occurring within a watershed. In a similar vein, flood response conveys something distinguishable from the older flood control, with an emphasis on emergency preparedness, rescue and recovery, temporary relocation of people or property, and restoration.¹

Water conservation and reuse are terms with multiple meanings and applications. They relate to the broader notion of squeezing the greatest amount of beneficial use out of a given water supply. Rather than taking existing uses and disposal of water as given, the goal of water conservation and reuse is to examine current practices of use and disposal and pursue opportunities for reducing or redirecting them. The activities falling under this heading include pricing practices intended to curb lower-valued uses, recirculating water for cooling or landscape irrigation, and even advanced wastewater treatment to supplement supplies for potable use. Although it may also seem to be an aspect of traditional water management, water conservation and reuse in the contemporary watershed context are often related to the search for ways to accommodate emerging demands for limited water supplies.

Sustainable economies are among the purposes to which the above goals are linked. Traditional water development programs sometimes bore slogans such as “water for people,” and watershed management concepts of sustainability are still directed largely at the communities and residents within the watershed. Preserving ranchlands or timber operations in locations pressured by urbanization, keeping small towns and businesses viable, and promoting economic prosperity while forestalling certain kinds of economic transformation all have been touted as potential accomplishments of integrated watershed management and as incentives for stakeholders to participate.

Water quality protection in the watershed management context has several applications, which include pollution prevention, runoff reduction and treatment, remediation of contamination, and salinity management. The goal has expanded from ensuring adequate treatment of drinking water supplies to protection of the source waters themselves by reducing threats to water quality.

Water-based recreation has been enjoyed by people for all recorded history, but its relative importance as a value for water resource management has risen lately. These non-consumptive uses of water are not only valued individually by the participants but can be important components of local

economies and community identities. Fishing, rafting, boating, and skiing have claimed places at the watershed management table alongside irrigation and municipal and industrial uses.

Instream flows are important for other reasons in addition to water-based recreation. Support of aquatic species and the aesthetic values of flowing water for communities in a watershed make instream flow protection an independent goal of watershed management in the contemporary scene. Also, although not often highlighted in the watershed management literature, navigation depends on instream flow protection.

Habitat protection and species recovery are of course related to instream flows but not identical. These goals include protection of riparian and off-channel habitat (for example, keeping wetlands and vernal pools from being eliminated by surface water diversions or groundwater withdrawals). Furthermore, just maintaining a certain level of instream flow—to support recreation, for example—may not suffice for recovery of a valued aquatic or riparian species that has become threatened or endangered. Thus, habitat protection and species recovery constitute a distinct goal of watershed management not subsumed by instream flow protection or water-based recreation.

River restoration may also seem to be covered by other goals already identified, yet it has its own dimensions. River restoration efforts are not only in the service of instream flow preservation, species recovery, or recreation; they may entail the removal of concrete channels, dams and weirs, abandoned bridge pilings, and the like purely for purposes of restoring the natural appearance and ecological health of a river itself. In many communities in the United States in the late twentieth and early twenty-first centuries, river restoration has an economic development component: recapturing (or, in some locations, discovering) the value of a riverfront or a lakefront as a community attraction.

Two other points are important in regard to this overall topic of multiple goals. First and perhaps more obviously, the multiple goals of watershed management may conflict in certain respects and under some conditions. Diverting surface water flows into storage facilities, for instance, may serve the goal of drought protection but not the goal of water-based recreation or the maintenance of instream flows. Flood hazard reduction means maintaining unused storage capacity in reservoirs and emptying them when they are full, whereas drought protection indicates maintaining maximum water

in storage, and instream flow protection suggests steady releases of stored water. Goal conflict is not fatal or even tragic, since reasonable trade-offs are usually feasible, but it is important to be mindful of the fact that the multiple goals of watershed management are not inherently complementary.

The other important point is that although all of the goals listed above are relevant to the scale of a watershed, the goals themselves can be pertinent to, or most effectively achieved at, alternative scales within the watershed or across watersheds. Recreational opportunities and demands may be focused within a particular portion of the watershed. Depending on the physical and social circumstances, organizing flood hazard reduction or drought protection measures or supporting sustainable economies might be more effective across multiple related and/or neighboring watersheds. The fact that the various goals of watershed management are all present or relevant within a particular watershed does not mean that they are necessarily best pursued or organized at the watershed scale.

Although these may appear to be obvious or commonplace observations, the fact that watershed management involves the simultaneous pursuit of multiple (but not necessarily complementary) goals at multiple scales is a statement worth contemplating. Its implications for the design, performance, and modification of institutions for governing and managing the watershed are so extensive they would be difficult to overstate. One of those implications is that people trying to achieve a variety of goals within a watershed could quite rationally opt to organize several overlapping institutional arrangements. Thus, in addition to the transaction cost considerations discussed in the preceding chapter, people create multiple organizations within a watershed because of the multiplicity of relevant goals and scales.

Beyond raising the prospect of multi-organizational, polycentric institutions within a watershed as a theoretical possibility, we can and should explore why and how such arrangements might emerge and how they might function. Equally if not more useful is to present and discuss empirical examples of such settings and how they work. In this chapter, we do both as we explore how multi-organizational arrangements can work and present an example of a watershed governed and managed through a polycentric structure that has been modified on several occasions to adapt to the emergence of new goals and previously unrecognized problems, as well as to take advantage of functional specialization and diversity of scale among the various organizations. The example in this chapter—the San Gabriel River

watershed, located in Southern California—is a substate watershed where coordination is at the scale of municipalities and special districts. In Chapter 6, we will use an interstate example to illustrate polycentric arrangements at a larger regional scale.

AN INTEGRATED ORGANIZATION OR MULTIPLE ORGANIZATIONS?

In light of the introductory discussion, perhaps the question that begs hardest to be asked is why not just establish a watershed-scale governing body to prioritize, balance, and pursue these multiple goals? With so many interrelated goals, and with pursuit of one often conflicting with the achievement of others, it is understandable that some watershed management proponents are inclined to advocate an organizational umbrella under which all stakeholders gather to discuss and plan and implement an integrated strategy.

