CHAPTER 7

U.S. Water Policy Reform

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The United States faces a bevy of persistent and emerging water challenges in the 21st century. Many key water laws and policies are outdated or not effectively or equitably enforced. An increasing number of aquatic ecosystems are in danger of collapse. Many cities, businesses, and farms are not taking advantage of existing, cost-effective water conservation technologies and practices. Much of the nation's infrastructure is outdated and will become increasingly obsolete as climate change alters the timing and magnitude of water supplies. Rising energy demands and shifts in energy sources, such as increased ethanol and natural gas production, are putting additional pressure on the nation's water resources. In turn, increased water demand for growing populations will have important energy implications.

Although many water problems are local and must be resolved at the local and state levels, the federal government has a role in developing and implementing appropriate national policies as well. These responsibilities are not being adequately fulfilled by the diverse federal agencies responsible for different aspects of water management and regulation. One part of the problem is confusion over authority. Another part is the failure of the executive branch in recent years to request sufficient funds to protect and manage our water resources, and of the legislative branch to appropriate and allocate those funds. A third part of the problem is old ideas that do not account for the realities of the 21st century and for recent advances in our scientific and technical understanding of both water problems and solutions. Finally, part of the problem is a lack of vision.

The U.S. is not alone in having inadequate water policies—indeed, very few countries in the world are fully engaged in efforts to revamp outdated institutions, laws, technologies, and strategies for managing freshwater. But in recent years, a number of countries have, for various reasons, begun to tackle difficult questions and to put in place new and innovative approaches to sustainable water management. This chapter will look at some of these experiences and their similarities, examining lessons relevant to challenges that the U.S. now faces and offering some recommendations for a 21st century national water policy. A book now in preparation will look at these issues in more detail (Christian-Smith and Gleick, in press).

Background

More than four decades ago, the U.S. Congress recognized the need for a more rational, comprehensive approach to water resource planning and management, passing the National Water Commission Act (P.L. 90-515). The Act called for the creation of a

National Water Commission to "review present and anticipated national water resource problems, making such projections of water requirements as may be necessary and identifying alternative ways of meeting these requirements—giving consideration, among other things, to conservation and more efficient use of existing supplies, increased usability by reduction of pollution, innovations to encourage the highest economic use of water, interbasin transfers, and technological advances." The commission's work culminated in a nearly 600-page report to Congress, concluding, among other things, that collaboration among agencies must be improved, that better water data must be collected, and that the beneficiary-pays principle should be applied more rigorously to water supply and infrastructure projects (NWC 1973).

Since the 1970s, the nation has seen some important strides in water management, including significant improvements in wastewater treatment and point source pollution associated with the implementation of the Clean Water Act, as well as an overall reduction in per-capita water use associated with increased water conservation and efficiency and changes in the economic structure of the country. However, the nation's fragmented approach to water has continued even as new cross-cutting challenges surface, such as emerging contaminants in public drinking water supplies, increased competition among water users, and climate change.

Persistent and emerging water challenges are apparent worldwide and have recently served as the basis for some governments to reassess their approach to water management. In the past few decades, South Africa, Australia, the European Union, and Russia have all passed innovative water policies, signaling a growing commitment to more comprehensive, integrated water management shaped by a variety of political, economic, environmental, and social factors. Because of the differing characteristics of water resources and political frameworks, governing mechanisms vary considerably across these countries. Yet, despite these variations, all four reform efforts include several similar components, including:

- Recognition of declining ecosystems and persistent water-quality problems;
- Better water data collection;
- Decentralized water decision making;
- Increased stakeholder participation;
- Clarification of institutional roles and responsibilities, such as through formal legislation and changes in water rights; and
- Application of more modern economic approaches, including principles of "user pays" and "polluter pays" and "full-cost pricing."

In this chapter, we discuss each of these water reform efforts in more detail and then consider the principles that are relevant for U.S. water policy makers and managers.

International Water Reform Efforts

More and more countries are facing and addressing water challenges, and there is growing experience with different approaches and solutions. Although the individual

experiences described here for South Africa, Australia, the European Union, and Russia are not likely to be widely replicated because of economic, political, and cultural differences, they do offer lessons and insights that may prove to be informative and widely useful.

