8 Effective and Adaptive Governance

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> Once an organization loses its spirit of pioneering and rests on its early work, its progress stops.
>
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This chapter discusses the institutional improvements needed if California is to achieve the reforms identified in the preceding chapters. Institutional inertia has impeded prior reforms, and even the best policies will fail if institutions are incapable of implementing them. Beyond today's reforms, governmental institutions must be able to identify and implement future reforms. Such adaptive capacity is particularly important, given the many inevitable changes that will occur in California's environment, economy, and society.

Information, Expertise, and Resources

The starting point for improving water management is to ensure that policymakers, managers, and judges have the information, expertise, and resources they need to identify, shape, and implement reforms. Without these fundamental building blocks of good governance, state policymakers and managers will be handicapped in shaping and implementing the dramatic improvements needed in California's water management.

Information

Although water agencies collect a multitude of information about the state's water resources and uses, policymakers and managers still lack key data and information for decisionmaking. Perhaps the most important missing data element is actual water diversions from surface waterways and groundwater aquifers. California is almost unique among western states in not collecting

Tuolumne River, in the Poopenaut Valley near Hetch Hetchy (Yosemite National Park).

The 2009 water legislation made some progress toward improving water use information. Photo by Justin Sullivan/Getty Images.

information on such diversions. California also lacks water quality information on many of its aquifers and waterways. California's local and regional water agencies track much of this information, such as water use and local hydrologic data. But these and other important data such as volumes traded in water markets, the value of water use in different activities, and the rates paid by different water users are unavailable to the public or not maintained in forms that are easy to access or use. Much of the problem is not the lack of data but the unavailability of data for analysis by other agencies or groups.

The 2009 legislature took an important step toward collecting better groundwater information when it passed Senate Bill (SB) X7-6, providing for monitoring and reporting of groundwater elevations. However, SB X7-6 addresses just part of the information gap confronting California water management. Congress also could support the U.S. Geological Survey and other federal agencies in collecting and analyzing data on key water issues, including the condition of groundwater aquifers and groundwater-surface water connections (Leshy 2009). Federal satellite data, for example, show promise for being able to accurately estimate crop evapotranspiration on the scale of a farmer's field, with potential to both inform farmers and water managers, at relatively little cost, and without inconvenience to farmers (Chapter 3). To aid analysis and enforcement, greater and more systematic state efforts are essential to assemble data from local, state, and federal agencies within a coherent framework. If

California knew what Californians know about water, management and policy-making would be much easier.

Policy Expertise

In addition to needing better water information, government officials must have the expertise and responsibility to use and analyze that information. For example, the California legislature needs synthesized data, information, and insights to help identify water problems and then evaluate and structure responsive policies. All legislatures need information, but data and information are particularly important where reforms deal with scientifically and factually complex issues, as is common for water policy.[1] State legislatures have far less data and information than Congress because (1) they generally have smaller staffs and lower budgets, (2) fewer "think tanks" and policy groups inhabit state capitals, and (3) term limits prevent legislators from developing expertise in policy subjects over time. Although stakeholders and interest groups can help fill the information gap, the information they provide can be biased to favor their positions, so-called advocacy or combat science (Chapter 2). More even-handed sources of information are generally in-house experts, major research universities, and independent think tanks.

A simple first step to reduce the legislature's information gap would be to create a full-time water analysis group within the Legislative Analyst's Office (LAO). Currently, the LAO has just one staff member with principal responsibility for water, along with a wider portfolio of natural resource topics. Given the importance of water in the state, a water analysis office within the LAO could usefully engage in long-term monitoring and study of California's evolving water challenges, providing the "expert capital" now in short supply within the legislative branch. The water analysis office would work with experts in state and local agencies to ensure that appropriate information is collected and evaluated and to summarize this information for the legislature. The office also would develop its own independent capabilities and analysis, and provide a form of technical institutional memory for a legislature subject to term limits. The LAO also might wish to create formal relationships with the state's major research universities, along with other expert research organizations and state agencies, to provide data and analysis on major water issues of immediate and longer-term interest to the legislature. This in-house service will better prepare legislators and legislative staff for timely and effective engagement in water issues.

1. On the general issue of legislative information needs, see Sabatier and Whiteman (1985); Lupia and McCubbins (1994).

The legislature also might consider adding scientific and technical water expertise to the Assembly Committee on Water, Parks and Wildlife, the Senate Committee on Natural Resources and Water, and other relevant committees. These committees are critical in identifying issues and developing and refining solutions to the state's water challenges. Creating a cadre of permanent water experts in these legislative committees and the LAO would provide the legislature with the "expert capital" needed to formulate effective policies and provide long-term institutional memory on water issues.

Expertise is also an issue for California's courts. The judges who have decided the vast majority of California's water cases have been generalists—trial and appellate judges with no specialized understanding or training in water issues. Several other jurisdictions have turned to specialized courts to resolve water and other environmental issues, on the theory that specialized judges can better understand the issues and develop a more effective and coherent body of law. Colorado, for example, uses specialized water courts to manage its water system (Sax et al. 2006). Australia's New South Wales has gone a step further and established a specialized Land and Environment Court with jurisdiction over environmental matters more broadly.

