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Training *People* Managers: The Social and Institutional Dimensions of Water Management

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Since the dawn of the "environmental era" in the 1970s, water managers have repeatedly found themselves in the midst of prolonged and intractable disputes over what at first appear to be straightforward scientific questions, such as how to maintain an ecologically healthy aquatic system while providing water for human use. What has become clear over time is that these controversies are rooted not in technical discrepancies but in value differences. Making matters even more complicated, those value differences are embedded in legal and institutional rules, as well as in organizational and professional cultures. As educators, if we hope to train effective water professionals it is imperative that we expose our students to the social, institutional, and political dimensions of water. To go one step further, we should emphasize that what really needs to be managed is not water, but human activity and its myriad impacts on aquatic systems. This is especially true as climate change and rapid population growth render conventional approaches to water management ineffective.

As educators, putting our emphasis on managing people would force us to acknowledge the pervasiveness of value differences in water politics. Currently, many newly minted professionals enter the world of practice armed with powerful analytic tools and models only to discover, to their dismay, that in policy-making more and better information does not automatically improve decision making. Instead, proponents of policy change use science as the basis for politically compelling stories or the source of authority in litigation. In the struggles that ensue, experts often regard their own problem-solving approaches as rational and value-free, and the claims of environmental and others interest groups as irrational and value-laden. Yet both scientists and engineers make myriad assumptions and extrapolations based on judgments about which kinds of risks are worth taking and to what degree. In fact, there can be stark differences between how scientists and engineers themselves approach water management problems. Ecologists tend to think in terms of how natural systems function and to prefer solutions that conserve or restore evolutionary processes while minimizing human intervention. Engineers, by contrast, are conditioned to focus on limiting natural variation and maximizing human control over natural systems. Both are inclined to value their own ways of knowing over local ecological knowledge. With the notable exception of conservation biologists, experts in scientific and engineering disciplines are reluctant to make their values explicit.

Complicating matters, water professionals work in organizations and institutions that must cooperate but have competing values embedded in their missions, statutory mandates, and standard operating procedures. For example, nearly two centuries ago the U.S. Army Corps of Engineers took charge of the nation's inland navigation and port systems, gradually, if reluctantly, assuming responsibility for flood protection and control.

Only in the 1990s did the Corps reassess its orientation—shifting in response to political pressures, not the overwhelming evidence that efforts to control aquatic systems have imposed enormous social and environmental costs and that wetlands are often the best long-term defense against flooding. The Fish and Wildlife Service, by contrast, has a legal obligation to protect plants and animals from endangerment by human activity.

On occasion, however, the agency's single-species mandate imposes severe constraints on its ability to embrace a more environmentally beneficial whole-system approach.

Adding yet another layer of complexity, stakeholders have mobilized to defend their interests in agencies' policies, many of which are rooted in mandates that embody conflicting values. For instance, the 1976 Magnuson Act required the National Marine Fisheries Service (now known as NOAA Fisheries) simultaneously to conserve fish stocks *and* rejuvenate the domestic fishing industry. Fishery managers around the nation have found themselves in a quandary as fishermen and environmental groups have clashed over which value—the short-term economic interest of fishermen or the long-term ecological health of the fishery—should predominate. The National Park Service is supposed to preserve historic landscapes unimpaired while assuring an enjoyable experience for visitors. Motorized recreationists argue they have a right to enjoy federally protected rivers, lakes, and beaches in motorboats and on Jetskis. Environmentalists respond that such uses threaten natural areas' wildlife and scenic values, as well as their ecological health. Park managers find themselves at an impasse.

The centrality of value conflict is manifest in many recent U.S. water policy-making episodes. Conflicts over restoring the South Florida Everglades illustrate how organizational, institutional, professional, and stakeholder disagreements, rooted in divergent values, can derail progress. Although participants in the debate over the Comprehensive Everglades Restoration Plan argue about which approach is most likely to "work," their fundamental disagreement concerns the risks they care most about. The Army Corps of Engineers and the South Florida Water Management District (SFWMD) jointly devised a management-intensive approach to restoration. But the Everglades National Park and its allies would have preferred to remove barriers to flow and let nature take its course. This situation is hardly surprising: the Corps and SFWMD are committed (and legally bound) to ensure that water users' supplies are not threatened; the park is primarily concerned with the resilience of the remaining Everglades. There are additional complications as well: the Fish and Wildlife Service, which might ordinarily side with the park, must do what it can to prevent the extinction of the federally listed Cape Sable Seaside Sparrow. Therefore, it opposes solutions that, although they might benefit the Everglades as a whole, may jeopardize the survival of the sparrow. Moreover, individual stakeholders—including native American tribes, property owners, and sugar growers—agree with the general principle of restoration but resist specific solutions that threaten their short-term interests.

The CALFED Bay-Delta Program has confronted similarly intense value differences. State and federal water managers in California, whose purpose is to ensure their clients get as much of their legal allotment as possible, historically have butted heads with their counterparts in the wildlife agencies, who are trying to conserve fish. Efforts to reconcile the demands of both sides with an innovative adaptive management approach, the Environmental Water Account, eventually foundered on a political unwillingness to fund environmental water purchases or to impose losses on powerful water users. The CALFED experience is typical: although widely touted by scientists and engineers, adaptive management is rarely executed in practice because of institutional and budget constraints that are rooted in non-environmental values.

Strong political leadership can sometimes ameliorate the paralyzing impact of a fractured policy-making system, as evidenced by restorations of the Kissimmee River and Mono Basin. In both cases, political officials have established firm ecological goals and exerted regulatory authority to ensure those goals are met; as a result, managers have been able to coordinate their efforts and make steady progress toward restoring severely damaged ecosystems. But the combination of population growth and climate change—by increasing overall demand for fresh water while changing the timing and location of its availability—is likely to make water politics more contentious, not less so, reducing the likelihood that such leadership will emerge. Water professionals will need to be well prepared to operate in an increasingly difficult and divisive political context—in the U.S. and elsewhere.

Studying illustrative cases of water policy-

making is one of the most effective ways to make manifest for students the way social values and political institutions affect decision making. Multidisciplinary programs—featuring classes taught by teams of social and natural scientists as well as engineers—can broaden students' perspectives and enable them to recognize and be able to articulate their own worldviews. Teaching students how to navigate a variety of political processes—from advocacy campaigns and litigation to joint fact-finding and other forms of collaborative problem solving—can greatly enhance their ability to participate effectively in policy-making. Bringing practitioners into the classroom to talk about their experiences can also help to make political challenges concrete. Encouraging students to undertake internships, in which they are exposed to real-world decision making, can reinforce academic lessons about the difficulties of reconciling competing values.

Perhaps most important, as educators we should be explicit about the values embodied in our own teaching and practice. Doing this in my classroom entails making clear my belief that we ought to treat engineering as a way to meet human *needs*, as opposed to human *demands*, with as little disruption to functioning ecosystems as possible. Taking that value as a premise has several implications for management: it would suggest operating as though the supply of fresh water is, for all intents and purposes, limited; the flow of water, not just its quality or quantity, is critical to the biological integrity of aquatic systems; and aquatic systems are just that—biological systems that play myriad life-sustaining roles, not simply "renewable resources." It would also imply the superiority of engineering solutions that cooperate with and emulate natural processes rather than trying to counteract those processes using ever more elaborate techniques.

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