A related question, raised also in Chapter 1, is why have water users and communities within watersheds rarely created such governing bodies? What explanation can be given of the motivations and choices of individuals in crafting instead the complicated and multi-layered arrangements found in most (if not all) American watersheds? In Chapter 4, we provided an initial answer to both questions. Boundedly rational people, crafting governing arrangements in light of transaction costs, devise a variety of arrangements as a means of limiting cognitive demands and easing transaction costs.

Building on that initial answer, this chapter adds that the varied arrangements crafted by boundedly rational people reflect also the diverse character of problems and the different and sometimes conflicting values that people attempt to realize in the context of a watershed. People indeed seek to realize a variety of values and goals in a watershed, but they line up differently in relation to those values and goals. Some people want less of *x* and more of *y*. They line up differently also because of when and where they reside in the watershed, the types of livelihoods they are pursuing, and other factors. As Lebel, Garden, and Imamura (2005) have wisely pointed out, in addition to the politics of scale (e.g., watershed vs. river basin vs. other area), there are the politics of position (related to the specific location within a given area) and the politics of place (related to the stakeholder's identity, status, and resources). Handling such diversity is difficult within a single governing structure. People often choose instead to create a variety of different types of governments and organizations.

One way of making sense of the complicated and multi-layered arrangements found in most American watersheds is to use the theory of public economies, which was developed over the past fifty years to explain complex polycentric systems, such as the governance of metropolitan areas in the absence of a metropolitan government (Ostrom, Tiebout, and Warren 1961; Bish and Ostrom 1973; U.S. ACIR 1987; Oakerson 1999). The application is particularly apt, since so many contemporary debates about how best to govern watersheds echo earlier debates among scholars and practitioners of metropolitan government (see King 2004 for a recent review). The most important components of such an explanation are the provision-production distinction, specialization, economies and diseconomies of scale, and coordination versus hierarchy.

In all social settings—from households to watersheds—decisions about provision of desired resources, goods, and services may be made without actually engaging in the production of those desired resources, goods, and services. Members of a household decide how (and how much) they will obtain of the necessities and conveniences of life—housing, food, schooling, entertainment—but they do not necessarily produce their own housing, their own food, their own schooling, or all of their own entertainment. Similarly, a community of individuals may organize a town, a water district, or a Web page and decide what services they want to receive, what forms and amounts of revenue they will contribute, what content they want to disseminate, and so forth. These are provision decisions. They do not imply that the individuals in the community will actually police the streets, construct wells or pipes, or make the Web page; they may choose to procure any or all of those services from other individuals or organizations that produce them (Oakerson 1999).

In a watershed, the provision-production distinction can help to explain some of the number and variety of organizations that exist when water users create those organizations themselves. As in the watersheds described in this book, there may be a few large organizations that produce water from large-scale projects but a larger number of smaller organizations that decide how much they want to receive and pay for relative to other water sources to which they may have access. A group of pumpers sharing the same groundwater basin may decide to establish a replenishment program, but they may choose to contract with an agency that operates flood control facilities to operate those facilities for water conservation rather

than construct and operate their own. Many of the organizations found in a watershed are *providers* representing or organizing smaller communities of individuals and then entering into contractual or other arrangements with *producers* of water supplies, flood control, contamination remediation, and so forth. Classifying the organizations within a watershed into provider and producer categories can help to begin sorting out the arrangements among them, making a different kind of sense out of what may appear at first blush to be mere fragmentation.

Following this logic, provision decisions may be appropriately organized on a smaller scale than production decisions. Sub-watershed organizations, for instance, often are organizations of water users with something in common (e.g., the same basin or the same part of the watershed, the kinds of characteristics Lebel, Garden, and Imamura [2005] call “position” or “place”). In these watersheds, inter-organizational and intergovernmental relationships often involve smaller service provision organizations contracting or otherwise arranging with larger service production organizations for the performance of desired functions. In the smaller provider organizations, water users or their representatives consider information about water supply conditions and decide, for example, how much project water to provide themselves with, how much to divert from a stream or pump from underground, how much water to purchase for replenishment or augmentation, how much to pay, and how to raise the money. In some cases, there are multiple producers, and the provider organizations act as buyers’ cooperatives on behalf of water users, securing the combination of water supplies that nets the best deal for them.

In this light, the distinction between provision and production brings into view the concept of functional specialization. There may be, and often are, advantages in organizing activities by taking advantage of specialization. Operating physical facilities such as dams is a task that could be undertaken by the same agency that also contracts for water supplies, monitors water quality, and sets groundwater production targets for every basin within a watershed, but it certainly does not have to be. There may even be good reasons for having a separate organization perform that task—or, for that matter, a separate organization performing each of the tasks in that short list. Water users in the watersheds we have observed appear to have made deliberate choices in both directions—sometimes adding a new function to the portfolio of an existing organization (e.g., having the county flood

control district operate the seawater barrier in the San Gabriel watershed described below) and other times creating a new organization (e.g., a joint-powers agency to organize and finance contamination remediation efforts in the main San Gabriel Basin or a conservancy to address riparian ecosystem restoration).

The choice about whether to add another organization or increase the responsibilities of an existing one will depend upon matters such as the skills required for the function, the resources available within existing organizations, the costs of coordination if a new organization is created, and the political issues of governance and control. There is not a single answer that fits all situations. Rather, it is to be expected that water users will create some single-function entities and other multiple-function ones based on considerations such as these. Their choices do not necessarily reflect hapless fragmentation or rampant duplication; indeed, when organizations truly specialize, they are not duplicates (Parks and Oakerson 1989). As Ingram and colleagues noted: "There are a variety of institutional structures through which decisions about water resources allocation and use occur. These structures are likely to have different policy orientations. They are also likely to vary in their accessibility and responsiveness to particular interests, their capacity to generate the appropriate flow of information, and their preference for certain problem solutions" (Ingram et al. 1984, 328).

Another concept that follows closely with those of specialization and the distinction between provision and production is that of scale. Some activities are less costly and more efficient if organized on a large scale. Others exhibit diseconomies of scale, becoming inefficient or cumbersome when too many people or too diverse a set of interests is involved.