Although specialized judges can bring greater expertise to water disputes, any move toward greater specialization should also recognize the value of generalization. Judicial generalists often bring a broader perspective to water issues than specialists might, and they sometimes are more willing to question traditional solutions. One potential approach to combining the advantages of both a generalist court and water expertise would be to appoint a single judge, or a panel of judges, from the superior court bench in each county to hear all water cases; the judge or panel would periodically rotate (e.g., every five years). This approach would allow judges to develop expertise in the water field, while ensuring a fresh set of eyes on a regular basis. Colorado appoints its water judges from the regular bench, and water judges continue to hear other matters; indeed, for most Colorado water judges, water cases are only a small part of their caseload. There is little turnover, however, among Colorado water judges. California is already taking a step toward this model with the appointment by the Chief Justice of the California Supreme Court of judges to hear groundwater adjudications. Water judges or panels also could develop more efficient procedures for water cases, hopefully reducing the complexity, time, and cost currently associated with adjudications of groundwater and surface water rights (Chapter 7).

Courts could also benefit from specialized training in water science and economics. The Land and Environment Court of New South Wales provides its judges with professional development courses focused on relevant environmental knowledge, expertise, and skills, and requires that they attend such courses at least five days a year (The Land and Environment Court of NSW 2010). Subjects could range from scientific advances in hydrology to the potential effects of climate change on fresh water.

Both federal and state agencies, including the Department of Fish and Game (DFG) and the State Water Resources Control Board (SWRCB), also could make greater use of internal and external expertise. As noted above, governmental investment in science has not kept up with decisionmaking needs; state scientific and technical capacity has declined, hindering the scientific basis for policymaking. In this era of smaller budgets, agencies should look to augment their capacities with new science partnerships with universities and other agencies, such as the California Energy Commission (which funds a great deal of climate change research). The Interagency Ecological Program for the San Francisco Estuary is one model for statewide research and monitoring. Agencies might consider establishing permanent contracts and coordinating mechanisms to engage university scientists in responding rapidly to research needs. At a minimum, agencies should better develop and employ in-house scientific experts.

Agencies also might consider appointing scientific experts to more key positions. As environmental issues grow in complexity, increased expertise is needed to implement and enforce the state's laws. For example, the Department of Fish and Game might create a specialized group of wardens with more scientific backgrounds to investigate major violations of environmental laws, such as illegal diversions of water and stream alterations.

Adequate Resources: A "Public Goods" Charge

Effective water management also requires that agencies have adequate resources to carry out their current responsibilities and to meet future challenges. As discussed above, agencies responsible for managing and protecting California's waters have long been underfunded to the point of ineffectiveness. Inadequate resources have been a theme in almost all studies of state water agency effectiveness (e.g., Little Hoover Commission 1990, 2010). Yet increased state general fund appropriations seem unlikely for many years. The fluctuations and unreliability of general obligation bond funds also make them unsuitable for such a sustained task.

As described in Chapter 7, a statewide "public goods" charge seems the best financial solution to sustain capable attention by California's water-related agencies. Public goods charge revenues could be allocated to support (1) operations of state agencies directly related to overseeing water allocation and extraction and addressing the effects of water management on fish and wildlife, (2) environmental reconciliation and restoration efforts, (3) regional collaborations and infrastructure for integrated water management, and (4) scientific and technical activities to improve water management. This use fee is modeled after the existing public goods charge on energy in California and the federal highway trust fund, which supports road, mass transit, and environmental cleanup using fuel tax revenues. In addition, some specific fees should be levied to address specific problems: a surcharge on chemical contaminants to help fund containment of source pollutants (modeled after California's electronic waste fee) and a fee on beneficiaries of dams to help fund mitigation efforts for fish affected by dams and dam retirement actions (similar in spirit to the requirement under California's Surface Mining and Reclamation Act that mine operators set aside a bond sufficient for restoring the mine site). Other sources of state revenue also could help support work critical to the health of California's waterways. Recognizing the major effects of roads on aquatic ecosystems, for example, a small percentage of transportation mitigation funds might appropriately support the work of the Department of Fish and Game. Finally, existing funding programs could be improved. Our interviews with state and local water experts revealed problems in the administration of federal grant and loan programs, which could benefit from streamlined procedures (or, at a minimum, more active assistance on applications by agency staff).

Problems arise not only from inadequate funding but from imposing new responsibilities on already strapped agencies. The U.S. Army Corps of Engineers' vital domestic role, for example, has been seriously compromised by demands placed on it by the nation's overseas military operations; resulting staffing gaps are undermining federal responsibilities in flood management (Chapter 2).

