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## Who Controls the Waters?

Incorporating  
Environmental and Social  
Values in Water Resources  
Planning

By James P. Morris

### I. Introduction

*Planning for the use and control of water is planning for most of the basic functions of the life of the Nation . . . Land, water, and people go together.<sup>1</sup>*

*[Water] is the first [natural resource] to have undergone public management on a large scale, and it is the first where man has attempted to cope in a rigorous way with integrated management of linked resources in the same area. . . . [I]t is in water that man has made his most ambitious efforts to deal with the whole complex network of transformation of landscape in the human interest.<sup>2</sup>*

*Never before have people understood better the social and ecological consequences of water policies and decisions. A commitment to make water use sensitive to the realities of natural and human communities can be rooted in this knowledge and ethically driven by the principles of conservation, fairness and ecology. The long-term vitality of communities across the American West, like the sustainability of societies throughout the world, depends on such commitments.<sup>3</sup>*

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1. *Report by the Mississippi Valley Committee of the Public Works Administration* 45 (Oct. 1, 1934) (emphasis added). The report was authored by Harlan Barrows, one of three engineers appointed to the Mississippi Valley Committee by the Natural Resources Board to study water problems in the Mississippi River drainage basin. Barrows believed that good planning required linking land and water use, and he propagated that idea many times during his distinguished career. See Martin Reuss, *Coping With Uncertainty: Social Scientists, Engineers, and Federal Water Resources Planning*, 32 NAT. RESOURCES J. 101, 117-23.

2. GILBERT F. WHITE, *STRATEGIES OF AMERICAN WATER MANAGEMENT* 4-5 (Univ. of Mich. Press 1969).

3. SARAH BATES ET AL., *SEARCHING OUT THE HEADWATERS: CHANGE AND REDISCOVERY IN WESTERN WATER POLICY 201-02* (Island Press 1993).

Conceptually, water resources planning is the simple process of balancing society's need for water with its available supplies. Such a balance can be achieved either by reducing demand to fit within existing resources, or by increasing available supplies to meet the larger demand. In reality, however, water resources planning is much more complex. Planning, which is an outgrowth of values and policies, provides a foundation and framework for subsequent decision-making. Values shape the formulation of policy objectives and planning processes.<sup>4</sup> First, policymakers identify values and articulate them as policy objectives.<sup>5</sup> Once these policy objectives have been established, planning processes are designed to analyze the problems and propose a set of actions to achieve the objectives. The set of alternatives constructed by the planning process frames the context in which final decisions are made. The more numerous and complex the values and objectives, the more complicated the planning process.

Historically, water resources policies focused on providing adequate water supplies to meet a community's need, controlling the flooding of land, maintaining navigable waterways or, more recently, the generation of hydroelectric power. The policy objective for water resources was to solve these problems at the lowest cost to promote economic growth or development in a particular area. Today, water policies are far more complicated. With an increased understanding of how water fundamentally impacts the sustenance and evolution of human and biologic environments, the importance of controlling and allocating water

resources has increased, as has the number and diversity of interests seeking a voice in the policy-making process. Current water resources issues encompass not only traditional balancing of supply and demand, flood control, navigation and hydroelectric power, but also protection of the environment, maintenance of water quality and distributive impacts of resource allocation. Water resources planning is now faced with the problem of harmonizing and blending multiple economic, environmental and social objectives into solutions that address the underlying water resource problems.

During the past several decades, water resources critics and commentators have focused on the policy environment, with an investigative eye toward how water policies are framed, debated and formulated. The concerns they have expressed include the participants involved in the policy debate, the values articulated in policy formulation, the extent to which alternative and dissenting views are considered, and the issues or policy impacts that are ignored. This focus has played a critical role in instituting procedural changes in the formulation of water policies, and caused gradual shifts in the substantive content of water policies. The result has been the articulation and translation of environmental and social values<sup>6</sup> into tangible water policy objectives.

Often ignored, however, is an examination of whether water resources *planning* has evolved to accommodate changes in policy objectives. Little attention has been given to whether the dynamic sociological values<sup>7</sup> altering water resources policies are carried into the

4. See generally Paul Davidoff & Thomas Reiner, *A Choice Theory of Planning*, 28 J. AM. INST. PLANNERS 103 (1962) (arguing that appropriate planning alternatives cannot be prescribed from a position of value neutrality because plans are based on achieving objectives derived from values). See *infra* notes 170-73 for further discussion of how values shape planning processes.

