CHAPTER 19

PUTTING SCIENCE IN ITS PLACE

CONNIE P. OZAWA

Until recently, in many urban areas of the eastern United States water was only rarely disputed publicly. Decisions were left to water service providers and engineers, with the blessing of elected officials when necessary. Urban residents hardly noticed the activities of their service providers, except when a new, expensive water or sewage project showed up as a rate increase on their monthly bills. These eight cases of water conflict in Florida foreshadow change in an arena of public decisionmaking long taken for granted. What can we learn from them that will help us to address future challenges?

Water conflicts invite a simplistic urge to use the "best" science to make decisions and settle disputes. However, rising demands by an increasingly diverse group of users—not only residential consumers, industry, and agriculture but also recreationists and advocates of ecosystem protection and restoration—have intensified competition and complexity, and added new parties to the fray. What qualifies as the best science is now often contested, and must be accepted by a wider array of parties than ever: not only resource managers at local, state, and federal agencies but also elected officials, professional representatives from user groups, and ordinary citizens.

The Florida water cases illustrate the failures and successes of integrating scientific and technical information into policymaking. They prove that the way in which science is introduced into decisionmaking does matter. They suggest that the use of scientific and technical analysis can aggravate conflict or narrow differences. They also suggest that water conflicts do not always revolve around disputed science. How science and other types of information such as technological feasibility studies, economic cost estimates, or "local knowledge" are integrated into decisionmaking cannot be analyzed in isolation from other facets of the process. It is neither what information is accessed nor how information is handled in the process that makes or breaks a decision. Parties agree when their political interests are sufficiently satisfied and their faith in the legitimacy of the process is intact.

This chapter considers challenges of addressing science in public decisionmaking. I suggest that despite the widespread recognition of the political content of scientific and technical information and analyses, we only partially understand the changes in behaviors and institutions necessary to create a system of collective decisionmaking to support adaptive governance. The Florida water conflicts exhibit a variety of uses of science. Some illustrate the persistence of missed opportunities for a more productive employment of information. Others demonstrate constructive techniques. This discussion addresses political representation, scientific learning, public learning, problem responsiveness, and decision process design. I first review the nature of scientific work and existing barriers to more effective integration. Next I discuss ways to incorporate science that appear to hold some promise for sustainable decisionmaking. Techniques and procedures alone, however, are not sufficient. Returning to the proposition that even the best science will not end disputes, I close with four themes central to creating a system of adaptive governance.

Challenges of Science in Public Decisionmaking

In water conflicts, as in other science-intensive situations, we know that our knowledge is incomplete. We know this uncertainty will persist. Nonetheless, we continue to create expectations that a best science can be objectively identified and, in many cases, we simply choose to ignore the meaning of "the social construction of knowledge." Not surprisingly, our efforts to reach decisions often are derailed. Adler et al. (2001) have identified 23 obstacles to science-intensive negotiations. They call these "rockslides in the road" toward agreement. The 23 "rocks" can be clustered into three sets of challenges, according to the ease of their solution, and these case studies provide useful examples

The first set of rocks obstructs access to information, expertise, and the quantity and quality of existing of data. Parties less comfortable with scientific and technical issues may feel that other parties are manipulating technical information and analyses to justify their own policies. In defense, they may try to deflect discussions away from technical issues. Instead, they may find themselves marginalized in discussions and their political demands muted and unattended, only to resurface further on in the process. Reservoir supporters in *Ocklawaha*, for example, remained uninvolved in the agency-directed technical studies dominated by pro-restoration scientists only to emerge later in the legislature with enough clout to prevent funding; their success was unrelated to the science involved. Data gaps or other known deficiencies further impede discussions, inducing some parties to advocate deferring a decision, although delay itself can benefit certain groups at the expense of others, and can therefore be interpreted as a contentious act.

A second set of rocks emerges when some parties will not accept scientific and technical information. Students of information and decisionmaking have discussed for several decades now the extent to which science is socially constructed (Andrews 2002; Fischer 2000; Kuhn 1962; Latour 1979; Ozawa 1991; Schraeder-Frechette 1993). We acknowledge the reliance of formal analysis on untested assumptions in order to speculate about future events and large ecosystems, necessary simplifications made in the course of creating models and identifying variables for analysis, limitations in the spatial and temporal expanse of data, and other shortcomings of reductionist approaches. Moreover, as Bisbal has pointed out, information and analysis important to environmental management include a range of scientific and quasi-scientific methodologies that vary markedly in their similarity to formal science (Bisbal 2002). Some forms of "scientific information" are little more than expert judgment, valuable in their own right, but not replicable to the same degree as laboratory experiments, for example. Despite this variability, we do not insist on revealing discretionary components of knowledge in our public policy debates. We continue to design our decisionmaking processes in ways that ignore embedded subjective judgments that can have important political implications.