Integration and Coherence

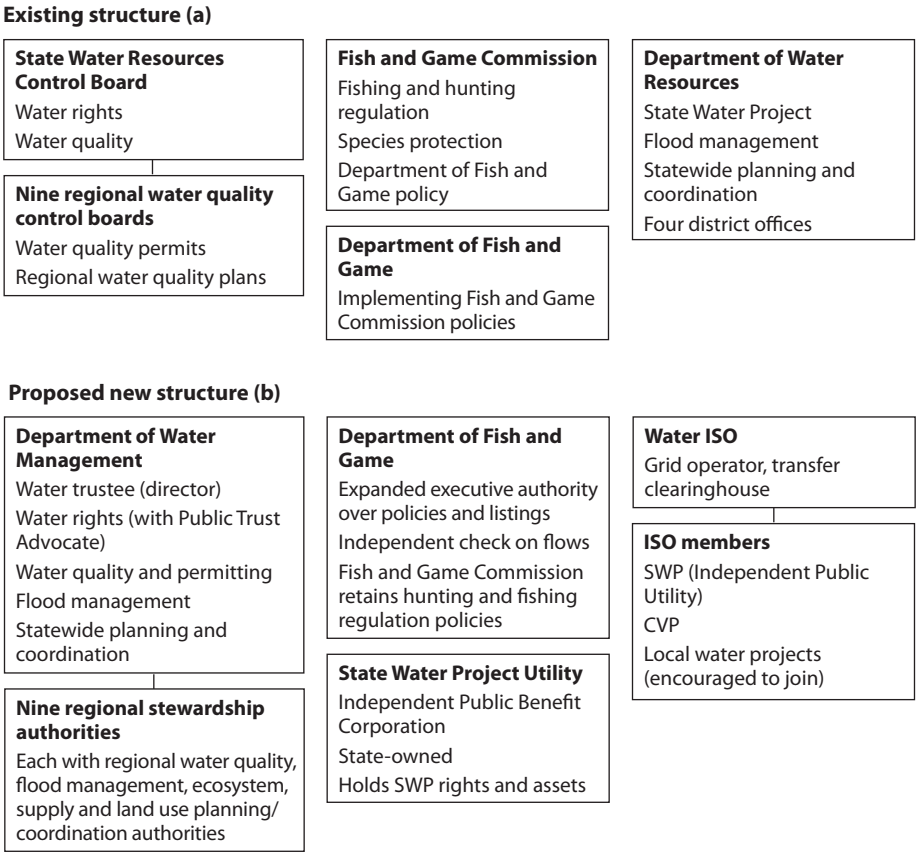
Good governance also requires integration and "coherence." Agencies must have sufficient breadth and internal coherence to address the challenges they confront. Fragmentation of agencies by geography, jurisdiction, and mission hamper California's ability to address many water challenges. Although

Better integration between water supply and flood management of reservoirs will become increasingly important. Photo by California Department of Water Resources.

decentralization can support responsiveness and innovation, fragmentation is generally inefficient and hinders coherent response. Valuable expertise and decisionmaking capability and perspective are split up, and potential efficiencies from combining management programs (e.g., water supply and water quality) or operating at a larger scale (e.g., regional treatment facilities) are lost. Geographic fragmentation can undermine the ability to plan and manage at a regional or statewide scale. Fragmentation also can undermine the sharing and development of expertise and information, magnifying the state's information problems discussed above.

Figure 8.1a shows the fragmented nature of current California water management. As discussed in Chapter 1, the legislature gave managerial authority to a single agency—the California State Water Commission—when it first created an administrative system for the state's water rights. At the same time, however, the legislature fragmented water administration by giving the commission authority over only post-1914 appropriative rights; all other rights (groundwater, pre-1914 appropriations, and riparian rights) were relegated to the courts. When California decided to build the State Water Project in the 1950s, the legislature further separated water management into two agencies—the Department of Water Resources (DWR) (with authority over the project and state water planning) and the Water Rights Board (with regulatory authority over the state's water rights system)—to avoid conflict between the state's roles as a water

Figure 8.1
Changes in state water governance structure would increase integration and adaptive capacity



project designer and as adjudicator of water rights. In one of the few moves toward greater integration, the legislature combined water quantity and water quality regulation in 1967 to create the current State Water Resources Control Board, replacing the Water Rights Board. The Department of Water Resources, however, remained separate. Authority over water-related fish and game issues has been fragmented for over a century, stemming from the decision in the late 19th century to create two separate entities—the Department of Fish and Game and the Fish and Game Commission (FGC).

Local authority over water issues is similarly fragmented. Many watersheds, for example, are governed by many small agencies, each with jurisdiction over only a small fraction of the watershed and only one or a few aspects of water management (Chapter 2). Jurisdictional fragmentation can further undermine effective water management. For example, to decommission a dam on a salmon-critical stream, a dam owner is likely to need permission from several state agencies (e.g., Department of Fish and Game, Department of Water Resources), federal agencies (e.g., Fish and Wildlife Service, National Marine Fisheries Service (NMFS), U.S. Army Corps of Engineers, Federal Energy Regulatory Commission), and local authorities (cities, counties, local water authorities). Governing legislation, moreover, often gives these agencies quite different and sometimes even opposing missions, increasing the problem of coordinating among agencies on a shared decision or issue.