South Africa

South Africa has been at the vanguard of water reform efforts—it was one of the first to engage in significant water reform, including writing human and ecosystem water rights into the new constitution and then passing a comprehensive new National Water Act in 1998, four years after the end of apartheid. The Act was lauded as a progressive piece of policy, with the redress of past injustices as one of its overarching aims (Movik 2009). In addition, the constitution and the Act embodied the recognition that "nature" must have a "water right" if the natural environment was to continue to support and sustain human endeavors. The new reforms defined the "reserve," which refers to both an ecological reserve that requires a minimum level of instream flow to ensure ecosystem sustainability, and a human reserve, which requires quantities of water necessary to meet basic human needs. This reserve must be met before water is to be allocated to other uses and demands.

The Act also created compulsory national water-quality and supply standards, standard water tariffs, and regulations for water services providers to follow in order to provide a framework for local government to provide efficient, affordable, economical, and sustainable access to water services. The rules support the principles contained in both the constitution and the Act and help to give meaning to the right of access of all people to a basic level of clean water provision.

In terms of management, the country was partitioned into 19 water management areas based on drainage regions, to be governed by Catchment Management Agencies. The purpose of the agencies was first and foremost described as coordinating and promoting public participation in water management (Anderson 2005), though it was envisaged that these responsibilities could be expanded to include setting and collecting water-use charges and issuing water-use licenses (Schreiner and Van Koppen 2002).

In the past decade, significant progress has been made in providing basic water and sanitation for millions of people who had previously been denied these services. By some estimates, about 15 million people lacked safe water supply and more than 20 million lacked adequate sanitation services in 1990. According to the World Health Organization and the United Nations Children's Fund, access to improved water supply in rural areas, where most of the unserved or underserved live, increased from 66 percent in 1990 to 78 percent in 2008, implying that more than 10 million people had gained access (WHO/UNICEF 2010). Far less progress has been made in sanitation, however, and water-quality improvements are also lagging. Data from 2004, for example, also showed that fewer than 50 percent of water-service providers had programs in place to monitor drinking water quality (WHO/UNICEF 2010).

In 2005, the Drinking Water Quality Regulation Program was established, requiring microbial and chemical water-quality testing and setting compliance standards. The government also developed the "Blue Drop" status, which is awarded to water service providers who are at or above 95 percent compliance with water-quality standards. In

2010, 100 percent of the municipal authorities had water-quality monitoring programs in place, though only 26 municipalities had been awarded Blue Drop status, out of over 150 municipalities (Republic of South Africa 2011), and far less progress has been made outside the main cities, where rural populations still face serious water-quality challenges. In addition, Movik (2011) reports that there has been little progress to date in terms of redistributing water use rights.

Australia

Australia has been presented with a remarkable series of water challenges in recent years. Like many other regions, growing populations and economic demands have led to rising water diversions for agricultural and urban use. In turn, increased human use of water has been accompanied by emerging environmental problems, including decreased water quality, loss of wetlands, toxic cyanobacterial blooms, and increases in soil salinity. Over the past decade, these issues have been exacerbated by severe and prolonged drought and extreme flooding, considered by Australian scientists and others to be the explicit indications of impacts from human-induced climate change (see Chapter 5). Between 1997 and 2006, runoff to the country's main agricultural region, the Murray-Darling Basin, was 21 percent lower than the historical average (CSIRO 2008). And, 2006 marked the lowest annual runoff on record in the Murray River system (Figure 7.1).