5. See William B. Lord, *An Evolutionary Perspective on Social Values*, in SOCIAL AND ENVIRONMENTAL OBJECTIVES IN WATER RESOURCES PLANNING AND MANAGEMENT 5 (Warren Viessman, Jr. & Kyle E. Schilling eds., Am. Soc'y of Civil Engineers 1986). "Objectives, of course, are derived from our values. They are disaggregated, formalized, and operationalized derivatives of the more ambiguous and general concepts which help to define a culture." *Id.*

6. The phrase "environmental and social values" is used interchangeably throughout the article with the phrase "sociolog-

ical values." The critical understanding for this article is that sociological values, as described in the *Appendix*, are distinguishable from economic values such as efficiency and effectiveness. Sociological values represent a communal desire for achieving a social benefit or avoiding a social cost. They are normative values, arrived at through a process of debate and deliberation. In contrast, economic values can be expressed as "communal" but are really the aggregate result of individual preferences established through numerous private market transactions. Economic values are established in the marketplace through the assignment of monetary weights. See *infra* notes 151-78 and accompanying text for further discussion of the important distinction between sociological and economic values, and its implications for water resources planning.

7. See *supra* note 6 and *Appendix* for an explanation of the term sociological values and how it is used in this article.

planning processes. Planning is the process that translates values and policy objectives into a set of proposed actions for subsequent decision making. The purpose of this article is to examine whether current water resources planning processes construct a framework for final decisions that adequately reflects water policy objectives. Over the past several decades, dramatic changes in the issues and values that make up water policies calls into question whether new water resource objectives are achievable through the prevailing planning processes.

This article argues that the newly articulated environmental and social policy objectives of the past three decades are not sufficiently addressed in our current water resources planning processes. The planning framework and analytic methods used lack the capacity to articulate and incorporate sociological values in the planning process, severely limiting the achievement of environmental and social objectives. As a result, water resources planning must be fundamentally restructured. If restructuring is not undertaken, the gap between patterns of water resource use and changing environmental and social values will continue to grow.

Sociological values provide a critical normative criterion for water resources planning. A community's environmental and social values represent its desire to achieve a social benefit, or avoid a social cost. They represent a community's aspirations and identity, and are established through a process of public debate and deliberation. Sociological values can be contrasted to objective economic values, which are aggregated monetary weights of individual preferences expressed through marketplace transactions. Sociological values, on the other hand, are context-specific and represent the collective moral considerations as to how a community thinks it should act, independent of how each individual would act in a private transaction. In this respect, environmental and social values create a set of guiding ethical

principles for water resources planning that must be recognized and incorporated in a normatively defensible planning process.<sup>8</sup>

The focus of this article is water resources planning in California; water resources planning at the national level is given attention where appropriate or helpful to the analysis. The article begins with a review of historic and current water resources planning. Sections II and III provide important background on how planning processes have developed over time to accommodate the changing water policy environment. As new concerns, values and issues in society have manifested themselves in water resources policies, the planning process has subsequently changed. Because information on historic water resources planning specific to California is scant, it is helpful first to examine the evolution of water resources planning at the national level. An analysis of the national planning process provides an outline of the various stages in the development of water resources planning, and a general understanding of what has induced the changes. The national perspective is then used as a framework to explore the California experience. As might be anticipated, water planning processes have evolved similarly in California and across the nation. Nonetheless, it is important to understand both histories before analyzing the water resources planning practices of today.

Section IV of the article provides a critique of current water resources planning. The central question explored is whether current planning processes have the ability to adequately consider and give effect to environmental and social objectives articulated in the policy arena. The examination concludes that the existing multi-objective planning framework, with its heavy reliance upon quantitative analytic tools and process of constrained optimization, prohibits water resources planning from effectively incorporating environmental and social values.

Section V proposes that merging water resources and land use planning would remove some of the barriers to achieving environmen-

8. See *infra* Section IV which pursues in further detail the importance of recognizing, articulating and finding appropriate procedures for the incorporation of sociological values in water resources planning.

tal and social objectives. Concurrent planning of these interrelated natural resources would also provide an opportunity to create a set of ethical principles to guide the process by which society uses and preserves two of its most important resources. The discussion puts forth several arguments why water resources and land uses should be planned together, and provides suggestions for beginning a subsequent study of how the two planning processes can be merged.