To improve the capacity of California's state and local institutions to manage water in a more integrated and coherent way, we propose institutional reforms to four functions of water management (supply, quality, floods, ecosystems):

- A new independent public utility to manage the State Water Project (described in Chapter 7);
- A new Department of Water Management, merging the water rights and water quality functions of the State Water Resources Control Board and the remaining planning and flood control functions of the Department of Water Resources;
- A new public trust advocate, to be housed within the Department of Water Management;
- A shift in responsibilities from the Fish and Game Commission to a reinvigorated Department of Fish and Game;
- New regional stewardship authorities, expanding on existing regional water quality control boards, to coordinate water quality, supply, flood management, and ecosystem management at the regional and state levels; and
- A water ISO to coordinate water market transfers (described in Chapter 7).

Figure 8.1b illustrates the basic proposed new structure of state and state-affiliated agencies and independent public-benefit corporations, key elements of which are described below.

One California Water Department

At the statewide level, combining the SWRCB with the nonproject functions of the Department of Water Resources can promote greater coherence and efficiency. As noted, the state created a separate Department of Water Resources only because of the potential conflict presented by the state's development and running of the State Water Project. If the State Water Project is separately managed by a public-benefit corporation, as recommended in Chapter 7, there is no reason to continue to maintain two separate agencies. Merger of the two agencies would allow better coordination of water management functions, increase the technical capabilities available to water rights and water quality regulators, and reduce inefficiencies. By contrast, there is no advantage to tying statewide water planning to the State Water Project. During the Hydraulic Era, when water planning was infrastructure planning, it made more sense to house planning and project operations functions in the same agency. But today, water planning should focus on a much wider and more integrated range of water management and policy activities, including regulation of water projects.

A new Department of Water Management would be an executive agency responsible for

- Administration and enforcement of water rights;
- Administration and enforcement of water quality laws, including continued oversight of regional permitting;
- Statewide water planning, and support and coordination of regional water plans, acting through regional stewardship authorities;
- Development of programs and policies to ensure that California's water is put to "reasonable" use and complies with the public trust doctrine;
- Management of grant and loan programs; and
- Oversight of dam safety and flood management infrastructure and programs.

As discussed below, a single executive official, rather than a council, should lead this new department. The current council structure slows decisionmaking and diffuses responsibility. To ensure the independence and objectivity of water rights administration, the adjudication of water rights should be delegated to administrative law judges, with the assistance of hearing officers.

This recommendation closely parallels the Department of Water Management proposed by the Little Hoover Commission 2010, with two exceptions. First, the Little Hoover Commission does not recommend that the new department have responsibility for administering water quality laws; we believe it is important to keep quality and quantity functions in the same agency. Water quality and quantity decisions are closely related, and California's merger of the two administrative functions is often held out as an example of integrated management (Sax et al. 2006). Indeed, even greater integration of quality and quantity decisions would be valuable. Second, the Little Hoover Commission recommends that the environmental-flow unit of the Department of Fish and Game be merged into the new Department of Water Management, but we recommend maintaining separate units and increasing the modeling capability within the new Department of Water Management. Separate units can help ensure the independence of environmental-flow analysis. If the environmental-flow analysis resides only in the new department, pressure might be placed on the unit to achieve the water department's desired outcomes, even if that is inconsistent with environmental protection. Rather than merging the unit, we recommend that (1) the Department of Fish and Game be revitalized (with, among other things, reinforced modeling capabilities), and (2) the Department of Water Management be required to request the views of the Department of Fish and Game before taking any major action that could negatively affect environmental flows. A similar system of advice and consultation works well with the Federal Energy Regulatory Commission (DeShazo and Freeman 2005).

An open question is whether the new department should be located in the Resources Agency or the California Environmental Protection Agency—or instead should be a separate agency. The Little Hoover Commission recommends locating the new department in the Resources Agency. However, placing the department in the California Environmental Protection Agency would promote coordination between water quality management and other pollution policies. At least one state, New Mexico, places its water department in its environmental agency rather than its resources agency (which focuses instead on energy and minerals). Given the role of water in California, a merged department would be sufficiently important to arguably justify independent, cabinet-level status. Several states, including Arizona and Idaho, have independent water agencies. More important than where the new department sits, however, is its combined jurisdiction, organization, and leadership.

California needs to strengthen the role of the Department of Fish and Game. Photo by Jeff Bernard/Associated Press.

More Coherent Regulation of Fish and Wildlife

The Little Hoover Commission concluded in 1990 that California "has an antiquated structure set up to protect the state's natural resources" and that this structure had proven incapable of "reacting either quickly, consistently, or adequately to the demands of our times" (Little Hoover Commission 1990). In the 20 years since this assessment, California's fish and wildlife have continued to decline. The threat to California's native fishes and the collapse of salmon populations indicate the continued inability of California's "antiquated structure" to deal effectively with conservation of aquatic resources (Chapter 5).