Although recurrent drought conditions are common in the Murray-Darling basin, there is growing scientific evidence that climate change is influencing these extremes (see Chapter 5). Australia's Bureau of Meteorology predicts that within two to three decades, drought will occur twice as frequently and be twice as severe (Schneider 2009). In 2007, Australia launched a reform of its water-management system to try to address this new, water-scarce reality, passing the Commonwealth Water Act. The Act and accompanying intergovernmental agreements have seen constitutional rights over water resources in the Murray-Darling Basin assigned by the states to the Commonwealth and investment of approximately $13 billion Australian dollars (about US$10.5 billion) in water-reform measures, including:

- Federalizing water data collection;
- Requiring greater regulatory reporting (e.g., water balances and a National Water Account);
- Moving to full-cost recovery for all water infrastructure and services;
- Creating a market for water trading (based on tradable property rights and in combination with a review of existing caps on water extractions);
- Increasing on-farm efficiencies (e.g., canal lining, drip irrigation, shifting to more water-efficient crops); and
- Purchasing water entitlements from willing sellers to restore aquatic ecosystems.

Australia's water reform has been closely tied to increasing the efficiency of water use, largely through a water rights market. The water market alone has been credited with halving water consumption, particularly in drought-prone regions like the Murray-Darling Basin. The Act also created a new federal repository of water monitoring and

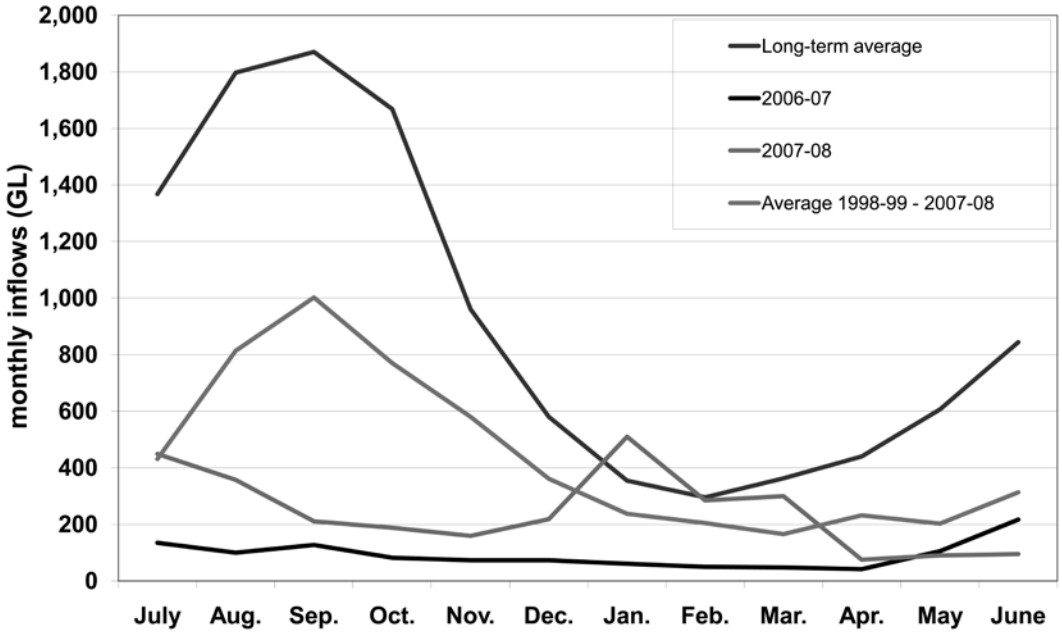

FIGURE 7.1 MONTHLY INFLOWS INTO THE MURRAY RIVER SYSTEM.
Source: Craik and Cleaver, 2008.

measurement information. These data are considered critical for adequate water-quality and water-quantity protection. For more information about the impact of Australia's water reforms, see Chapter 5.

European Union

The European Union Water Framework Directive was passed in 2000 (Directive 2000/60/EC). The directive rewrote and centralized water policy for member states into one piece of legislation that encompasses three main issue areas that had previous been addressed only separately, and incompletely. The "three pillars" of the legislation are as follows:

- Ecology—all water bodies must reach "good" ecological status by 2015;
- Governance—new water management authorities were created at the river basin scale and were charged with more participatory decision making; and
- Economy—water suppliers should aim for full-cost recovery and begin economic analyses to charge the "true cost" of water by 2010.