## II. Historical Development of Water Resources Planning

### A. Pre-1960s—Optimizing Economic Efficiency

Planning for water resources had a limited role in American history prior to the twentieth century. During most of the 1800s, development of water resources was undertaken by individuals or localized public agencies to supply water for consumptive use, keep flood water off the land or utilize navigable watercourses for transportation. Except to address water quality problems in the urbanized East,<sup>9</sup> local supplies largely fulfilled water demands. In the arid West, where water was not abundant, early settlement patterns closely paralleled adjoining watercourses that were diverted for domestic and irrigation purposes.<sup>10</sup>

Single-purpose planning was the norm. Under this planning paradigm, water resource issues were disaggregated, requiring each problem to be analyzed separately. Proposed

projects were intended to serve only one purpose such as flood control, navigation or water supply (including water quality). Planning merely involved a comparison of reasonable project alternatives to determine the best design for satisfying the purpose.<sup>11</sup> Simple efficacy testing was employed to ensure the project achieved the desired goal with minimum inputs of materials. The common criteria for water resource projects were safety, workability, durability and economy.<sup>12</sup>

With the ushering in of the Industrial Age and Progressivism in the early 1900s, water resources were developed and controlled on an unprecedented basis, allowing for the provision of water to vast new areas.<sup>13</sup> Three engineering accomplishments provided a powerful stimulus for damming the rivers of America: pumping technologies for the transportation of water across great distances, improvements in the production and use of concrete for dam construction, and the development of hydroelectric power.<sup>14</sup> Furthermore, west of the hundredth meridian, where the spatial imbalance between water supply and water demand is often extreme, an ongoing population explosion dictated rapid deployment of new water resource technologies. With a growing perception of water as a “developable natural resource,” the need for more comprehensive planning became apparent. Technology made possible the use of water for multiple purposes, and diversifying demands necessitated a planning process.

Beginning with the administration of

9. See ROBERT GOTTLIEB, *A LIFE OF ITS OWN: THE POLITICS AND POWER OF WATER* 158-61 (Harcourt Brace Jovanovich 1988); see generally NELSON BLAKE, *WATER FOR THE CITIES: A HISTORY OF URBAN SUPPLY PROBLEMS IN THE UNITED STATES* (Syracuse Univ. Press 1956).

10. See Vincent A. Ostrom, *The Role of Public and Private Agencies in Planning the Use of Water Resources*, in *LAND AND WATER: PLANNING FOR ECONOMIC GROWTH* 29, 34-35 (Harold L. Amoss & Roma K. McNickle eds., Univ. of Colo. Press 1961); see also PETER ROGERS, *AMERICA'S WATER: FEDERAL ROLE AND RESPONSIBILITIES* 47-49 (Twentieth Century Fund 1993).

11. See WHITE, *supra* note 2, at 15-33. Single purpose planning is designed to serve a single aim by a single means, relying on construction as that means. This was the practice in water resources development prior to the twentieth century efforts to develop water resources for multiple uses such as hydroelectric power, irrigation, municipal water supply and waste disposal. See *id.* at 11; see also JIM MULDER ET AL., *INTEGRATING WATER RESOURCES AND LAND USE PLANNING* 6 (Utah State Univ. 1979).

12. See WHITE, *supra* note 2, at 11, 30-33.

13. See SAMUEL P. HAYS, *CONSERVATION AND THE GOSPEL OF EFFICIENCY: THE PROGRESSIVE CONSERVATION MOVEMENT, 1890-1920* (Harvard Univ. Press 1959). Hays argues that the progressive conservation movement was rooted in the deep faith that science and technology could improve human lives through continual planned and efficient progress. The movement gave rise to the notion of resource management, including the concepts of “river-basin planning” and “multiple-use.” *Id.*

14. See Kenneth D. Frederick, *Changing Water Resources Institutions*, in *SUSTAINING OUR WATER RESOURCES* 67-71 (Water Science & Tech. Bd. ed., Nat'l Academy Press 1993). “The combination of these technological, economic, and political forces contributed to the rapid growth of water use and dam construction that characterized the first seven decades of this century. Total off-stream water use rose from about 40 billion gallons per day (bgd) in 1900 to 370 bgd in 1970. The number of completed dams rose from less than 3,000 at the start of the century to more than 50,000 by 1970.” *Id.* at 71.