We will illustrate using the Southern California region, the location of this chapter's case study. It might well represent wasteful duplication if each municipality in a watershed such as those in Southern California had built its own aqueduct to the Colorado River or to Northern California, because such a facility exhibits significant economies of scale. Instead, municipalities in Southern California chose either to join the regional Metropolitan Water District or to contract with the state for access to its State Water Project. These arrangements allowed local communities to take advantage of scale economies without merely subsuming their interests into a regional governance organization. Each of those smaller local districts retains the ability to determine how much imported water to purchase in a given year

(if any) and how to pay for it, without having to build and operate enormous facilities. By the same token, the large producer organizations, such as the California Department of Water Resources and the Metropolitan Water District of Southern California, do not have to try to determine for each local community the desired mix of imported and local water supplies. This is one example of provider-producer arrangements in a public economy where the presence of multiple organizations at diverse scales holds the prospect of enhancing efficiency and responsiveness rather than diminishing them.

INTER-ORGANIZATIONAL COORDINATION

It is reasonable to ask, of course, whether all these organizations—provider organizations and producer organizations, specialized by function and created with some effort to capture scale economies and avoid diseconomies—create immense coordination costs. Do they overwhelm whatever advantages of scale and specialization may be gained? Why not just organize a single authority encompassing all these activities? These questions have motivated nearly a century of debate in public administration, public policy, and political science.

Inter-organizational coordination is costly, of course, but the alternatives are not costless either. Organizational integration has its own costs of internal coordination and communication, information distortion, control losses, and the like, described in the political economy literature on bureaucratic pathologies. Bureaucratic abilities to effectively and comprehensively engage in and coordinate a multitude of activities has suffered sustained criticism from public administration theorists and political scientists for more than five decades (e.g., Simon 1955; Knott and Miller 1987; Chisholm 1989; V. Ostrom 1989; Miller 1992).

Integration costs may be quite substantial even on the scale of a watershed, as suggested by Behrman (1993, 11–12):

There was a study made some years ago . . . of the Columbia River basin, which is if anything even more complicated than the South Platte basin. The study looked for any empirical evidence (and there again, the control is very fractured) that a unified control system would produce superior results compared to the existing system, which is very similar to the South Platte. The conclusion was that there was no evidence that it would be

superior. The unified system, by bringing in bureaucratic control, creates unanticipated results that are not all that favorable.

Furthermore, Milon, Kiker, and Lee (1998) pointed out that the comprehensive watershed-scale approach to Everglades restoration produced an unintended bias toward engineering analyses and the construction of physical structures to alleviate problems rather than addressing institutional alternatives based on social science analyses.

Undoubtedly, Woolley and McGinnis (1999, 579) were correct in observing, “Watershed policymaking is particularly difficult when the decision making context includes a large number of relatively autonomous governmental and nongovernmental participants with dissimilar values.” What remains unclear is how much easier watershed policy making would be if a large number of participants with dissimilar values were operating within a single organization or jurisdiction. On balance, whether organizational integration or inter-organizational coordination is more costly is an empirical question, and the answer will vary from one situation to another.

In an earlier study of conjunctive water management in Arizona, California, and Colorado (Blomquist, Schlager, and Heikkila 2004), we uncovered no instances of comprehensive organizations with extensive authority to manage and engage in a wide variety of activities on a watershed or river basin scale. To the contrary, time after time and place after place, water users apparently chose *not* to center all water-related activities in a single agency. In Arizona, which is the most nearly centralized of the three states, specific limitations were placed on the authority that the Arizona Department of Water Resources (ADWR) could exercise when it was first created in 1980. ADWR was granted authority only to manage and limit demand for groundwater, not to engage in groundwater supply development or in surface water management. In Colorado, water users have repeatedly declined to extend the authority of the state engineer and division engineers. Water users vigorously and successfully opposed a proposal to grant division engineers the authority to act as water referees within water courts, insisting instead on referees who were independent of the state and division engineers and employees of the courts. And after water users brought repeated litigation over the state engineer’s actions in integrating well pumpers into the state’s water rights system, the state legislature, state engineers, and water user organizations worked out a decision-making process that vets

proposed rules through the water courts before they take effect—again opting for polycentricity over integration in the design of institutions for policy making in the state’s watersheds.

COMMUNITIES OF INTEREST AND COMMUNITIES OF IDENTITY

Of course, there are more considerations than economic efficiency at stake in the watershed. The creation and preservation of institutional arrangements constructed around interests in a watershed is not just an effort to construct a local public economy and reap efficiency advantages. It also reflects real distinctions among groups within a watershed.

A watershed may be a single, interrelated physical system, but it places people in distinctly different positions. Some will be downstream, others up. Some may overlie a capacious and easily replenished groundwater basin, others will not. Some may reside adjacent to wetlands or riparian habitat that others wish to see preserved. Some may be at risk from contamination whereas others enjoy relatively pristine water. Such differently positioned groups may well wish to work toward watershed-scale management actions but through organizations that reflect their sub-watershed distinctions.

As we have observed in a number of places, within the physical system of the watershed is a complex social one. Overlaid upon the differences in people’s physical situations within a watershed are the myriad other distinctions that come from the broader social, economic, and cultural settings within which the watershed is found. Topography is not destiny, as Woolley and McGinnis noted: “As one moves from the science of geography and biology to culture, definitions become increasingly subjective. A cultural ‘map’ of a watershed includes political, economic, and social conventions. Participants in watershed policymaking may well think of themselves in terms of political affiliations rather than biogeographical identification with an entire watershed” (1999, 579–580). Distinctions of wealth, ethnicity, religion, occupation, social status, and the like will also exist among and between watershed residents and the groups or communities with which they identify (Lebel, Garden, and Imamura 2005).

Thus, in addition to the opportunities to take advantage of scale efficiencies, institutional arrangements can be designed to enhance responsiveness and equity. There is certainly no guarantee that polycentric organizations will be more responsive or fairer than centralized ones, but neither is

the opposite necessarily true (Rockloff and Moore 2006). As with efficiency questions, the responsiveness and equity of a polycentric system versus a unitary one are empirical questions and the answers can differ from one circumstance to another. Where a particular problem affects one portion of a watershed more than others, organizational diversity can allow for a more equitable matching of costs to benefits than can a central organization. Where multiple communities of interest or identity exist, organizational diversity can allow for more effective representation of communities than can combining them into a single constituency or expecting a single set of decision makers to take all interests into account. As always in political situations, the questions of who gets to decide and how are as important as, and often more important than, the question of what shall be done.