Each pillar has its own series of measures to be enacted within a specific timeframe (Table 7.1). Beginning with the ecology pillar, the directive set the target of "good" ecological status and established a decision-making process to determine whether surface-water and groundwater bodies are in bad, poor, moderate, or good status. In order to attain "good" status, the physical, chemical, hydro-morphological, and biological elements must show very slight to no alterations from reference conditions (reference areas are chosen to reflect a lack of human disturbance). After characterizing all

of the water bodies within a river basin district, river basin authorities are responsible for setting up monitoring programs, establishing a series of objectives and measures to achieve "good" status, and inscribing these in a river basin management plan (Bouleau 2008).

Article 3 of the directive requires member states to designate "Competent Water Authorities" for implementing river basin characterization and management plans. Competent authorities must ensure coordination among all stakeholders and bodies concerned with water management in order to draft these plans. In addition, Article 14 insists on the active involvement of all interested parties in the production, review, and iterative updates of the river basin management plans. This primarily involves consultation rather than active participation, as the directive states that member states shall "publish and make available for comments to the public a timetable and a work program . . . an interim overview of the significant water management issues . . . draft copies of the management plan." For each step, the public has at least six months to comment in writing on those documents and to provide access to background documents and information upon request.

In contrast with the narrow ecological definitions of the legislation, the very broad definitions of governance procedures may lead to widely different interpretations and implementation in member states. Depending on institutional and political contexts, competent authorities may be national bodies (e.g., the Environment Agency in England and the National Institute of Water in Portugal) or more local ones (e.g., river basin water agencies in France). In many ways, the directive leaves the governance

TABLE 7.1 Timeline for the Implementation of the European Union Water Framework Directive

Year	Issue	Policy Reference
2000	Directive entered into force.	Article 25
2003	Transposition into national legislation. Identification of river basin districts and authorities.	Article 23 and Article 3
2004	Characterize river basins through pressures, impacts, and economic analysis.	Article 5
2006	Establish monitoring network. Start of public consultation (at the latest).	Article 8 and Article 14
2008	Present draft river basin management plan.	Article 13
2009	Finalize river basin management plan, including program of measures.	Article 13 and Article 11
2010	Introduce pricing policies.	Article 9
2012	Implement program of measures.	Article 11
2015	Meet environmental objectives. First management cycle ends. Create second river basin management plan and first flood risk management plan.	Article 4
2021	Second management cycle ends.	Article 4 and Article 13
2027	Third management cycle ends; final deadline for meeting objectives.	Article 4 and Article 13

Source: Adapted from the European Commission, http://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm.

issues flexible in order for member states with very different sociopolitical contexts to determine how they will organize implementation to achieve the goals (Grantham et al. 2008).

The directive also calls for an economic analysis of water uses in each river basin district. This economic analysis is necessary to make the relevant calculations necessary for taking into account the principle of cost recovery, using estimates of volume, prices, and costs of water services; estimates of present and forecasts of future investments; and estimates of the social, environmental, and economic effects of recovery. The analysis should also consider long-term forecasts of supply and demand for water in the river basin district in order to make judgments about the most cost-effective combination of measures to inform the Program of Measure (Article 11) and River Basin Management Plan (Article 13) (Bouleau 2008). Economic analysis is currently lagging behind the implementation of most other aspects of the Directive. And, some member states (e.g., Greece and Malta) have not yet reported on their surface water monitoring programs as required by the Directive (Commission of the European Communities 2009).

Russia

In 2006, Russia rewrote its water code (Russian Federation Water Code No. 174-Ф3) to focus on integrated regional water management. The code's founding principles are that protection of water bodies (both surface and ground) takes priority over use, that usage shall not harm the environment, and that utilization be prioritized toward drinking and other domestic purposes (Simpson 2007). Some of the code's innovations include its river basin approach, the introduction of integrated water basin management schemes, and, in theory, improved involvement of civil society in decision making.

The new code sets new water-quality standards with maximum allowable concentrations for a range of chemicals, nuclear substances, microorganisms, and other contaminants. These norms are developed by responsible federal executive authorities for each water basin. For water bodies that are used for drinking water supply, special pollution prevention zones are established. A system of regulations and bans now apply to sewage discharges, along with new regulations constraining dumping and discharges of harmful substances.