As a result, parties quite sensibly view studies put forth by policy advocates and purchased information skeptically, and are wary of others' strategic use of information. In A*quifer Storage*, for example, environmentalists resisted the experts' projections about the fate of water injected underground. In other cases, the scientists' labor may be directed at questions not of primary concern to the decisionmakers. *Appalachicola* provides an excellent example; decisionmakers from Georgia continued to ignore the pleas by downstream Florida biologists concerned more about habitat impact than water flow. While scientists often labor meticulously over their studies in order to arrive at their findings, the presentation of a "black box" may be sufficient reason for parties to discount their work. Although outright rejection of their work without an opportunity to explore its relevance may frustrate the experts, indifference to their findings may be a logical response to analysis performed without consultation. Challenges to acceptability are more complicated to address than lack of access to data or expertise, and they inevitably arise.

A third set of rocks springs from the incompatibility of the scientific enterprise in its purest form with the practical demands of public decisionmaking. This set includes accommodating uncertainty and instances of what Alvin Weinberg identified as “trans-scientific” questions, a class of questions important for policy, but impossible for science to answer (Weinberg 1972). Predicting underground water flows as in *Aquifer Storage*, water quantity and quality needs of ecological systems during periods of climatic stress as in *Apalachicola*, and the unending quest to reveal the inner workings of the *Everglades* are all examples of trans-scientific questions. Difficulties in decisionmaking surface because science as a field has high tolerance for ambiguity—“Competing versions of scientifically derived ’truth’ can, and often do, coexist” (Ozawa 1991)—whereas policymakers and the electorate demand more clarity and conclusiveness.

A concrete example of the dissonance between science and public decisionmaking is reaction to surprise. Scientists are not put off balance by the unexpected. Instead, they welcome it; new information may hold the key to unlocking more pieces of the scientific puzzle. “In terms of experiments…surprising results are legitimate, rather than signs of failure” (Lee 1993). In contrast, surprise in the public arena arouses suspicion or contempt. Decisionmakers dread having to admit that they had based their policy positions on analyses later found to be inaccurate. The unexpected is regarded as a threat to existing negotiated agreements. Individuals and organizations are viewed suspiciously if they modify their understanding of technical dimensions. As a result, although science is most appropriately conceived as a process in which surprise is acceptable, existing policymaking dynamics create expectations of predictability that are both unrealistic and antithetical to the nature of discovery itself.

The Florida cases show that despite our enlightened awareness about the nature of knowledge acquisition, public conflicts are littered with many of these "rocks," and our decisionmaking processes do not deal with them adequately.

Guidelines for Decision Process Design

What would a system of decisionmaking more congruent with our understanding of the social nature of knowledge require? The Florida cases suggest some changes. Any attempt to modify the dynamics of relationships and interactions among competitors for scarce resources must take seriously existing legal rights and protections and must be undertaken cautiously. Nonetheless, the list below is offered as a start toward transforming our thinking and behavior in the use of science. It gives examples of practices that have been or might be implemented in these Florida water conflicts and elsewhere.

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Disseminate information regularly. The importance of disseminating information is popularly recognized, and mechanisms for doing so are well developed. Public outreach and education is viewed as a critical element of efforts to nurture a shared understanding of public issues and garner public support. Disclosing the basis for decisions is integral to the accountability of elected officials and administrative agencies. Not only must information be available to all, but a minimal level of competency and comprehension must be assured if democratic ideals of representation and participation are to be achieved (Marshall and Ozawa

2004; Ozawa 1993). Hence, whereas disseminating information is one step, public learning to ensure a shared understanding of that information is an important second.

Explain discretionary elements in analyses. Whereas the preceding step is almost routine, and is often legally required, the second is more resource-intensive, less often mandated, and more often neglected. If parties are to believe that resource managers are making a good faith effort to explain the basis for their decisions, then workshops, educational presentations, and other mechanisms for two-way communication and disclosing discretionary methodological choices would seem to be essential. The *East Central Florida* water supply case describes the extensive efforts made by the regional water authorities to cultivate a shared understanding of the issues among the decisionmakers, the public, and service providers in anticipation of decisions on allocation and the development of new water supply alternatives.

