

---

## 31st WEDC International Conference, Kampala, Uganda, 2005

### MAXIMIZING THE BENEFITS FROM WATER AND ENVIRONMENTAL SANITATION

## Monitoring utility performance and resolving conflicts

*Sanford V. Berg, USA*

---

*It can be argued that there are four sources of conflict in policy development and implementation: cognitive conflicts (based on technical disagreements regarding how scientific data might be interpreted), interest conflicts (where stakeholders obtain different benefits and costs under alternative policies), values conflicts (involving ideology or personal preferences regarding outcomes), and authority conflicts (stemming from jurisdictional disagreements). These potential sources of conflict characterize most politically-charged situations, with water supply management illustrating the interplay of these forces. Strategies for managing the four conflicts are reviewed: “balancing” competing goals, cycling between different objectives, making different agencies responsible for meeting specific goals, and relying on precedents to make decisions. Benchmarking (despite its limitations) is shown to be an important tool in conflict resolution, as it documents past performance, establishes baselines for gauging improvements, and makes comparisons across service providers.*

---

### Introduction

Public policy in the area of water supply stirs conflict, including debates over the sustainability of current consumption patterns, fights between agricultural and urban interests, arguments between those seeking growth and those concerned with environmental impacts, and disputes among government agencies over jurisdictional responsibilities. Contentment with the status quo can be based on (1) sound science that supports water resource policies, (2) acceptance of current water allocation procedures and investment schemes as being beneficial, (3) agreement on the ethical values associated with outcomes, and (4) consensus regarding the division of responsibilities among government agencies—ensuring continued good performance. When we understand the sources of conflict we are in a better position to create strategies for addressing complex political issues, like water supply policy (Berg, 2005).

We consider four sources of conflict in policy development and implementation: cognitive conflicts (based on technical disagreements regarding how scientific data might be interpreted), interest conflicts (where stakeholders obtain different benefits and costs under alternative policies), values conflicts (involving ideology or personal preferences regarding outcomes), and authority conflicts (stemming from jurisdictional disagreements). These potential sources of conflict characterize most politically-charged situations, with water supply management illustrating the interplay of these forces.

The analysis presented here utilizes Thacher and Rein’s (2004) catalogue of alternative government strategies for addressing value conflicts. They survey four approaches taken by governments: “balancing” competing goals, cycling between different objectives, making different agen-

cies responsible for meeting specific goals, and relying on precedents to make decisions. The approaches are taken in response to the other three sources of conflict as well. After summarizing these strategies, I outline sources of conflict in the area of water supply management. This study surveys the contributions of different disciplines in resolving technical issues (cognitive conflicts), indicating how these professional perspectives tend to be associated with specific strategies. My analysis attempts to improve our understanding of the link between sources of conflict and resulting government strategies for addressing policy issues.

### Strategies for managing conflicts

Public policy establishes the legal constraints facing decision-makers and determines the jurisdictional responsibilities of different levels of government. Economists argue that market imperfections (market power and information gaps) and market failures (such as pollution or misuse of common property resources, like water) can justify some form of government intervention to improve sector performance. Water policies tend to address four broad areas: water resource supply, operations of water/wastewater utilities and other water users, environmental impacts of water use, and the scientific basis for evaluating health and ecological consequences. Government intervenes when economic or social problems catch the attention of policy actors. Politicians then craft legislation and create administrative agencies to implement the laws. The courts rule on the legality of different arrangements when laws come into conflict or are challenged in terms of constitutionality. Thus, pressure for changes in public policy builds as water sector performance falls short of expectations. The relative roles of markets and government shift when citizens lack confidence in current

institutional or jurisdictional arrangements, when new social concerns (or crises) arise, or when social goals or values are re-evaluated.