Finally, Russia's new law establishes a monitoring system at the water basin level to provide regular observations on water quality and quantity, regimes of water use, data processing, and updating of a state water register. The state water register, to which there is free access (Article 31), is a compilation of data on water bodies and water basins, water quality and quantity, water use, water-related facilities, and water protection zones. It also provides access to legal agreements and decisions on water use. The new water code is only just beginning to be implemented broadly, so its impact on water management and use is still relatively unclear.

Common Themes and "Soft-Path" Solutions

While these varied international initiatives have different cultural dimensions and political imperatives, they share a commitment to many "soft-path" water solutions

addressed in previous volumes of *The World's Water* (see, for example, Wolff and Gleick 2002). The "soft path" approach defines a new strategy for more sustainable water management and use that recognizes the limits to traditional approaches. It recognizes the importance of critical ecological services, such as nutrient cycling, flood protection, aquatic habitat, waste dilution and removal, and aesthetic values, while also satisfying human uses, such as the provision of clean drinking water, hydropower, agriculture, commercial fishing, and recreation. Soft-path solutions rely less on traditional hard infrastructure that transports water over large distances or centralized water supply and wastewater treatment. Rather, soft-path solutions encourage more local water-supply options, greater water conservation and efficiency (e.g., the use of low-flow devices in homes and businesses and the use of precision irrigation technologies on farms), using water more than once (e.g., graywater and recycled water), managing local surface and groundwater resources together, smarter use of economics (e.g., water pricing and innovative markets), and developing better urban and agricultural practices to retain water (e.g., low-impact development, rainwater harvesting, and conservation tillage).

Part of the impetus for the international water reforms described earlier include the perception that new approaches will be less expensive than traditional hard-supply options, that they will be less energy intensive and produce fewer greenhouse gas emissions, that they are more likely to be acceptable to local communities if public involvement is encouraged rather than ignored, and that they are likely to be more sustainable in the long term if the institutions created are adaptable, flexible, and able to manage for increased uncertainty in the future. This includes an explicit understanding that adaptation to climate changes will be inevitable, as in the Australian case, and that meeting basic needs for ecosystems and humans together is a top priority, as in the South African, Australian, and Russian cases. Many of these principles are relevant for the challenges now facing U.S. water policy makers and managers.

A 21st Century U.S. Water Policy

Conventional water management approaches in the U.S. have not been focused on comprehensive and integrated policies or soft-path solutions. Human systems and ecological systems have been managed separately or not at all. Economic tools are ineffective or absent, with few consistent water-pricing approaches and little effort to permit markets. And, management at the federal level involves segregation, disconnection, and isolated agencies and policies split into individual "silos" (Brooks et al. 2009). In response to the growing concerns around current and future water quality and supply, U.S. water policy must begin to address these obstacles and develop a more comprehensive approach to stewarding the nation's precious water resources. Below we offer several overarching conclusions of a new assessment of water management (Christian-Smith and Gleick, in press) and make specific recommendations for developing a 21st century national water policy.

Federal water-related agencies and programs are fragmented and require better coordination. More than 30 federal agencies, boards, and commissions in the United States have water-related programs and responsibilities. The complex legal and institutional framework of water management has evolved over two centuries and has never undergone comprehensive review or integration. The result is an incomplete and often

inefficient approach to water management at the federal level that has been noted by numerous commissions, advisory boards, and councils over the years. Given the persistent and emerging challenges of the 21st century, the time is ripe for an integrated and comprehensive approach to national water policy (Neuman 2001, Leshy 2009). Although many water issues will remain local, to be resolved by community efforts, the national government can no longer ignore the more effective role it can play both in the U.S. and abroad by integrating some of the common principles of the water reform efforts discussed earlier. Following are key steps to a 21st century national water policy.

Clarify Institutional Roles and Responsibilities

Currently, more than 30 federal agencies and programs have water-related responsibilities. Few of these agencies' central missions are related to water and, therefore, none is ultimately responsible for the combination of land- and water-use impacts that have led to 42 percent of the nation's total stream length being classified as in poor condition (US EPA 2006).