Share technical expertise. If public decisions are to be legitimate and grounded in the best science, not only information but technical expertise must be accessible to ensure competency. This sharing should occur between government agencies and the public as well as among the agencies themselves. Making technical expertise available may be as simple as question-and-answer sessions with experts or as labor-intensive as tutorial sessions to interested parties who may be unfamiliar with a particular specialized line of inquiry. The *Fenholloway* case provides an example of an effort to ensure competency among the participants, with the Process Technology Work Group agreeing to "discuss the transparency of the report…including a more detailed discussion of what was feasible and on what time line, and a question of how much work and money," and environmental representatives gaining shared access to otherwise unavailable technical expertise.

Pursue joint fact finding. Joint fact finding has been utilized in many mediated negotiations of science-intensive disputes. "Stakeholders with differing viewpoints and interests work together to develop data and information, analyze facts and forecasts, develop common assumptions and informed opinion, and, finally, use the information they have developed to reach decisions together" (Erhmann and Stinson 1999). Discretionary methodological decisions are deliberated and determined by consensus. If agreement cannot be reached on appropriate assumptions, such as those used in forecasting models, analyses can substitute a range of acceptable values. Rather than bickering over the precise figure to assume, the discussion can entertain a range of probable projections, bounding a portion of the methodological uncertainty and narrowing cause for disagreement (Ozawa 1991). The early days of the *Apalachicola-Chattahoochee-Flint* conflict used joint fact finding to develop a common hydrological model acceptable to all states, although joint fact finding broke down later in the process when one side introduced new assumptions unacceptable to the other.

The products from joint fact finding are truly socially constructed by the parties and gain legitimacy as a matter of course. Involving non-experts not only enhances the technical competency of these participants, it adds importantly what Andrews calls "civil legitimacy" to the work (Andrews 2002). Knowing that stakeholding parties are involved in discretionary decisions along the course of the investigation puts observers at ease regarding the compatibility of political values and technical judgments embedded in the work.

Acknowledge the possibility of surprise. Dissemination, open access, joint fact finding, and the ability to adequately understand the work of scientists and other technical experts facilitates deliberations among represented interest groups and decisionmakers. Without them, false expectations can arise. Elected officials, in particular, often lament that the pace of knowledge accumulation and the role of surprise in scientific undertakings are quite at odds with their electoral demands. Concurrently, the temptation to strategically employ scientific work, with all its ambiguity, is often irresistible. As a result, elected officials sometimes find themselves locked into a policy position despite new contrary scientific findings because an important constituency has evolved around that position. Public statements by resource managers and elected officials, and indeed by all parties, about the routine discovery of new information, surprise, and new understandings may alleviate the pressure to be held captive to old ideas and discredited scientific views. In fact, a statement early in the process, a sort of ground rule that explains the levels of uncertainty and expectations for additional information to emerge during a given process, would be one way to avoid embarrassment. No strategy is foolproof, but early acknowledgement of possible surprises or deviations from assumptions would better protect the credibility of many participants.

Clarify scientific discrepancies publicly. When analyses or reports point to opposing policy prescriptions (otherwise known as advocacy or adversarial use of science), resource managers or elected decisionmakers ought to issue public statements clarifying the basis for the discrepancies. If they are left unexplained, the public and other stakeholders are often confused. Confusion can discredit decisionmakers or, more seriously, lead to a rejection of all scientific work and a retreat to other bases for decisionmaking. If public decisions are to be informed with the best knowledge available and the legitimacy of institutions maintained, the public must be reminded that scientists and other experts can legitimately disagree. Choosing the analysis more appropriate to the situation is a matter of judgment and values, one that ought to be deliberated openly.

Straightforward public recognition of both the possibility of surprise and disagreements among experts present opportunities for public learning. With such public acceptance, decisionmakers will gain flexibility to more aptly mirror the demands of an adaptive management system. Because this message goes against deeply ingrained expectations, repetitive efforts may be required before the public accepts surprises and a lack of unanimity in the science underpinning public decisions.