Goals can be complementary or conflicting: the latter require that policy choices focus on one objective to the detriment of others. Thacher and Rein (2004) note that the instrumentalist approach (as with cost-benefit analysis) expresses outcomes in terms of a common metric: values are taken to be commensurable, so a single overarching objective function is used for comparing outcomes associated with alternative policies. Economists are generally comfortable with this framework, although incorporating risk into studies requires analysts to characterize that risk and assign a risk premium for evaluating net present values. Whether political leaders are as comfortable with this approach is another question altogether: “When a policy actor encounters a new situation in which its goals conflict, it may find that its preferences are simply unfinished. Existing models of policy rationality have great difficulty in accommodating such situations.” (Thacher and Rein, 2004, p. 458)<sup>1</sup>

They go on to describe three other strategies utilized by policy actors for coping with ambiguity: “. . . they cycle between competing values over time; they assign primary responsibility for pursuing each value to a separate institution; or they eschew general decisions about the relative merits of two goals, preferring case-by-case resolutions of particular problems that draw on analogical reasoning and situated judgment.” (p. 458) Although these strategies do not require commensurability among values, they can yield valuable information about the impacts of focused policies and citizen attitudes toward outcomes: “In this sense, commensurability at best results from the response to value [or other] conflict rather than guiding it.” (p. 458)

**Cost-Benefit Analysis:** With its emphasis on efficiency and the creation of net economic benefits, this framework is often used to eliminate strategies that warrant further attention from political actors.<sup>2</sup> Its advantages include the ability to incorporate multiple impacts into a single summary statistic. However, when there are conflicts regarding values (the ultimate weights to be given different objectives), political systems are not likely to depend on cost-benefit analysis: efficiency is not going to be acceptable as an ultimate value. In addition, using money as a common denominator violates some ethical principles.<sup>3</sup>

**Cycling Between Competing Values:** By focusing sequentially on specific values, policies are implemented

that improve performance along one dimension at a time. However, this means that in the interim other values are neglected. Once the negative consequences become unacceptable, the other value is given priority. This approach leads to action toward meeting one objective, but yields information about side effects. This approach “. . . may facilitate the invention of new strategies so that they become progressively more sophisticated in the way they handle the dilemma over time.” (Thacher and Rein, 2004, p. 463) For example, environmentalists might argue that it is time to give priority to ecological systems because a tough policy would likely result in technological and organizational innovations, allowing other goals to be met. They might argue that the system has become locked into weak performance along this valued dimension of performance. From their perspective, delaying a water policy shift toward meeting environmental objectives might lead to further irreversible damages inflicted by residential, commercial, and industrial development. On the other hand, a delay might be used to improve the science of water supply management, improving the data for decision-making and lowering the costs of meeting objectives. In his case study of water industry regulation, Maloney (2001) describes such policy cycling as being “episodic.” Note that flip-flopping on policies can weaken citizen confidence in the political system and introduce greater policy uncertainty into the equation—raising the cost of capital.

**Compartmentalization through Specialized Agencies:** The need for specialized skills and regular interactions with particular constituencies is one reason for creating agencies that pursue particular values. It simplifies policy design, since multiple objectives would require multiple policy instruments. This strategy ensures that each value will have a strong champion responsible for putting forward specific claims on society: organizational firewalls avoid having to consider multiple values. When agencies are assigned multiple tasks they are forced to make trade-offs that might be viewed as unacceptable or involving excessive internal conflict. Thus, in the water sector, environmental agencies, health agencies, resource management agencies, and utility regulators focus on different objectives: environmental protection, public health, sustainability, and efficiency (and low prices), respectively. These agencies are in a position to collaborate to ensure that policies are consistent. For example, a recent Memorandum of Understanding

<sup>1</sup>Thacher and Rein (2004) focus on the rationality of alternatives to the instrumentalist framework. The present study uses the water sector to illustrate how the sources of conflict partly determine the policy strategy most likely to meet citizen values over the long run.

<sup>2</sup>A colleague who served on the Council of Economic Advisors, when asked what he did during his term of service, replied: “I killed dumb ideas.” The use of a cost-benefit analysis can screen out poor policies.

<sup>3</sup>Greer (1993) notes, “Teleological standards are typically concerned with ends that are continuously variable, subject to balancing, and offer opportunities of comparison.” (p. 10) He distinguishes between “. . . teleological standards, which focus on the nonmoral outcomes or results of acts or rules, and imperative standards, which hold that certain acts or rules are right or wrong in themselves, regardless of the economic or other consequences.” (p. 12) Not only do citizens care about both the means and the ends, they also accept nonteleological or imperative standards, where trade-offs are not acceptable: “Thou shalt not kill” illustrates one such moral judgment on human behavior.

among water agencies in Florida illustrates this outcome. Alternatively, agencies might participate in jurisdictional conflicts as they battle one another in the court system or the legislative arena—determining primacy (Nicholson-Crotty, 2005). Maloney (2001) describes how the division of labor among water agencies in England and Wales led to the water utility regulator (OFWAT) fighting the National Rivers Authority (and its successor, Environmental Agency) to delay the implementation of the European Community Urban Wastewater Treatment Directive. The process led to some balancing of the objectives pursued in a single-minded way by each agency. Nevertheless, cost containment and lower prices were given priority, relative to meeting tighter water quality standards.