The Office of Science, Technology, and Policy's Committee on Environment, Natural Resources, and Sustainability should be tasked with developing a national strategy for water protection. Such a strategy would define a protocol to assess existing pressures and potential threats to interstate surface and groundwater; recommend amendments, or new legislation, to bring interstate watersheds under existing regulatory authorities; develop a framework for systematic collection and dissemination of national water data; and serve as a focus for improved communication among federal agencies.

Decentralize Water Management and Increase Stakeholder Participation

The U.S. had a series of active river basin commissions first devised by the Hoover Commission on the Reorganization of the Executive Branch and supported in recommendations of the Cooke Commission, the Presidential Advisory Committee on Water Resources Policy, the National Water Commission, and the Western Water Policy Review Advisory Committee (Neuman 2010). In 1981, the majority of these commissions were eliminated by a single executive order (Executive Order 12319, President Ronald Reagan). As noted above, modern water management approaches such as those developed by the European Union, Russia, and South Africa recognize the importance of watersheds as a key to more effective and sustainable water management.

U.S. river basin commissions should be reconstituted, particularly in basins with ongoing disputes; commissions should be tasked with developing river basin management plans that become a gateway for federal funding. For example, grants for improved water management that are now dispersed through separate agencies and programs (e.g., the Farm Service Agency, the Environmental Protection Agency, and State Revolving Loans) could instead be integrated to prioritize projects developed through comprehensive river basin management plans.

A national water council composed of diverse, nonfederal experts, including leaders

of the environmental justice movement, should be formed to develop guidelines and requirements to ensure that river basin management plans are scientifically rigorous and participatory, identify key threats to water resources, and recommend projects that address those threats. The council's responsibilities could also include reviewing all water-related budgets and making recommendations for key priorities. Broader participation and transparency is another hallmark of new international approaches to sustainable water management, as shown by the language in the Russian, South African, and European Union examples. The commission's first task should be to develop guidance documents for the river basin commissions in terms of creating scientifically rigorous, participatory river basin management plans. In addition, a national water commission could make recommendations for reducing the risks of international tensions over shared water resources, including how to resolve concerns with Mexico and Canada over shared water systems. These recommendations would be valuable in other international river basins where the United States' experience, international stature, and expertise can be effective.

Collect More Comprehensive Water Data

The nation lacks an adequate understanding of water supply, use, and flows. A consistent theme across all of the water reform efforts discussed earlier was improved water data collection and availability. In the U.S., Congress must prioritize funding for programs that provide critical information about the hydrology, quality, and use of the nation's water resources, including the U.S. Geological Survey's stream gage program, the national water census, and the Environmental Protection Agency's water-quality monitoring programs.

Apply Modern Economic Principles

Water pricing is often thought of as a local or state concern in the U.S. However, many modern water management strategies require integrating more sound economic principles into water pricing and applying pricing mechanisms where they are missing. In the U.S., the federal Bureau of Reclamation is the largest wholesaler of water in the West and therefore is directly involved in setting water rates for those customers. Instead of achieving full-cost recovery, the Bureau's water rates are heavily subsidized. In 1973, the National Water Commission recommended discontinuing the subsidization of new irrigation projects, writing: "Direct beneficiaries of Federal irrigation developments should pay in full the costs of new projects allocated to irrigation." Nearly four decades later, this recommendation has largely been ignored. The U.S. should reform pricing policies that subsidize the inefficient use of water. The Central Valley Project Improvement Act, passed by Congress in 1992, among other things required the Bureau of Reclamation to institute tiered water rates to encourage conservation. This requirement for conservation pricing should be extended to all Bureau projects and should be designed carefully so that tiered rates actually apply to current rates of water use and provide incentives for improving water-use practices.

In addition, we suggest creating new financing strategies to improve the administration of water-related laws. Rather than simply expanding federal investment, we recommend an approach that, first, requires increased local cost shares to reduce the amount

spent on federal grants; encourages more local investment through continued federal capitalization of state revolving funds; encourages better local cost recovery through appropriate water-pricing policies; and raises fees on polluters to be re-invested in agencies that regulate water pollution. Again, these economic tools are increasingly being used worldwide to discourage unsustainable water practices.