Fragmentation is again part of the problem. First, responsibility over fish and wildlife is divided between the Department of Fish and Game and the Fish and Game Commission, undermining the state's ability to effectively address fisheries and modification of the state's waterways. Most states unify fish and game protection in a single agency. Because the FGC is constitutionally mandated (Cal. Const., art. IV, § 20), the division cannot be completely eliminated. However, because the exact jurisdiction of the FGC is not constitutionally specified, the legislature could limit the responsibilities of the FGC to setting regulations for fishing and hunting, which was its initial jurisdiction. The other duties of the FGC (from managing commercial fisheries, to listing endangered species, to dealing with dams and diversions) are more appropriately handled by scientific experts and should be unified within DFG.

Second, there could be more coordination between DFG and the state agency responsible for water management (whether it be the existing State Water Resources Control Board or the proposed Department of Water Management). Both agencies have common goals but often do not work together effectively. As recommended above, the water agency should receive the timely views of DFG before taking major actions affecting fish and wildlife. The water agency also should establish mechanisms to increase administrative coordination with DFG. Both the water agency and DFG, for example, could coordinate their efforts to require and monitor environmental flows and conditions below dams.

Regional Stewardship Authorities

Greater integration and coherence is important not only at the statewide level but also within regions or watersheds. California encourages regional integration and management of water to a degree. Recent state law, for example, requires linkages between the planning activities of cities and counties (i.e., local land use authorities) and urban water suppliers and flood management agencies (Chapter 2). The state has also provided over $2 billion in bond funds to support Integrated Regional Water Management (IRWM) (Chapter 6). Although this funding has supported projects that multiple water agencies in a region already wanted to pursue, it has not yet served as an effective incentive for additional integration of multiple water management functions at the watershed scale.

To further encourage integration of water resource planning, the California legislature could create an affirmative structure for regional integrated planning and management. We propose creating nine regional stewardship authorities, coinciding with the jurisdictions of existing regional water quality control boards. As discussed below, the authorities would develop and manage integrated basin plans. The new authorities would coordinate and integrate staff from the various state agencies working on aspects of water management within the authority's region, and they would have authority to regulate dams under § 5937 of the Fish and Game Code. The authorities could replace the current regional water quality control boards (assuming these boards' current responsibilities) or supplement and coordinate with the existing boards. Leadership would reflect the broad responsibilities of the new entities. In some cases, local agencies and groups might jointly form regional authorities (similar to the Santa Ana Watershed Project Authority (SAWPA), Box 6.9) to perform these regional coordination functions, under authority and responsibility delegated

by the state, with responsible oversight. This latter model reflects a "cooperative federalism" approach to water reform, discussed further in Chapter 9.

The authorities, much like the new Delta Stewardship Council, would be responsible for developing integrated basin plans that encompass water quality, flood control, groundwater management, and other local water resource development, as well as aquatic ecosystem management encompassing everything from local restoration projects to basinwide planning and management. These integrated basin plans would build on the existing basin plans developed by the regional boards, which focus on water quality for human and environmental uses, and incorporate additional water management functions (flood control, water supply), including broader ecosystem management.

Borrowing another idea from the Delta Stewardship Council, all local entities involved in water resources planning, including local land use authorities, water utilities, flood control and reclamation districts, and resource conservation districts, would be subject to a consistency requirement. Both the federal Coastal Zone Management Act and the transportation-planning requirements of the federal Clean Air Act provide models for an effective consistency process. All planning by local entities—such as general plans, urban water management plans, and flood-control plans—would need to be consistent with the broader regional plan to the maximum extent practicable. The regional plans also would be required to be consistent with the state planning policies overseen by the new Department of Water Management. Indeed, coordination of regional and watershed planning efforts would provide much of the basis for the statewide plan, maintaining decentralization, but reducing fragmentation. Various mechanisms could be used to enforce the consistency requirements. For example, state funding for local actions and planning could be contingent on a finding that the local entity is in compliance with the consistency requirement, local plans could be submitted to the regional stewardship authorities for approval (which could be automatic absent action by the authority), or aggrieved parties with standing could be permitted to challenge local actions on consistency grounds in state court.

The existing boundaries of the nine regional water quality control boards—defined to match the boundaries of broad watersheds—are largely appropriate to the scale of regional planning from an integrated resource management perspective.[2] This is a suitable scale for planning to occur, not only for water

2. DWR's hydrologic regions overlap those of the regional boards. The Central Valley board (region 4) consists of three hydrologic regions (Sacramento River, San Joaquin River, Tulare Basin), and the Lahontan board (region X) consists of two hydrologic regions (North Lahontan, South Lahontan). The South Coast hydrologic region is split into three regional boards (Los Angeles, Santa Ana, San Diego), corresponding to local watersheds (www.waterboards.ca.gov/waterboards_map.shtml).