When water users create water resources management institutions, they tend to organize at least some of those entities around communities of interest and communities of identity. Their communities may be defined by their physical position in the watershed, by their identity in the larger social system, or (most likely) a mixture of both. People draw multiple boundaries that reflect their differing positions and their differing communities. Merely to observe or repeat that a watershed is a single community hydrologically or ecologically will not overcome this social reality.

Furthermore, polycentric arrangements allow decision-making processes to vary within and among different organizational arrangements. Consensus building, super-majority voting rules, simple majority voting rules, and judicial decisions are combined and nested, allowing multiple opportunities for conflict articulation, conflict resolution, and the taking of decisions. Nested decision-making entities are a characteristic of federal political systems, which are the focus of the next chapter. First let us consider the topics of diverse interests, functions, and values in the watershed through a case study from Southern California.

MULTIPLE GOALS, MULTIPLE COMMUNITIES, AND MULTIPLE ORGANIZATIONS: THE SAN GABRIEL RIVER WATERSHED

The San Gabriel River watershed is a complex physical system situated in one of the largest metropolitan accumulations of people and commerce in the world. The watershed includes most of coastal Los Angeles County, from the San Gabriel Mountains to the Pacific Ocean. It contains two rivers—the

San Gabriel and the Rio Hondo—several creeks and washes, and four major groundwater basins. The lower area of the watershed is adjacent to the lower area of the Santa Ana River watershed described in Chapter 1.

Toward the midpoint of the San Gabriel River's course from the mountains to the sea, the Whittier Narrows divide the watershed's upper area from its lower area. The upper area includes the Main San Gabriel and Raymond groundwater basins. The lower area contains the Central and West groundwater basins. These are coastal basins, in hydrologic contact with the Pacific Ocean, and vulnerable to saltwater intrusion.

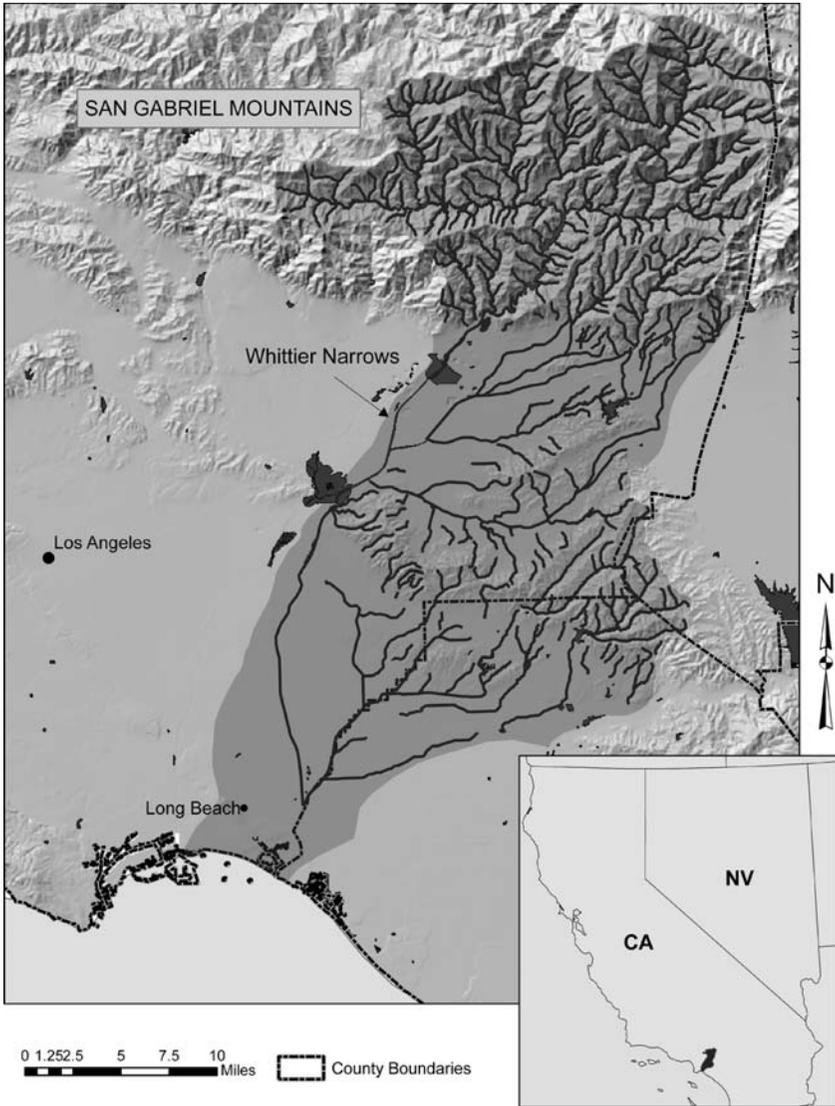
Three of the groundwater basins in the San Gabriel River watershed form an interconnected chain. Most of the Central Basin and all of the West Basin are confined by a surface layer of relatively impermeable clay-like soils, so only the northeastern portion of the Central Basin is susceptible to direct replenishment from the land surface. All of the natural freshwater replenishment to West Basin comes from subsurface inflow from Central Basin, and most of the natural freshwater supply to Central Basin comes through Whittier Narrows from the Main San Gabriel Basin.

Virtually the entire area is urbanized; all or parts of 100 municipalities are found within the watershed. Urbanization brought the paving over of soils through which rainfall used to percolate into the underground water supply, the collection and export to the ocean of storm and wastewater that used to return underground, and the lining of miles of surface water channels for flood control purposes.

Several water resources management problems have arisen in the San Gabriel River watershed, owing to the combined effects of the region's limited water supplies, its extensive agricultural and then urban development, and the hydrogeology of the watershed itself. Each of these problems has been multi-jurisdictional in scope. Water users responded to each by developing new institutional arrangements. Those arrangements are fitted together through a system of inter-organizational and intergovernmental relationships.