**Case-by-Case Resolution:** A fourth approach (labeled *casuistry* by Thacher and Rein) involves political actors avoiding general decisions regarding the weights to be assigned different values. Rather, the approach incorporates arguments based on how the current situation is similar to or different from previous situations that generated specific policy responses. This strategy requires that the agency consider conflicting values simultaneously. Staff reason on the basis of analogies rather than from first principles: “In this respect casuistry resembles contemporary jurisprudence, where the meaning of vague legal provisions like ‘due process’ and the proper resolution of conflicts among them are worked out case-by-case by drawing analogies with established legal precedents.” (Thacher and Rein, 2004, p. 477) This strategy would seem to be a very nuanced (and flexible) approach to problem-solving; rather than striking a balance in terms of abstract principles, facts, and actors to determine the decision regarding specific policies.

## Sources of Conflict

A quarter of a century ago, Bill Lord (1979) outlined sources of conflict in the water resources planning arena: cognitive, interest, and value conflicts. To these three, Leonard Shabman (2005) has added authority conflicts—where the political jurisdiction suitable for developing and implementing policy is not established or authority is unclear. Let us take these in order.

“*Cognitive*” conflicts are disputes over factual matters: “What is?” For example, what happens to water consumption per household under a particular conservation program? Technical disagreements reflect cognitive conflicts. Such conflicts can be reduced through comprehensive data collection and analysis. Investment in the production of new scientific knowledge improves the scientific basis for policy by providing a better understanding of physical and behavioral relationships required for modeling water systems and for developing water policy.

“*Interest*” conflicts reflect the differential impacts of policies on various stakeholder groups: “For whom is the policy?” If the situation is actually a zero-sum game, one group benefits at another’s expense. If there is no compensation for lost economic (or social) values due to the policy,

those harmed will fight the policy. For example, granting a consumption use permit to a set of agricultural interests can mean that a water utility is forced to go to higher cost sources—such as desalinization. The political economy of regulation suggests that when the beneficiaries of a particular policy are concentrated (and per capita benefits are high) and the losers are diffuse (and the per capita damages are low), rational investments in political lobbying are likely to result in policies that benefit well-organized stakeholders—even when the costs to the losers outweigh the benefits to the winners. Thus, special interests articulate their views and are able to influence laws and their implementation.

“*Values*” conflicts are more ideological in nature, reflecting the different preferences or values of groups. Here, there may not be a political consensus over the weight assigned to particular outcomes, especially outcomes involving non-monetary impacts. Thus, the choice between environmental quality and economic growth can depend on one’s income and personal values. Improved technical understanding of the implications of alternative water policies need not resolve “interest” or “values” conflicts. Both involve “What should be?” rather than “What is?” or “What are the consequences?” Thacher and Rein (2004) focused on this type of conflict, although their insights apply to the other sources as well.

“*Authority*” conflicts are based on different views regarding where decisions will or ought to be made.<sup>4</sup> When an issue arises, the jurisdiction may not yet be assigned or the issue might be addressed by multiple agencies. When there is lack of clarity, stakeholders will go jurisdiction-shopping—selecting the agency or the level of government most likely to support its interests in policy design and implementation. Appeals procedures within the judicial system can delay implementation. In such situations, benefits delayed are (effectively) benefits denied.

These conflicts characterize most on-going policy issues. Water policy is particularly sensitive to public opinion because the sector significantly affects citizens.<sup>5</sup> In addition, stakeholders (such as agricultural and industrial interests or environmental coalitions) are often politically powerful. The range of concerns means that political coalitions (based on regional alliances or ideological predispositions) form around issues and support policy initiatives that meet their concerns. Some groups focus on social justice (or fairness), particularly regarding the effect of water prices on low-income citizens. Others worry about environmental impacts associated with water usage and seek investments in research and development and conservation to reduce those impacts.