Limit decisions, and provide for review. The stakes in public decisions often loom larger than necessary because of the sense of permanence associated with much legislation, policy, and administrative decisions. Admittedly, substantial effort is needed for passage of a new bill or permit, or reversal of an existing one. Given the uncertainty that abounds in scientific undertakings involving large ecosystems, however, it is not simply hubris but folly to commit to a course of action that does not allow continual refinement or the possibility that a substantially different understanding of the natural system may arise. It may make sense, in certain cases, to limit the term of any decision, requiring a re-opening of the issue at specific intervals that coincide with anticipated new information. Alternative actions can be prescribed for a range of possible future scenarios. (See the discussion of "contingent agreements" in Chapter 15.) Required reassessment in the light of new information would constitute an adaptive approach. Such an approach would also allow entry points for those whose interests emerge later. Periodic reviews of decisions thus normalize new voices, new information, and new understandings. In this light, issuing 50-year or even 20-year operating permits for large facilities without explicit provisions for review at periodic intervals may signify a serious loss of opportunity to incorporate science into collective actions.

Monitor progress. Periodic review and reassessment make monitoring and data collection essential and eminently practical. Decisions can be refined as uncertainty is diminished. Scientific learning can proceed with political legitimacy. Without ongoing monitoring and data collection, the periodic review might be perceived as an attempt to renegotiate priorities rather than an opportunity to refine actions to achieve priorities already established.

Share risks. At times, requiring a renewal of a commitment to a past practice or inviting a re-opening of "settled" decisions may present undesirable costs to some parties and encounter resistance as a result. For example, in the *Fenholloway River* the Buckeye pulp mill would incur costs of $39 million or more to relocate their effluent pipe. The mill would certainly not be complacent about the possibility of a retraction of the permit approving the pipe, even if scientists accumulated sufficient data over the intervening years to demonstrate irreparable ecological harm. Industries, firms, private individuals, and municipalities are sensitive to capital investment costs and rely on a certain degree of stability and predictability in decisions.

However, we may be saving dollars at the loss of far more valuable resources. Risk sharing, an arrangement that would distribute the costs of decisions and changes in those decisions, would enable decisionmakers to demonstrate responsiveness to the groups most directly affected. The Suwannee River Initiative is an example. Farmers were given technical assistance and economic subsidies for implementing best management practices (BMPs) to improve water quality in nearby streams. However, what the resource managers identified at that time as BMPs may ultimately prove insufficient for addressing water quality issues. If that were the case, the farmers would need to change their practices again, and would presumably incur additional costs as a result. This arrangement of technical and financial assistance and the implied continuation of such assistance in the future effectively divide the cost of the initial change and the risk of further modifications between the public agency and the farmers. Although what induced the farmers to cooperate was undoubtedly the combination of realization of the unattractive alternatives to cooperation (the legal framework, its current interpretation, and the empirical data linking water pollution to farming) and the technical and economic assistance offered, the arrangement nonetheless is an example of how risk can be shared.

Further Guidelines for Adaptive Governance

Adaptive governance requires more than technique. It requires new attitudes toward interacting with one another, and institutions restructured to support such interactions. Four areas warrant consideration.

Develop trust. Develop conditions and structures that build social trust so that parties may work together despite high levels of uncertainty in the scientific knowledge that underpins decisions. Kasperson et al. (1992) have suggested that social trust is a critical element in the siting of hazardous facilities and other contentious public decisions. They identified four constituents of social trust: commitment, predictability, competency, and caring. They contend that attending to these elements will help parties make decisions in the face of uncertainty.

In the context of public decisions, commitment and caring are closely related cousins and can be manifested as a shared willingness to recognize interdependency given costly alternatives to cooperation. This is similar to the concept of what Fisher et al. call “best alternative to a negotiated agreement,” or BATNA. Participants in the East Central Florida Regional Water Initiative reportedly shorthanded their common BATNAs by simple reference to the Tampa Bay “water wars.” Their “commitment” to the Initiative was sealed by their realization that alternatives to negotiation for each of them would be costly and not likely to generate a stable water supply. The “caring” that parties felt for one another emerged not from altruism, generosity, or love, but from a level-headed calculation of their interdependency.

Procedural regularity can be used to create a sense of predictability. In the Fenholloway River Initiative, the group established a process for sharing information, work groups with diverse representation, and mandatory attendance at steering committee meetings for all Initiative members. The more explicit the procedures, the greater assurance for all parties that they would have channels for influencing decisions and actions.