Integrate Changing Climatic Conditions

The Government Accountability Office reports that although many federal resource managers understand that climate change impacts are important to the resources that they manage, they have not yet incorporated climate change projections, mitigation, or adaptation efforts into planning (GAO 2009). Although there has been increased collaboration on improving data collection and information dissemination in regard to the impacts of climate change on water supply, a coordinated national strategy is still lacking.

The passage of the Secure Water Act (2009) calls for the establishment of a Climate Change and Water Intra-governmental Panel, which primarily focuses on downscaling climate data and conducting individual basin studies (beginning with the Colorado, Yakima, and Milk/St. Mary river basins). This is critical in terms of enhancing our scientific understanding of climate change impacts, but such mitigation and adaptation efforts should be accelerated. The Council on Environmental Quality's recently formed Interagency Climate Change Adaptation Task Force finds that "there still are significant gaps in the U.S. government's approach to climate change adaptation and building resilience" (White House Council on Environmental Quality 2010). The Interagency Climate Change Adaptation Task Force should be tasked with developing national strategy for climate change adaptation.

In addition, the federal government should require states to develop adaptation planning documents (preparing contingency plans for both floods and droughts and identifying vulnerable communities). States should develop and submit these plans every five years to the Climate Change Adaptation Task Force for review. New financing available for climate change adaptation will be predicated on the approval of plans by the Climate Change Adaptation Task Force.

Transition from a Focus on Increasing Water Supply to Reducing Water Demand

The traditional approach to meeting water needs has been to increase water supply, building massive, capital-intensive infrastructure such as large dams and reservoirs, centralized water and wastewater treatment plants, and extensive pipelines and aqueducts. This approach has brought many benefits, permitting the nation to feed an ever-growing global population, reducing the incidence of water-related diseases, mitigating the threat of both floods and droughts, and supporting continued economic growth. But it has also come at great social, economic, and environmental costs, many of which were either ignored, undervalued, or unknown at the time. For example, many dams—including Kenzua Dam in Pennsylvania, Shasta Dam in California, the Tennessee Valley Authority dams in the Southeast, and American Falls Dam in Idaho—flooded

communities and forced residents to relocate. Nearly 40 percent of North American freshwater and diadromous fish species are imperiled because of physical modifications to rivers and lakes (Jelks et al. 2008). Dams have been constructed on the most appropriate sites; the remaining sites provide fewer benefits at higher and higher costs.

As a result of these constraints, water managers are beginning to look seriously at new ways to enhance water supplies and are rethinking approaches to managing demand to ensure that sufficient water resources are available to meet anticipated needs. New emphasis should be placed on improving the overall productivity of water use rather than seeking endless sources of new supply; matching water quality to the users' needs (e.g., making better use of water waste streams, including stormwater, graywater, and recycled water); meeting basic human and ecosystem water needs as a top priority; and integrating decision making across sectors (e.g., water demand, flood management, and land-use planning, to promote projects or facilities that produce multiple services).

Conclusions

The 21st century brings with it both persistent and new water challenges, including growing human populations and demands for water, unacceptable water quality in many areas, weak or inadequate water data collection and regulation, and growing threats to the timing and reliability of water supply due to climate change. Several countries have reformed their water policies to better address these challenges. The political and cultural contexts of these reforms have varied, but these international water reforms reflect a greater focus on soft-path water solutions to address declining ecosystems and inequitable water policies, including water conservation and efficiency, smarter water pricing, polluter-pays, and more participatory water management.

The United States has not followed suit and continues to rely on a fragmented and outdated approach to water policy based on a patchwork of old laws, competing institutions, and aging infrastructure. In this chapter, we have laid out a path toward a more integrated national water policy for the U.S. Our recommendations draw on the unique characteristics of the United States' water system together with insights drawn from recent international water reforms, in an effort to help identify a more effective and sustainable approach to federal water management.

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