<sup>4</sup>Heikkila (2004) combines common-pool resource management theory and local public choice theory in a thoughtful empirical study of jurisdictional issues in California water programs. She shows that jurisdictional collaboration can be facilitated by functionally specialized institutions established to address shared problems. Leach, Pelkey, and Sabatier (2002) describe consensus-seeking water partnerships in California and Washington.

## Reasons NOT to engage in benchmarking

Since the purpose of this paper is to strengthen regulatory and managerial capabilities in conflict resolution via performance benchmarking, it is useful to develop the case against benchmarking. Studies that are poorly done or misinterpreted can lead to establishing inappropriate targets and poor incentives for WSS utilities. Metric benchmarking utilizes quantitative techniques: the results are only as good as the underlying data and models utilized in the analysis. We know that both data and models present problems. Available data may not capture reality, and where the numbers are “correct”, key factors affecting costs and output may be omitted from the analysis. The model’s results may be very sensitive to specification.

*“If you torture the data, they will confess.” Thus, if the group conducting the study lacks technical skills, the absence of sound statistical procedures will yield misleading results.*

The idea behind benchmarking is well developed on theoretical grounds; furthermore, it has an admirable objective. However, in practice, the results can be distorted. There are still many problems with the various methodologies, which supports postponing studies until the data can be fully audited and analysts achieve more agreement regarding which methodologies should be applied in particular circumstances.

Some of the potential shortcomings of current practice in performance benchmarking are listed below:

**Information Asymmetries:** Benchmarking requires significant amounts of data that are often quite difficult to collect. It also depends on the accuracy of the data that are collected. The information collected may be verified by the regulator (or analyst), but this usually comes at some cost. In addition, some data are unverifiable by the regulator or extremely costly to acquire. From this point of view, the regulator has to trust the firm regarding the truthfulness and accuracy of reported data. We then end up in a situation of severe information asymmetry: the fundamental problem of regulation. Recall that the principle behind of benchmarking is that regulators cannot rely solely on the information provided by the firm when designing its regulatory framework

(including targets and incentives). Since the utility benefits from having private information, regulators would like to avoid such dependence when designing targets for a rate of return based price structure or a price cap regime (including an X-factor). However, if a benchmarking methodology still requires information from the firm, one can argue that we have gained little by choosing this more sophisticated method.

**Sensitivity to model specification:** Quantitative techniques utilized by most benchmarking methodologies produce dramatically different results under similar circumstances. A quick review to the literature on benchmarking reveals that conclusions (such as performance rankings or scores) differ considerably, depending on the variables chosen, on the particular methodology applied, on the interval of time considered, as well as other factors that need to be determined for a benchmarking study. This point applies to all the methodologies used: from simple ratio analyses to sophisticated quantitative techniques (such as ordinary least squares, stochastic frontier analysis, Data Envelopment Analysis, and distance functions). This observation raises questions about how reliable a benchmarking process can be, especially when we realize that performance comparisons affect the economic foundations and financial sustainability of a company that is usually the sole provider of WSS service in a particular geographic area. This important issue brings into question the use of complicated mathematical algorithms that are sensitive manipulation.

**Unique situations:** The operating environment is seldom the same: every firm is different even when there might be utilities providing the same service-mix in similar areas. There is always a particular input, geographic feature, or specific technological consideration that differs from one firm to the other, raising doubts about the possibility of a fair comparison between the two WSS utilities. Inherited infrastructure is one of these features, since it is rare to see firms starting from zero and building entire networks and facilities as a Greenfield activity. In the case of privatized WSS utilities, the utilities inherited fixed assets already designed and installed years or decades ago. Publicly owned utilities have generally received soft loans or grants in the past, leading to networks that reflected past political priorities.