quality but also for groundwater and surface water interactions, coordinated management of reservoirs and stormwater for flood management and water supply, coordinated development of recycled water use and brine disposal, and integrated management of flows and riparian habitat to support aquatic ecosystems. At present, of the 46 IRWM regions accepted by DWR (and hence eligible for bond funds), only three correspond to the boundaries of the regional boards (the Santa Ana River, the North Coast, and the San Francisco Bay Area). Even geographically small regions, such as San Diego and Los Angeles, contain multiple groups, and in many cases these groups have overlapping boundaries.[3]

Some types of management need to be more local, but even then the broader watershed approach can provide policy guidelines and help to set priorities for local projects. For instance, in an area like the Central Coast, where flood management must be for local streams, broader basin planning can develop principles that improve environmental and water supply functions (e.g., less riprap—or rocky armoring—on levees, expanded use of floodplain storage, improved groundwater recharge, improved logging practices). The basin planning approach also would make it possible to prioritize ecosystem reconciliation efforts and conservation dollars within particular areas and local watersheds. The authorities also could encourage and help fund projects of local watershed groups, recognizing that local involvement is essential for success at the regional level as well. Similarly, within the Central Valley, integrated groundwater and surface water management and some aspects of flood management will be needed for more localized areas, but this effort should be integrated at the broader watershed scale to take into account environmental flows into the Delta, water quality, and broader goals of water supply and flood management.

Local Integration and Coordination

Beyond the major structural reforms discussed above, the state should continue to encourage greater coordination among and, where appropriate, merger of, local water agencies. Given the increased complexity of water challenges and the abundance of agencies with often fragmented jurisdiction over water, a single agency may find that its jurisdiction does not extend to all issues or areas that

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The Department of Fish and Game's seven regions also have a fair degree of overlap with the regional board regions (www.dfg.ca.gov/regions/).

3. For a map of accepted regions as of late November 2009, see www.water.ca.gov/irwm/docs/RegionalsAcceptanceProcess/IRWM_RAP_sizeE_final_decision_11_23_09.pdf. For more information about the regional acceptance process, see www.water.ca.gov/irwm/integregio_rap.cfm.

must be addressed to achieve effective reform. For instance, collaborative agreements between wastewater and water agencies are often needed to implement effective water recycling projects—as with the Orange County groundwater replenishment system project (Chapter 2).

Coordination and integration of local water agencies also can increase their ability to adapt to changes in conditions. Limited geographic or functional reach can restrict adaptation options (Thompson 2010; Folke et al. 2005). A small local water distributor with a single source of supply, for example, may have less ability to respond to a drought than a larger agency with multiple supply alternatives. Flood management agencies with the ability to exercise land use powers may be better able to respond to shifts in flood magnitudes and frequencies than agencies with only the ability to manipulate physical infrastructure. Joint powers authorities have been successful in many cases (such as SAWPA), but agency mergers and other actions also may be warranted.

Legislation that requires coordination—such as the 2001 "show me the water" laws requiring that cities and counties get the approval of the local water district before approving large new developments—can help in this regard, even when the broader lines of authority between agencies remain distinct (Hanak 2010).

Federal Fragmentation

Federal water management also suffers from unnecessary fragmentation. One of the best examples is the division of responsibility under the Endangered Species Act (ESA) between the National Marine Fisheries Service, which is housed in the Department of Commerce, and the Fish and Wildlife Service, in the Department of the Interior. For decades, this division did not exist, and the Fish and Wildlife Service handled freshwater, marine, and anadromous fisheries. In the late 1960s, however, President Richard Nixon moved management of anadromous and marine fisheries to the National Oceanic and Atmospheric Administration in the Department of Commerce. Merging the NMFS back into the Department of the Interior would promote greater coherence in federal protection of imperiled species.

Decisionmaking

A third issue is how to ensure that decisions are made in a timely fashion and with due regard for science and the public trust. The current committee structure of the State Water Resources Control Board, in which decisions are made by votes

of the five board members, presents concerns on both counts. In many instances, the board's committee structure, combined with the requirement that most decisions come before the full board, slows and complicates decisionmaking. Because the board is quasi-adjudicatory, it also has been unwilling in some situations to commit to agreements negotiated through multistakeholder processes, undermining efforts to solve state water problems through such negotiations. However, in other situations, the board's appointed members have proven incapable of withstanding significant political pressure from water users and have encouraged parties to reach a compromise agreement rather than making politically difficult decisions. Sometimes, the committee structure has also diffused responsibility and reduced the accountability of individual board members.

The legislature should consider moving away from the current committee structure, whether it retains the current State Water Resources Control Board or replaces it with a unified Department of Water Management. In most western states, a single state engineer, rather than a multimember board, administers the water rights system. Replacing the current board with a "state water trustee," modeled after state engineers but with a modern emphasis on the official's responsibility to manage the state's water in compliance with the public trust, would address several major deficiencies of the current board structure. Like current members of the State Water Resources Control Board, the state water trustee should serve for a fixed term rather than at the pleasure of the governor. Smaller steps could address specific problems. For example, establishing an active network of administrative law judges or providing for decisions by delegated individual board members, without full board consideration except where the board chooses to convene as a panel, could help speed the current process. Such steps, however, would not eliminate the fundamental problems of a board structure.