Securing Supplemental Water Supplies to Support Urban Development

As the Los Angeles area began to urbanize at the beginning of this century, municipal water departments (some of which contracted with private water companies) became the principal water suppliers for urban resi-



The San Gabriel River Basin.

dences and businesses. Local surface water supplies were scarce, unreliable, and already committed to agricultural uses. Several municipalities turned to groundwater production for a more reliable local supply. A subset also pursued more ambitious schemes of importing water from near or distant sources.²

In the 1920s, a group of thirteen cities decided to form a partnership to pursue water importation from the Colorado River and organized the Metropolitan Water District of Southern California (MWD). Nearly half of the original member cities were within the San Gabriel River watershed, including Los Angeles, Pasadena, Compton, Long Beach, San Marino, and Torrance.

After MWD's aqueduct from the Colorado River was completed and began deliveries in the 1940s, MWD was interested in expanding its service areas, and other communities were interested in joining MWD. The original member cities thought that allowing other communities to join one at a time would be administratively and financially tedious, and might ultimately expand the size of MWD's board of directors to more than 100 members. Therefore, MWD adopted a policy of requiring the formation of water districts covering multiple communities prior to annexation and membership in MWD.

This policy, and the desire of the remaining communities within the San Gabriel River watershed to annex to MWD for reasons described later, led to the formation of five municipal water districts within the watershed over the period 1948 through 1960. The West Basin Municipal Water District brought a dozen coastal communities mostly overlying that groundwater basin into MWD. The Central Basin Municipal Water District encompassed another thirty-seven municipalities on the coastal plain. The Foothill Municipal Water District gathered four of Pasadena's immediate neighbors in the upper area. The Upper San Gabriel Valley Municipal Water District (USGVMWD) covered twenty-two communities overlying most of the Main San Gabriel Basin. The Pomona Valley Municipal Water District (now renamed the Three Valleys Municipal Water District) straddled the hilly divide from the eastern edge of the San Gabriel watershed to the western portion of the Santa Ana River watershed, taking in some communities on the boundaries of each.

A few municipalities in the upper area of the watershed had chosen not to join any of these districts and come into MWD's service area. By the 1950s, the State of California was planning the State Water Project to bring Northern California water to the central and southern regions of the state. The state was establishing its own contracts for Northern California water, including one with MWD that brought all of MWD's member cities and districts potentially within reach of State Project water. But the option

also existed to contract directly with the state without joining MWD, and a handful of municipalities in the upper area of the watershed chose to do so. Those four cities (Alhambra, Azusa, Monterey Park, and Sierra Madre) formed the watershed's sixth municipal water district—the San Gabriel Valley Municipal Water District—which has its own contract and facilities for delivery of State Project water.

Managing Groundwater Use

By the time imported supplies from the Colorado River and Northern California reached the San Gabriel River watershed in the late 1940s and early 1970s, respectively, the watershed had become home to millions of residents and an immense industrial economy. During that period of development, the public and private water suppliers had intensified their groundwater production, significantly exceeding the rate of natural replenishment and creating overdraft conditions in each of the watershed's four major groundwater basins.

The arrival of imported water supplies relieved some of the pressure on the local groundwater supplies but also triggered a new debate. Since imported water was much more expensive than water pumped from underground, the pressing questions became who should curtail groundwater production, in what amounts, and how would any such arrangement be reached and enforced. Every water producer had a significant incentive to keep using groundwater in preference to imported water, but for each to do so would bring the detriment of all.

In this atmosphere, new organizations emerged. Water production in each basin was dominated by a mix of public and private organizations—municipalities, water districts, water companies, and industrial and other commercial entities that pumped their own water. Nongovernmental water-user associations were formed in three of the four groundwater basins to bring these diverse organizations together for discussions of the condition of the water supply and of their common and conflicting interests therein. The West Basin Water Association was formed in the 1940s, the Central Basin Water Association in 1950, and the Upper San Gabriel Valley Water Association in 1955.³

From the 1930s through the 1970s, groundwater production rights were defined and limited in each of the groundwater basins through a series of

adjudications. The adjudications were adversarial, but once the issues had been brought to court, the devices of civil discovery were used to develop a shared information base from which the parties began negotiations. In each of the four basins, stipulated judgments were reached by the parties, presented to the court, and approved.

The adjudications occurred in a series rather than all at once because the circumstances of each basin were different. Overdraft problems had become acute first in the smaller Raymond Basin of the upper area and in the coastal West Basin, which was exposed to saltwater intrusion from the ocean once underground water levels fell below sea level. The Raymond Basin litigation began in the late 1930s and concluded in the mid-1940s. The West Basin litigation began in the late 1940s and ended in the early 1960s.

Since West Basin receives its entire freshwater inflow from Central Basin, West Basin could not be brought back into balance once overdraft in Central Basin began choking off the underground flow from there. West Basin water users encouraged the Central Basin Water Association and the Central Basin Municipal Water District to adjudicate and limit pumping in that basin, too, which was done during the 1960s.

Finally, overdraft in the Main San Gabriel Basin was perceived to be a threat not only to pumpers there but to the supply of water coming across the Whittier Narrows from the upper area to the lower area. After the downstream interests had sued the upstream interests to guarantee an average annual flow (described in the next section), upper area pumpers used the leadership of the Upper San Gabriel Valley Water Association and the Upper San Gabriel Valley Municipal Water District to initiate and complete an adjudication and limitation of pumping rights in the Main San Gabriel Basin.

By the mid-1970s, groundwater use in each basin of the watershed was limited by a court judgment that was potentially enforceable by each pumper against all others. Pumpers were required by the terms of the judgment they had negotiated to report their groundwater production monthly so compliance with the judgment could be monitored.

In each basin, the court appointed a “watermaster” to collect data on pumping and groundwater conditions and report annually to the court. In the first three basins to be adjudicated (Raymond, West, and Central), the court appointed the Southern District office of the California Department of Water Resources (DWR) as the watermaster, since DWR had produced several reports on water conditions in these basins already and had a base

of data with which future conditions could be compared. Using DWR as watermaster also avoided creating a new organization with its own staff for each basin.