**Single Performance Indicator:** Given the multiple dimensions of WSS output and inter-temporal considerations, coming up with a single performance index may be impossible. So-called “total methods” (regression analysis) can still yield problematic performance scores. For example one utility could keep costs down by not performing maintenance, but the consequences for costs in the future could be dramatic. Another utility might be engaging in an expansive capacity development program for employees, which will have payoffs in the future, but place the company in the “high cost” category at present. To capture some service quality elements, customer surveys might be used to supplement production data: citizen evaluations matter. However, we know that “Believing is seeing,” which suggests that cus-

<sup>5</sup>The U.S. Environmental Protection Agency (EPA) estimated in 1997 that water infrastructure in the U.S. (including pipes for drinking water and wastewater collection) needed \$138 billion over 20 years. The American Water Works Association reviewed the water distribution network issues and re-estimated the need to be \$360 billion for the period. In 2000, the Water Infrastructure Network published a report estimating nearly \$1 trillion in investments would be needed over two decades. Such estimates may be inflating the dollars to justify massive federal programs. However, they suggest the water utility component of the water problem is non-trivial. Add to this number the costs of operating utility systems, promoting greater security, agricultural run-off, wetlands destruction, and related issues, and the water sector presents a set of high profile policy problems.

customer perceptions might be unduly influenced by attitudes (reflecting past performance or some highly publicized event). No ideal index has been developed.

This list of doubts about the fair applicability of benchmarking techniques could be easily extended. Such concerns are quite important and must be addressed by those conducting (and using) performance comparisons. Perhaps the best response to these concerns is the following observation:

*“If not now, when? If not here, then where?” Benchmarking is fundamental requirement of good management. If regulators cannot identify historical trends, determine today’s baseline performance, and quantify relative performance across WSS utilities, then they may as well be writing “pretty poetry”.*

### Concluding observations

Since efficiency evaluation plays such an important role in incentive regulation, regulators should be careful of the ranking techniques adopted from among parametric and non-parametric evaluation models. First of all, regulators should figure out what they really want to compare. They might want to focus only on cost minimization. In this case, they can choose from among the regression model, COLS (corrected ordinary least square), SFA production (cost) function model or single output DEA models. If regulators want to measure other outputs simultaneously, such as customer density and quality of service, they can choose to use a synthetic evaluation system (like SUNASS), DEA models or SFA input (output) distance function models. There is some evidence of consistency of the efficiency measurement within specific groups of models, such as single or multiple output groups, but studies need to check this out.

Thus, regulators should be aware of the advantages and shortages of different models and choose the most appropriate ones to do the benchmarking and evaluation. Different approaches include Performance Indicators that capture key ratios (such as labor productivity or water losses). In most cases, these partial indicators are then aggregated to determine “overall” performance. A second approach involves performance scores based on production and cost regressions utilize sophisticated quantitative techniques for determining the relative rankings of utilities. Third, some countries use engineering (or “model company”) approaches to determine relative performance. In addition, process benchmarking and customer survey benchmarking represent two other methodologies used to gauge performance.

In the case of Overall Performance Indicators (OPIs) as used by SUNASS (Peru) and SEAWUN (Southeast Asia), the components are generally assigned equal weights. This weighting is arbitrary and not convincing. Nevertheless, many regions of the world have adopted this method as a first step in a more comprehensive approach to efficiency analysis.

Regression models focus on the cost efficiency of a company, but can fail to consider other important factors such as quality of service, coverage of service, and financial

sustainability of current prices. Nor does OLS consider the effect of the random shock or statistical noise. In addition, an inherent problem of regression analysis is that it requires specification of functional form, which risks fitting in an inappropriate function. Furthermore, regression analysis is limited to only one dependent variable, which might not depict the real world in a sophisticated way.

DEA models do not have these limitations. DEA does not require the specification of a functional form to be fitted, nor does it need to impose weight to the factors. DEA allows for multiple outputs and inputs. For example, dimensions of service quality can be included in the analysis. In addition, DEA analysis can give us more information than the ranking. It can also be used to evaluate returns to scale and can set a goal for inefficient companies regarding how much they should improve to get on the efficient frontier. However, DEA models are not perfect either.

The outcome of DEA analysis is sensitive to the selection of the models and different DEA methods. And DEA has been developed in a non-statistical framework, so hypothesis testing is problematic. In addition, DEA does not account for possible noise. SFA is arguably a better method. It accounts for the effect of the random shocks and statistical noise and can accommodate multiple inputs and outputs by using the distance function. However, it also has potential problems; in particular, the standard SFA method uses a specific assumption on the residual skewness to separate inefficiency from measurement errors.