The legislature should also look for ways to ensure that the water agency adequately considers the public trust interest in California water. The diffuse character of public benefits and the limited resources of environmental interests mean that the public trust is not always adequately represented in board proceedings. One potential solution is to establish a public trust advocate, modeled after the Division of Ratepayer Advocates at the California Public Utility Commission (Division of Ratepayer Advocates 2010). The public trust advocate would be responsible for evaluating major board proceedings for public trust implications and advocating for positions that promote the public trust. To promote independence, the public trust advocate could be appointed by the

governor, with confirmation by the legislature, but serve for a fixed term rather than at the governor's pleasure. In addition to ensuring representation of public trust interests, a public trust advocate would also help provide for more deliberate and consistent development of public-trust principles in the board's work. Like the Division of Ratepayer Advocates, the public trust advocate also could be a source of information to the legislature. A public trust advocate would be a useful innovation whether the board remains independent or is merged into a Department of Water Management.

In interviews, we repeatedly heard that a major obstacle to effective, long-term reform by California administrative agencies has been political pressure from the legislature or governor. The state may wish to seek ways to shield state water authorities from the most pernicious pressures and provide them with sufficient autonomy to formulate coherent, long-term water policies. The short-term political objectives of water users and other stakeholders often are inconsistent with the long-term needs of a sustainable water system. Effective water management requires a consistent, long-term perspective, protected to a significant degree from short-term politics. When crises such as droughts hit, water managers need to keep long-term goals in mind and not simply respond to immediate political demands. Autonomy is particularly important where issues are technical and depend on scientific expertise, as in the protection of imperiled ecosystems and fisheries.

In similar situations, Congress and other legislatures have developed a variety of techniques to try to reduce political pressure on administrative actions. For example, the legislature can provide administrative appointees with fixed terms, so that they cannot be fired in response to political pressure. As noted above, we recommend that major water positions in California receive fixed terms. In the case of some administrative positions (e.g., members of the Federal Reserve Board who serve for 14 years), terms are longer than political cycles to help insulate the appointees from day-to-day political pressures. Councils with staggered terms also should provide greater protection from momentary political pressure, although this benefit must be weighed against the potential costs from council systems discussed above. Providing agencies with significant budgetary independence (e.g., through fee revenues that do not require yearly appropriations) also helps reduce the potential for disruptive political influence. In considering new administrative structures for water management, the California legislature should evaluate the potential benefits of these and similar mechanisms to ensure effective, long-term water management.

Adaptive Capacity

Governmental institutions should be able not only to address current challenges but also to adapt their policies and practices to changing conditions and demands. Government's adaptive capacity has always been important. Changes in the environment (including water conditions), the economy, population, technology, and other factors frequently require new policies and approaches. Government must be able to identify and respond to those changes on a timely and effective basis.

Climate change and the other drivers of change described in Chapter 3 make adaptive capacity all the more important today and in the future. Climate change alone will significantly affect water resources and demands: Mean temperature will change, extreme events such as droughts and floods will become worse and more common, and weather regimes themselves could shift (Duit and Galaz 2008). These changes will often be unpredictable, making it critical that agencies be able to adapt to events as they occur (Thompson 2010; Easterling, Hurd, and Smith 2004). The many other drivers of change in California water management impose similar demands for governmental adaptation.

Effective adaptation requires that governmental institutions have capacities to explore, create, and implement new policies (Thompson 2010). Institutions must gather, develop, and analyze information to identify changes in conditions and needs that may require new policies and practices. Institutions must also have sufficient creativity to be able to develop solutions to problems that have not been seen before. Creativity requires openness to new ideas and to dissent within an institution. Finally, institutions must be able to implement needed adaptations on a timely basis, which requires that they be capable, efficient, and coherent.

In addition to adopting the structural changes suggested above, California could improve its adaptive capacity in at least four additional ways. First, agencies can make modest investments that keep or expand the availability of future alternatives (Dobes 2008). For example, if a water supplier is building a treatment plant, the supplier can plan and construct the plant to permit future expansion—enabling the supplier to increase capacity in the future if changing conditions require it, without having to make potentially unnecessary investments today. Even the simple steps of planning options today and preparing environmental assessments of those options in advance of their implementation can increase the ability of agencies to respond to changes on a timely basis (Quay 2010).

Second, legislatures can enhance the adaptive capacity of agencies by not straight-jacketing agencies unnecessarily (Thompson 2010). Although reducing the risk of administrative abuse of discretion, strict legislative directives often reduce the ability of agencies to be efficient and effective and to modify practices in response to changing conditions. As discussed above, for example, the strict mandate in the Endangered Species Act that governments take no action that could jeopardize endangered or threatened species may become unworkable given significant climate change or additional invasive species (Chapter 5). Although the U.S. Fish and Wildlife Service might be able to better effectuate the goals of the ESA in some future cases by focusing on ecosystems and triaging among species, the ESA limits that option.