Finally, competency of all parties, attained through such methods as discussed earlier, ensures that the agreements are technically sound and are not likely to require revision due to misunderstandings of the scientific and technical components. Systematic attention to these constituents of social trust is important if parties are to work productively on science-intensive issues.

Focus on knowledge that matters. Embrace the limitations of science in order to get to the issues that matter. Science can be a weapon or a tool. Getting parties to use science as a tool to build a collective future rather than to undermine each other’s wants requires a fundamental reorientation of public decisionmaking and the social relationships among the parties. Although the techniques cited above can be helpful, real success will come only with fundamental change in the way we talk, of the sort suggested by Susskind and Forester. We need to ensure procedural regularity and authenticity of process, acknowledge interdependencies, cultivate mutual recognition and respect, and more. It is not a simple endeavor. A close and critical examination of relevant scientific work can move us toward agreement on issues that matter most to us. As Andrews found, “In the exploration of uncertainty, the essence of the debate became much clearer” (2002).

Science and information are important and can help to clarify the real motivations behind public action. However, our focus on the use of science and information in this chapter should not blind us to the fact that sometimes the science matters very little to stakeholders. It is quite striking that the scientific basis for actions appeared to pass without question in three of the eight Florida cases. In the Suwannee River Partnership, for example, the farmers seemed to put up little resistance to changing their behavior in order to improve water quality. Whether the farmers were persuaded by the studies that linked water pollution to farming practices or they were simply not prepared to battle the state is unclear. In the Rodman Reservoir case, the feasibility or cost of restoring the river was not challenged; the dispute was simply whether such an outcome was preferable to the status quo. Apparently, the reservoir supporters did not want to lose the recreational value of the dam, regardless of how certain or inexpensive restoration of the river system might be. Finally, in Phase I of the East Central Florida Regional Water Supply Initiative, participants did not contest the District's analysis. Again, the lesson from these cases is not that science is unimportant, but that the issues that motivate stakeholders are in their essence not scientific but political. Stakeholders care who bears what costs, who reaps what benefits, and who gets to decide.

What more is needed? Dealing with these issues in the context of elite decisionmaking will only get us partway toward a system of adaptive governance. Who is included in the discussions must remain an open question, to be answered each time a conflict arises. Our political history informs us of the growing, not diminishing, diversity of voices in our polity. Demands for shared governance are growing louder, not softer. Any system we develop for folding science and other sorts of information into decisionmaking must be able to make space for heretofore silent voices and multiple ways of knowing.

Incorporate Different Sources of Knowledge. A growing body of evidence suggests that expanded participation diversifies the types of knowledge that are considered, improving decisions, especially with respect to effective implementation and sustainability (Doak 1998; Fischer 2000). An adaptive governance system must be open to additional voices as groups previously unheard gain political strength. Our present institutions narrowly construe what sorts of information are relevant to public decisionmaking. Water quality regulations cite specific standards to be met, focus on particular species rather than the habitat as a whole, elevate some indicators and minimize the importance of others. If authentic participation is to be achieved, we must enhance the ability of our institutions and decisionmaking processes to consider diverse perspectives and multiple ways of knowing (Marshall and Ozawa 2004).

Western education has created a hierarchy of knowledge. Certain ways of knowing are privileged over others, perhaps for good reason, perhaps not. Native American scholars have pointed out the substantial gaps in evidence for many theories widely accepted among western scientists, such as the Bering Strait theory as a possible explanation for the American Indians' occupancy of the Western Hemisphere. These scholars argue that the oral history of indigenous cultures provides a way of understanding the world that is as valid as the unproven theories that are now so commonly accepted by western scientists that they pass and are repeated without critical examination (Deloria 1997). These claims are reinforced indirectly by scholars of social studies of science who point out that the peer review system often serves as a mechanism for verifying shared views, rather than establishing truth (Jasanoff 1991). Traditional ecological knowledge refers "to the cumulative body of information and insights about the natural world gained by local resource users or indigenous peoples, which is passed down through generations in an oral tradition" (Bisbal 2002, *1955*). What method of validation is more accurate? In the face of uncertainties, such judgment is difficult to pass. At minimum, all views ought to be heard. The more voices we listen to, the greater the likelihood that we will not miss something important.