By the time the Main San Gabriel Basin adjudication was completed in 1973, however, new ideas had emerged about how to manage groundwater basins, resulting in a different watermaster arrangement there, as described later. And in 1984, watermaster duties in Raymond Basin were transferred by the court from DWR to the new Raymond Basin Management Board. DWR continues to serve as watermaster for the West and Central Basin judgments.

Upstream-Downstream Division of the River

In addition to the groundwater supplies provided by the four basins, the San Gabriel River itself represented a significant local water supply source. Like the local groundwater, water carried by the river was less expensive to use than imported water. Continued growth in total water use in the upper area in the 1950s threatened to leave almost no San Gabriel River water crossing over to the lower area at Whittier Narrows, costing the lower area a valuable resource and leaving the downstream communities even more dependent on imported water.

Once the Upper San Gabriel Valley Water Association and the upper area municipal water districts had been formed, the Central Basin Municipal Water District and the cities of Compton and Long Beach, on behalf of lower area water users, took the major upper area water producers to court for a determination of the lower area's right to the waters of the San Gabriel River. The litigation began in 1959 but quickly turned into a negotiation that achieved a common statement of "Principles of Settlement" by 1961 and a stipulated judgment approved by the court in 1965.

The settlement guaranteed the lower area an annual average of 98,415 acre-feet of usable water through Whittier Narrows. The court appointed a three-member San Gabriel River watermaster, composed of representatives of the upper area and lower area chosen by the water users, to monitor compliance with the judgment. The data on river flow at the narrows are provided to the San Gabriel River watermaster by the Los Angeles County Department of Public Works, which operates a flood control facility there. Accordingly, the San Gabriel River watermaster needs and has no staff, providing purely a governance function.

Groundwater Contamination Remediation

Some of the greatest challenges in the San Gabriel River watershed have come from water quality problems. In 1972, amendments to the California Administrative Code required water suppliers serving domestic consumers to institute adequate water quality monitoring programs. The California Department of Health Services suggested that producers within common hydrologic units avoid unnecessary duplication of effort by forming programs to monitor water quality on a regional basis. In the upper area of the watershed, the Upper San Gabriel Valley Municipal Water District and the San Gabriel Valley Municipal Water District proposed to undertake the Area-Wide Water Quality Monitoring Program. The first Area Water Quality Monitoring Report for the Main San Gabriel Basin, filed on September 1, 1974, revealed excessive concentrations of nitrates in drinking water, especially in the easterly portion of the basin. Subsequently, the Main San Gabriel Basin watermaster assumed responsibility for the basin's Area-Wide Water Quality Monitoring Program, which quickly became the largest item in the watermaster's administrative fund budget as discoveries of water quality problems in the watershed's upper area multiplied.

Another concern emerging in the 1970s was the siting of municipal waste landfills on lands overlying the upper area's groundwater supplies. The Main San Gabriel Basin watermaster published conditions for conditional use permits for landfills, more stringent than those imposed by existing regulatory agencies, and began a program of inspection of all active landfills within the Main San Gabriel Basin. The watermaster's inspections augment the inspection programs of the Regional Water Quality Control Board and the county Department of Health Services.

In 1979, water quality monitoring discovered relatively high concentrations of trichloroethylene (TCE), a volatile organic chemical, in a Valley County Water District well in the Main San Gabriel Basin. Several nearby wells were tested and found to have varying concentrations of TCE and other volatile organics, predominantly tetrachloroethylene (PCE) and carbon tetrachloride (CCl₄), all suspected carcinogens. California Department of Health Services and Regional Water Quality Control Board preliminary investigations concluded that basin groundwater supplies were potentially in jeopardy (Stetson 1986, 13). A threat to the upper area's groundwater supplies was also worrisome for the lower area's Central and West Basins,

since groundwater migrates through the Whittier Narrows from the upper area to the lower.

In January 1980, the affected water producers met in the USGVMWD offices with representatives of the state and county health departments, the Regional Water Quality Control Board, and the county Flood Control District. State and county health officials announced that they had closed four wells because of high TCE concentrations and would begin an intensive well-testing program to determine the areal extent and size of TCE concentrations. The Flood Control District would provide groundwater contour maps with which to plot the movement of TCE concentrations. The Regional Water Quality Control Board would attempt to identify the source or sources of the TCE and recommend steps to prevent further contamination. Possible remedial measures were discussed, such as aeration, water blending, and replacement of groundwater use via direct connections to imported water supplies. The Main San Gabriel Basin watermaster held a special meeting a few days later, where the watermaster's attorney reviewed the situation for the watermaster board and staff.

Monitoring programs continued, and wells with concentrations of TCE, PCE, CCl_4 , or other hazardous organic chemicals were closed, or water from them was treated or blended with clean water to reduce contaminant concentrations to below state action levels. By 1985, eighty-eight wells operated by thirty-three different producers in the Main San Gabriel Basin and representing one-fourth of the basin's total groundwater production had been found to have concentrations of these chemicals in excess of state action limits. The number of active producing wells in the basin dropped from an average of 333 at the time of the late 1970s judgment to 237 at the end of the 1980s.

Four large areas of groundwater contamination in the Main San Gabriel Basin became Environmental Protection Agency (EPA) Superfund sites in 1984, making cleanup activities eligible for funding under the federal Superfund program. EPA officials characterized the San Gabriel site as one of the worst in the western United States and estimated that full implementation of basin cleanup could take up to fifty years and cost up to \$1 billion.

Discussions among the Main San Gabriel watermaster, the California Department of Health Services, and the EPA arrived at a planned approach to basin remediation. The remediation program would be directed by the Department of Health Services, financed with Superfund monies, and

assisted by the Main San Gabriel Basin watermaster as the water users' representative, with the Upper San Gabriel Valley Municipal Water District as the principal provider of staff support. A technical committee and a management committee were established to coordinate aspects of the remediation effort.

In the late 1980s, the EPA shifted its focus from the long-term cleanup effort within the Main San Gabriel Basin to short-term efforts to treat the worst areas and intercept contamination plumes before they passed through Whittier Narrows and hit Central Basin in the watershed's lower area. Also, the EPA wanted to focus on identifying the polluters so they can be forced to pay the long-term cleanup operation's costs, whereas state and local officials and valley residents wanted to press ahead with full basin cleanup. The political question arose regarding what entity should have principal responsibility for the cleanup operation.