President Theodore Roosevelt, federal agencies charged with the development and control of water resources began to alter their planning methods. "River basin planning" and "comprehensive water resources planning" became widely utilized.<sup>15</sup> These multi-purpose planning processes were implemented to optimize the use of water resources for needs such as water supply, water quality, navigation, flood control, hydropower, land utilization and transportation.<sup>16</sup> The goal of multi-purpose planning was to design and manage water projects to satisfy numerous purposes, a revolution from the historic single-purpose planning. For example, a major dam would be planned to simultaneously control flooding, generate hydroelectric power, store water supplies, develop farmland, regulate streamflow for navigation and create recreational opportunities.<sup>17</sup>

Planning for a "purpose," however, differs from planning for an "objective." Purposes are defined as tangible problems such as water supply, irrigation or flood control, while objectives are defined as policy goals such as economic efficiency, environmental quality, equity and fairness. Purposes define the ends to be achieved or problems to be solved. Objectives delineate and shape the means to achieve the ends.<sup>18</sup> For the first two-thirds of the twentieth century, water resources planning sought to ensure that projects served multiple purposes, but the objective of the planning process was

singular—economic efficiency.<sup>19</sup> Once the purposes or problems were identified, the planning process would analyze whether a proposed project could achieve the purpose or solve the problems in an economically efficient manner. Benefit-cost analysis was the backbone of water resources planning because it optimized the objective of economic efficiency.<sup>20</sup> If a proposed water project that achieved the stated purposes could be designed and managed to produce more benefits than costs, the project was approved. Planning water resources projects to accomplish multiple purposes merely facilitated the economic efficiency objective, because benefits were more likely to outweigh costs. One author summarized the water resources planning process as follows:

By the late 1950s, water resources planning was a design-oriented process carried out basically by one agency responsible for the specific problem to be solved. A need, flood control, water supply, hydroelectric power, or navigation, was recognized, and an engineering design was prepared to satisfy this need. The design strived towards maximizing monetary net benefits through multiple purpose use of structures. Evaluation was generally based on monetary benefit-cost analyses.<sup>21</sup>

15. See Theodore M. Schad, *Water Resources Planning—Historical Development*, 105 J. WATER RESOURCES PLAN. & MGMT. DIV. 9, 12-15 (March 1979).

16. See NATIONAL RESOURCES COMMITTEE, *REGIONAL FACTORS IN NATIONAL PLANNING AND DEVELOPMENT*, 111 (1935); see also ROGERS, *supra* note 10, at 50-54.

17. See WHITE, *supra* note 2, at 10-11. "[There is] a traditional distinction between the single-purpose dam for flood control, irrigation, or power, and the multiple-purpose dam, serving two or more purposes, which played an influential role in the development of river basin programs in the 1930's and 1940's." *Id.* at 11.

18. For example, assume the purpose or end is to create an adequate water supply to meet demand. Assume also the objective is to balance supply and demand in the most economically efficient manner. A balanced supply and demand could be achieved either by building a dam, conserving current supplies, importing water from another region, or controlling demand for water. The action, or combination of actions, which attain the purpose (balanced supply and demand) would be evaluated on the objective to be achieved (economic efficiency). Adding additional purposes might make it easier to achieve the objective. For example, it may be more economically efficient to build a dam if

the purpose is not only to create a water supply, but to also control flooding and generate power. But if there are other objectives that must be achieved (e.g., environmental preservation, equity, ecology), the mix of actions to fulfill the purposes may change dramatically; balancing supply and demand through conservation, controlling flooding by land use decisions, or generating power from an alternate source.

19. See Frederick, *supra* note 14, at 124-29; see also Reuss, *supra* note 1, at 110-13; MULDER ET AL., *supra* note 11, at 8.