Third, the government should avoid unnecessarily locking in decisions for lengthy periods of time (Hallegatte 2009). Permits, licenses, and contracts can limit the government's adaptive capacity when they do not allow for modification during their terms, last for long time periods, and carry a presumption of renewability. Water users, whether dam operators or water recipients, have legitimate reasons to seek certainty. However, too often terms and conditions have erred in favor of certainty rather than agency flexibility, and flexibility has become necessary for adapting to change. The government therefore should reevaluate whether current terms and conditions for dam licenses, reclamation and other water contracts, and appropriation permits should be revised.

Finally, the government can promote adaptation to climate and other changes by enhancing the ability of markets to respond to changed conditions. Markets historically have been responsive to climate changes and have already begun to respond to current climate shifts (Thompson 2010). The government should therefore avoid erecting unnecessary barriers to market adaptation. Water markets, for example, can help regions adapt by allowing water-short regions and users to acquire water from regions or users who are better able to spare water (Chapters 2, 6). By promoting water markets, the government increases society's ability to adapt to changes in water availability (Phelps et al. 1978; Lund and Israel 1995b; Kiparsky and Gleick 2005; Luers and Moser 2006). As highlighted in Chapter 7, the state can take further steps to enhance California's water market—through streamlined environmental reviews and the creation of a water ISO to serve as a water transfer clearinghouse. In addition to participating in these reforms, the federal government can enhance water marketing by eliminating the types of crop subsidy programs that discourage water transfers. For instance, current rules disallow farmers from collecting

crop payments for relatively low-value field crops (such as cotton) if they use the land to plant higher-value fruits and nuts—a discouragement of more efficient use of scarce water resources (Chapter 2). Further "decoupling" of federal farm subsidies—so that they do not create artificial incentives to produce particular crops—is part of a responsible federal water policy for the 21st century.

Improving Water Governance

Leadership is ultimately more important to California water management than is the structure of the state's water institutions. But structure matters. Existing and new policies to tackle California's water management challenges are less likely to be implemented effectively if governmental institutions themselves are ineffective. Institutional structure also helps determine a state's ability to identify needs for future reforms and to adopt those reforms on a timely basis.

Many of our recommendations, such as the creation of a new Department of Water Management and regional stewardship authorities, will require legislative action. Others can be undertaken today without new legislation. California courts, for example, can provide for greater expertise and training, local agencies can establish new collaborative partnerships, and agencies can increase their flexibility by anticipating and planning for changing conditions.

Our recommendations reflect five themes. First, adequate information, expertise, and resources are critical for making wise decisions and for knowing when adaptation is needed. Existing state agencies and the proposed Department of Water Management should ensure that adequate information is being collected and available to policymakers, stakeholders, and the public at large in a usable and useful format. Moreover, the legislature should require the submission of key information. Policymakers and managers need access to the expertise and resources needed to make and implement effective decisions.

Second, the most important reform for water-related agencies at all levels of government is to increase integration, coordination, and coherence. This will not only help improve current water management but also increase the state's adaptive capacity and ability to deal with changing conditions. At the statewide level, the State Water Resources Control Board should be merged with the nonproject functions of the current Department of Water Resources. As discussed in Chapter 7, the State Water Project should be managed as a separate and independent public utility. At the regional level, the legislature should create new regional stewardship authorities (either replacing or supplementing

existing regional water quality control boards). The state also should continue to encourage, through financial and other incentives, integration and coordination among local water agencies.

Another major theme is that the state should move away from management through council structures and toward greater use of expert agencies. The council structure of the State Water Resources Control Board appears to diffuse responsibility and to slow and complicate decisions. Similarly, many decisions assigned today to the Fish and Game Commission are far more complex than is appropriate for a nonexpert committee of volunteers. All regulatory functions of the State Water Resources Control Board, whether it remains independent or is merged into a new Department of Water Management, should be headed by an appointed state trustee. The responsibilities of the Fish and Game Commission should be limited to setting hunting and fishing restrictions, with other responsibilities being reassigned to the Department of Fish and Game.

Fourth, the state system should develop structures and mechanisms to ensure that the public trust in water is better protected. The legislature, for example, should create a new public trust advocate, to be located either in a new Department of Water Management or in the State Water Resources Control Board if it is maintained as an independent entity. The Department of Fish and Game should retain authority over environmental flows, as an independent check on the authority of the State Water Resources Control Board to issue and oversee water use permits. Before making any major decision that could negatively affect aquatic resources, the board should consult with the Department of Fish and Game and take its views into account.

Fifth, governing institutions should take steps to improve their adaptive capacity. This includes taking actions that expand management opportunities in the future, avoiding strict legislative directives that overly restrict agency authority. One key institutional issue is to avoid unnecessarily locking in decisions for lengthy periods of time. Permits, licenses, and contracts can limit the government's adaptive capacity when they do not allow for modification during their terms, last for long time periods, and carry a presumption of renewability. Both the state and federal governments should reevaluate whether current terms and conditions for dam licenses, water contracts, and water rights permits should be revised.

These institutional improvements should make it easier for reforms and leadership to be more effective in managing water adaptively in a changing California.