A report released by the Regional Water Quality Control Board in spring 1990 recommended that the cleanup program be supervised locally by the Main San Gabriel Basin watermaster. The MWD, local water producers, the overlying municipal water districts, and the watermaster agreed with that recommendation. However, two prominent local public figures, U.S. representative Esteban Torres (D-La Puente) and California state senator Art Torres (D-Los Angeles) opposed expanding the watermaster's powers and, along with the Sierra Club and a local group called the East Valleys Organization, have called for the creation of a new "super-agency" to organize and perform the cleanup. Senator Torres sponsored legislation in December 1990 to create such an agency, and his bill passed the California State Senate in April 1991.

In August 1990, the Main San Gabriel Basin watermaster returned to Superior Court, seeking an amendment of the judgment to expand its authority to oversee the cleanup and to control pumping patterns within the basin in order to arrest the migration of contamination plumes. The watermaster's motion was supported by the MWD, the Regional Water Quality Control Board, and the three overlying municipal water districts. The motion was opposed by the Sierra Club, the East Valleys Organization, and the office of Los Angeles County district attorney Ira Reiner. Those opposing the motion alleged a conflict of interest of the water producers who are represented by the Main San Gabriel Basin watermaster, and the lack of public accountability of the watermaster. Maxine Leichter, speaking

for the Sierra Club's Angeles Chapter, said, "The Watermaster cannot protect both the private interests of water companies and the public's interests." A brief by the county district attorney's office emphasized that the cleanup operation vitally affects all valley residents and water consumers, but the watermaster is accountable for its actions only to the court and the roughly 100 water producers in the basin. There is no provision for participation by the general public in watermaster selection or decision making.

A negotiated result produced a new element in the watershed's governance system. In August 1990, the Main San Gabriel Basin watermaster, the Upper San Gabriel Valley Municipal Water District, the San Gabriel Valley Municipal Water District, and the Three Valleys Municipal Water District formed a joint-powers agency, the Main San Gabriel Basin Water Quality Authority, to develop financing for the cleanup operation. The Water Quality Authority represented neither an independent "super-agency" nor the mere addition of cleanup responsibilities to an existing body; it lies somewhere between those alternatives. Although its form may be somewhat difficult to classify in traditional public administration categories, the Water Quality Authority has provided an organizational means for pursuing state and federal funding of the cleanup operation and supervising its ongoing progress. Contaminated groundwater has been pumped and treated in several locations, the contaminant plumes have been intercepted, and the impact on the lower area of the watershed has been limited. In the meantime, EPA has pursued the polluters through a series of investigations and trials, securing monetary judgments against some of the largest ones.

River Restoration

During the first half of the twentieth century, the lower reach of the San Gabriel River was converted into a concrete channel for flood control purposes. The same was done with other Southern California streams, most famously the neighboring Los Angeles River. It was not inevitable: in the late 1920s, a committee from the Los Angeles Chamber of Commerce hired the famed design firms of the Olmsted Brothers and Harland Bartholomew and Associates to plan regional recreation areas in the rapidly urbanizing Los Angeles Basin. The 1930 plan produced by the designers envisioned the San Gabriel River as a ribbon of parkland running through the metropolis, with construction kept back at least 1,000 feet from the water and natural

banks providing a buffer for flood flows. A variety of concerns—the expense of implementing the plan, the difficulties of establishing a governmental body with the territory and authority to do so, the foregone construction opportunities, and whether flood protection for communities along the lower reaches of the river would be adequate, to name a few—led to another choice, lining the channel and confining the river.

Since by mid-century most of the natural flows into the San Gabriel River were captured and impounded by dams in the upper area and at Whittier Narrows, with controlled releases diverted and spread for groundwater replenishment, the concrete-lined portions of the channel conveyed little or no natural flow except during significant flood events. Municipalities throughout the upper and lower areas of the San Gabriel watershed discharge treated wastewater into the river channel, and these discharges have made up most of the flow in the channel since the mid-twentieth century.

In the 1970s, the Los Angeles County Department of Public Works paved a bicycle trail along the banks of the San Gabriel River from Azusa (at the base of the mountains) to Long Beach. The primary purpose of the 37-mile bike trail was to facilitate alternative transportation, but over the ensuing two decades it became increasingly popular for recreational riders. Municipalities along the river constructed access points at numerous intersections and increased patrols and lighting in higher-crime areas along the trail, and the county public works department made further improvements to the trail itself. As many as fifteen small parks and recreation areas were established or restored along the trail, and the California Department of Fish and Game stocks catfish and trout at the Santa Fe Dam Recreation Area, the Whittier Narrows Recreation Area, and other sites.

As the river course gained popularity as a recreation site, public attention to the condition of the river increased. Community organizations began weekend river cleanups, removing trash and other debris from the channel and banks and covering graffiti on the concrete surfaces. Birds flourished along the cleaned-up sections of the river, drawing more attention and visitors. A network among members of community organizations located along the river developed into a group called Friends of the San Gabriel River. In the 1990s, the Los Angeles and San Gabriel Rivers Watershed Council formed to advocate restoration efforts for both rivers. By the end of the decade, the San Gabriel River Master Plan Committee, composed of representatives from thirty-five conservation groups, municipalities, and govern-

ment agencies, was meeting monthly to compose a blueprint for restoration and protection of the river ecosystem.

In 1999, the California legislature approved the creation of the San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy, with \$15 million in capital to acquire land and continue restoration efforts along the rivers. A single conservancy was created for both rivers for a number of reasons, including the fact that they are connected via the Rio Hondo Channel, itself a target for restoration efforts. In a political concession to the state's funding of the conservancy, Sacramento was given the power to appoint most of the board members. On the other hand, the conservancy lacks eminent domain powers, so it must work closely with municipalities along the length of each river to ensure agreement on parcels of land to acquire. In 2000, the Los Angeles County Department of Public Works established a watershed management division to work with the watershed council and the conservancy on projects to improve and restore the rivers.