Another closely related category of “non-scientific” knowledge is “local knowledge.” Local knowledge, or “ordinary knowledge,” is information gained by resource users through their experience with that resource over time. It has been defined as “knowledge that does not owe its origin, testing, degree of verification, truth, status, or currency to distinctive…professional techniques, but rather to common sense, casual empiricism, or thoughtful speculation and analysis” (Lindblom and Cohen 1979). Fischer has argued that local knowledge has “the potential to provide new knowledge…that is inaccessible to more abstract empirical models” (Fischer 2000). Although perhaps impressionistic, the holistic nature of local knowledge is one of its strengths.

Furthermore, while anecdotal information is often discounted derisively as “unscientific,” observations aggregated can add up over time to a formidable collection that may eventually become important information for creating new hypotheses that may then be tested by conventional scientific methods. . Moreover, what we call anecdotal can in fact represent a time series of data points, albeit informally collected. Favorite family fishing holes, for example, are probably good indications of plentiful fish in particular spots over several years. Anecdotes, especially based on observations about physical phenomena however obtained, should be welcomed and catalogued to be reconciled, if possible, with other existing data sets or analyses.

In addition to embracing different sources and types of knowledge, communication technique must also be thoughtfully considered and executed. Computer presentations with colorful hydrographs and maps are one way to convey certain kinds of data. Field trips to project sites convey other kinds of information. Each approach can be effective, depending on the type of information conveyed and who the receivers are. Similarly, whereas graphs and charts can condense large amounts of data quickly, sometimes stories are far richer. Processes that aim to share knowledge—scientific, technical and otherwise—must be designed to accommodate not only other ways of knowing, but also other ways of telling.

Resolve tensions between rights and environmental responsibilities. The final concern is the need to resolve what might be called an ethical tension between “promise keeping” and ecological protection (Beatley 1994). Our existing system of governance relies on legislation, administrative rules, and plans intended to create a stable context for individual decisions about private investments. In other words, individuals can regard such policies as implicit promises about future roles, rights, and responsibilities. Our developing state of knowledge about ecosystems, however, often discredits previous methods deemed appropriate for environmental protection. Recall the situation at an early stage in the Fenholloway River case. Local residents and environmentalists were enraged that the Buckeye plant was allowed to continue to discharge waters they believed were contaminated with cancer-causing dioxins. They referenced a former FDEP scientist who reported “massive groundwater contamination.” The state scientists and administrators, however, believed the plant was entitled to continue to operate because the effluent contamination levels did not appear to exceed standards specified in the regulations. Whether or not the Buckeye plant effluents were indeed responsible for contaminating the groundwater to unacceptable levels of dioxin was not relevant to the state’s position. The state focused on legal rights and liabilities, rather than conditions of the resource, and placed its obligation to the Buckeye plant owners who had abided in good faith with existing effluent regulations above a concern about current or future resource quality. This suggests a need to create conditions in which ethical conflicts can be aired and resolved.

Conclusion

The best science (and other types of knowledge) is that science whose meaning is agreed upon by the participants in a decisionmaking process. Far from making a claim for relativism, I am advocating a frank and pragmatic response to an intellectual consensus on the social nature of science that spans decades. Current decisionmaking processes and institutions lag behind our academic recognition that knowledge and meaning are socially constructed, and cause undue harm to the environment and social relations as a result.

In this chapter, I have suggested several deficiencies in conventional approaches to dealing with science and information generally in decisionmaking. I have presented arguments supporting both familiar and novel techniques for addressing these challenges, ranging from information sharing and joint fact finding to courageous public statements by leaders about the evolving nature of scientific knowledge and its consequences for public decisions. These techniques are aimed at serious deficiencies, and represent an important starting point for altering the dynamics of public decisionmaking. As discrete procedures, however, they have limited effectiveness. As the ACF case demonstrated with its on-again-off-again joint fact finding, intermittent uses of isolated techniques do not lay a stable foundation for productive social relationships.

Broader, more philosophical changes in our attitudes toward one another as well as our treatment of scientific knowledge and information are needed. Adaptive governance calls for a system that neither elevates nor denigrates scientific work. It would allow parties to wrestle with their political differences unencumbered by arguments about scientific soundness or technical feasibility, in a way that engenders social trust among parties so as to enable them to work together despite uncertainty, with the flexibility to embrace diverse forms of knowledge generation and transmittal, acknowledging the ethical dimensions of public decisions. These Florida water conflicts indicate that we have some experience with promising techniques, but the journey toward a functioning system of adaptive governance has only begun.

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