Third, regulators can select two to three appropriate techniques to construct models, conducting a three-level consistency tests to compare the outcomes of different methods and decide whether the model chosen is needed or not. If the study involves panel data, regulators should also check whether these efficiency measures are consistent over time. If the consistency tests are satisfied, the regulator can choose one of the techniques that is most intuitive. If the tests are not satisfied, extra emphasis should be put on the companies with coincident ranking and with totally opposite rankings. In these ways, regulators can provide a relatively fair and convincing ranking to inform the public.

While benchmarking is not a panacea for overcoming impediments to public and private infrastructure investment, it does provide key inputs into public policy debates and managerial evaluations, with wide-ranging implications for the following:

- Sustainability of capital inflows, public deficits, and reform initiatives;
- Poverty reduction and public perceptions regarding infrastructure reforms;
- Development and implementation of incentives for improving WSS service performance; and
- Appropriate roles for multinational organizations, donor nations, and regional cooperation in the provision of WSS services.

The strengths and limitations of benchmarking methodologies need to be understood by those engaged in reforming, regulating, and managing water and sewerage service utilities. To date, data specification, collection, and collation has been the focus of benchmarking programs. With several years of consistent data available for many utilities, the issue becomes one of how to utilize the data (including core indicators) in evaluating utility performance and rewarding those managers responsible for improvements.

Furthermore, benchmarking and other forms of performance monitoring are absolutely essential if conflicts are to be resolved in a convincing and an amicable manner. Science-based studies can resolve technical issues—limiting the role of cognitive conflicts. Getting the facts out to the general public (transparency) can also limit the destructive power of special interest conflicts: program beneficiaries can be clearly identified and resource allocations re-evaluated if the outcomes do not mesh with stated objectives. Values conflicts are unlikely to be resolved by numbers or performance comparisons. However, strong incentives (based on performance) can generate win-win options that are unavailable in inefficient systems, diffusing some ideological disputes. Finally, authority conflicts will ultimately be resolved within the broader political system. Cross-country comparisons and data on domestic performance trends can help political leaders appreciate the importance of legal clarity in the water/wastewater sector.

Benchmarking represents an important tool for documenting past performance, establishing baselines for gauging improvements, and making comparisons across service providers. In the water sector particularly, valid comparisons can contribute to improved performance. Rankings can inform policymakers, the providers of investment funds, and customers regarding the cost effectiveness of different service providers. They also can serve as the basis for incentive systems that can promote cost containment, enhance service quality, and finance network expansion. Ultimately, such improvements in sector performance are what citizens and policy-makers seek.

## References

Berg, Sanford V. (2005). "Crisis, Concern and Complacency:

- Managing Conflict in Water Supply," Public Utility Research Working Paper.
- Greer, Douglas F. (1993). *Business, Government, and Society*, New York: Macmillan Publishing Co. 3rd Edition, xviii-606.
- Heikkila, Tanya (2004). "Institutional Boundaries and Common Pool Resource Management: a Comparative Analysis of Water Management Programs in California," *Journal of Policy Analysis and Management* 23(1): 97-117.
- Leach, William D., Neil W. Pelkey, Paul A. Sabatier (2002). "Stakeholder Partnerships as Collaborative Policymaking: Evaluation Criteria Applied to Watershed Management in California and Washington," *Journal of Policy Analysis and Management* 21(4): 645-670.
- Lord, William B. (1979). "Conflict in Federal Water Resource Planning" *Water Resources Bulletin* 15(5): 1226-1235.
- Maloney, William A. (2001), "Regulation in an Episodic Policy-Making Environment: The Water Industry in England and Wales," *Public Administration* 79 (3), 625-642.
- Nicholson-Crotty, Sean (2005). "Bureaucratic Competition in the Policy Process," *The Policy Studies Journal* 33 (3), 341-361.
- Shabman, Leonard (2005). "Water Supply Conflict and Government Response: The Challenge for Florida," *Askew Institute Report* Spring: 10-11.
- Thacher, David and Martin Rein (2004). "Managing Value Conflict in Public Policy," *Governance: An International Journal of Policy, Administration, and Institutions*, Vol. 17, No. 4, October, 457-486.

---

## Contact Address

Dr. Sanford V. Berg  
Distinguished Service Professor, Economics  
Director of Water Studies  
Public Utility Research Center  
University of Florida  
Gainesville, Florida  
sberg@ufl.edu www.purc.org

---