The conservancy is an example of an additional governmental body established to overlap numerous other jurisdictions, but with a limited mission and authority. The conservancy cannot displace the functions of other local governments, but it can perform functions they cannot achieve together or independently. It adds to the number of governmental bodies at work on water resources in the San Gabriel River watershed, but it is not an addition that necessarily comes at the expense of the authority of other bodies. It increases coordination costs, but if the same authority to acquire land for river restoration projects had been distributed among existing jurisdictions, it is doubtful the coordination costs would have been smaller. What a body such as the conservancy can do is specialize and focus on watershed-wide restoration activities that would have been difficult for other existing bodies to accomplish. Whether its accomplishments in this regard warrant the expense and effort of establishing another water resource organization in the watershed remains to be seen, of course, but its creation in 1999 was consistent with the logic presented in this chapter and book.

CONCLUSION: POLYCENTRICITY AND THE PURSUIT OF MULTIPLE VALUES IN THE POLITICAL WATERSHED

The San Gabriel River watershed exists as a physical phenomenon, and it can certainly be said that all resources and problems within the watershed

are interrelated to some degree. On the other hand, different portions of the watershed confront different problems and are home to distinguishable communities. Furthermore, watershed management within the San Gabriel River case clearly exemplifies the presence of a multiplicity of goals, some of which have been present since the earliest organization of water management activity within the watershed and others of which have emerged over time in connection with newly recognized problems or developing social values.

Under these circumstances, individuals and organizations within the watershed have established institutional arrangements and operated a number of resource management efforts at several scales. Groundwater supplies were allocated among pumpers within each of the watershed's four major basins through largely (although not entirely) separate processes over four decades, rather than for the watershed as a whole through a single process. The flows of the San Gabriel River were divided between upper and lower watershed areas by another process. The representative body that monitors the river agreement is not the same as the bodies that monitor the four groundwater basin judgments. More recently, new organizations (one a joint-powers agency, the other a nonprofit conservancy) have been established to focus, respectively, on groundwater cleanup in the Main San Gabriel Basin and on river restoration throughout the watershed and beyond.

The resulting institutional array is complex but does not necessarily fit characterizations such as "fragmented," "piecemeal," or "myopic." Although unquestionably imperfect (as any institutions created by human beings are), the institutions of the San Gabriel River watershed are comprehensible and do display a logic. The complexity of the institutional arrangements in the San Gabriel River watershed results from the combined effects of differences among the interests of individuals and organizations within the watershed, changes over time in the understanding of problems and in values for water, the need to pursue multiple resource management goals, distinctions in the efficient scale of operation of organizations performing diverse functions, and the importance of finding distributions of benefits and costs that are perceived as fair by those who bear them.

Taking the multiple problems and goals apart and pursuing them through diverse organizations therefore represents a plausible alternative, and one might even conclude represents a reasonable approach. Although control of groundwater pumping in each of the four major groundwater

basins mattered to some degree to everyone in the watershed, it plainly mattered most to the collections of pumpers within each basin, and the adjudications of pumping rights in each basin took place through negotiations and litigation between and among those pumpers. With respect to the division of San Gabriel River flows, the most relevant interests were the interests of lower area communities on the one hand and all upper area communities on the other. Groundwater contamination in the Main San Gabriel Basin certainly threatened Central Basin and even potentially West Basin, but its most direct and costly consequence was the shutdown of wells within the Main San Gabriel Basin. And its causes were traceable to polluters within the Main San Gabriel Basin, so it could be argued that establishing a water quality authority for that basin rather than the entire watershed exhibited some political and economic logic. The river restoration programs undertaken more recently affect people not only within the physical watershed but in adjacent communities, and the conservancy is organized over that broader area.

Diverse management functions within the watershed also exhibit different efficiency scales, as the public economies literature would predict. The agency that imports water to the San Gabriel River watershed from the Colorado River and from Northern California is not the same as the entities managing local supplies or the various sub-watershed local governments that decide on behalf of their residents how much imported water to purchase each year. The importing organization, the Metropolitan Water District of Southern California, is enormous and encompasses several watersheds besides the San Gabriel, but the choices of what to purchase and what to supply are made at a much smaller scale through municipalities and municipal water districts.

In some ways, the San Gabriel River watershed is pretty typical. Previously existing jurisdictions—cities and the county, for example—did not match the contours of the watershed, and within that watershed, natural resources are interrelated. Merely observing that previously existing political jurisdictions did not match watershed boundaries, however, fails to take into account the possibilities of institutional design. Individuals and organizations within the watershed created institutional arrangements over several decades to fit, if not the watershed's topographic boundaries, then at least its principal problems and its principal communities of interest, and to provide means of pursuing multiple goals simultaneously. In those

processes of establishing institutions, individuals faced numerous institutional design choices and debated at length (sometimes contentiously) over what to do—whether contamination remediation should be undertaken by an existing agency or a new one (in the end, they created a hybrid, a joint-powers authority of existing agencies), whether separate conservancies should be established for the San Gabriel and Los Angeles Rivers (and for the Rio Hondo that runs between them) or a combined one, and so forth. The choices they made reflected questions of hydrology but also of society, of scale efficiencies and transaction costs, of values, interests, power, and accountability—political questions.

As with the other case studies in this book, the San Gabriel River watershed does not represent an ideal. It represents a possibility. It is possible to manage a complex watershed facing significant problems, and to do so without a central watershed agency or authority. The patterns of organization in the San Gabriel River watershed are non-centralized, or polycentric. As a political watershed, the San Gabriel case represents the possibilities that may be available through a sort of watershed federalism, an idea to which we now turn.

NOTES

1. One could argue there is only a semantic difference between these terms and the older terms “flood control” and “flood prevention.” It appears to us, though, that the shift of language is more than merely new labels on old bottles.

2. Los Angeles’s efforts to bring water from the Sierras are legendary (or infamous) in this regard, but other municipalities such as Pasadena also explored water importation possibilities.

3. Water users in the smaller Raymond Basin did not form a water association, but there were far fewer major pumpers there and they embarked upon an adjudication and limitation of pumping more than a decade earlier than in any of the other basins.