20. See Allen V. Kneese, *Economics and Water Resources, in WATER RESOURCES ADMINISTRATION IN THE UNITED STATES: POLICY, PRACTICE, AND EMERGING ISSUES* 23, 25-28 (Martin Reuss ed., Mich. State Univ. Press 1993); MULDER ET AL., *supra* note 11, at 14. In 1936, with the passage of the Federal Flood Control Act, benefit-cost analysis was officially adopted as a tool for assessing and comparing the economic feasibility of alternative proposed projects. The practice was soon incorporated into all water resources planning practices. See *infra* notes 137 and 142 for a definition and description of how benefit-cost analysis is conducted.

21. Harry E. Schwarz, *Water Resources Planning — Its Recent Evolution*, 105 J. WATER RESOURCES PLAN. & MGMT. DIV. 27, 28 (1979).

The result of this multi-purpose, single-objective approach to water resources planning was policy debates limited to the discussion of which projects should be built, and whether small design changes would add benefits or avoid costs. Discussion about whether a water project was desirable or should be built based on other criteria was not included in the planning process or policy debate.<sup>22</sup> Optimizing the objective of economic efficiency meant that water resources projects were always deemed desirable and justifiable when project benefits exceeded costs.

### B. 1960 to 1980—Emerging Environmental and Social Concerns

The 1960s and 1970s presented new challenges to water resources policies, requiring planning methodologies to evolve from serving a single objective to grappling with the complex task of satisfying multiple objectives.<sup>23</sup> The fundamental shift resulted from fiscal, environmental and social forces set in motion during this period which have continued to influence and change water resources policies and planning. While current water resources planning is more technically complex, the fundamental challenge of multi-objective planning, to opti-

mize competing and often conflicting objectives, remains a central struggle.

The fiscal problems associated with single-objective planning received heightened scrutiny in the early 1960s.<sup>24</sup> The cost of proposed water projects skyrocketed and public support faltered for three reasons. First, projects became increasingly expensive and complex as benefit-cost analysis determined the simplest and most beneficial projects were built first leaving only marginally justifiable projects.<sup>25</sup> Second, various groups mounted legal and political challenges to proposed projects, greatly extending the time period for completion.<sup>26</sup> Third, the public's willingness to finance expensive water projects waned in the post-New Deal era as public debt rapidly increased and a growing number of social programs accelerated the drain on public funds.<sup>27</sup> The cost of supplying water also increased sharply due to rising energy costs for water delivery, new water quality standards requiring expensive treatment and increased maintenance costs of an aging water resources infrastructure.<sup>28</sup>

The emerging environmental movement in the late 1960s and early 1970s also helped raise the public's awareness of the environmental consequences of water resources

22. See Leonard Shabman, *Nonmarket Valuation and Public Policy: Historical Lessons and New Directions*, in *MULTIOBJECTIVE ANALYSIS IN WATER RESOURCES* 16, 21-22 (Yacov Y. Haimes & David J. Allee eds., Am. Soc'y of Civil Engineers 1982).

23. See Frederick, *supra* note 14, at 130-31. "Multi-objective planning is based upon the concept of constrained optimization. One merely optimizes one objective, for example national economic growth, while setting other objectives, such as environmental quality, as constraints upon the system, or alternatively weighs different objectives into one objective function to optimize." Peter Rogers, *Integrated Urban Water Resources Management*, *NATURAL RESOURCES F.* 37 (1993). See generally ARTHUR MAASS ET AL., *DESIGN OF WATER RESOURCE SYSTEMS: NEW TECHNIQUES FOR RELATING ECONOMIC OBJECTIVES, ENGINEERING ANALYSIS, & GOVERNMENT PLANNING* (Harvard Univ. Press 1966). Section IV, *infra*, provides further discussion of multi-objective planning and how it is practiced.

24. See THE PRESIDENT'S WATER RESOURCES COUNCIL, *POLICIES, STANDARDS, AND PROCEDURES IN THE FORMULATION, EVALUATION, AND REVIEW OF THE PLANS FOR USE AND DEVELOPMENT OF WATER RELATED RESOURCES*, S. DOC. NO. 87-97 (1962) (highlighting the need to move from single-objective water projects subject to benefit-cost analysis, towards a multi-objective evaluation processes which could include analyses reflective of three basic objectives: national economic development, resources conservation, and the well-being of people).

25. "Fifteen years and 20 billion dollars later [after the President's Water Resources Policy Commission report issued in

1950] a number of the major basins in the United States have reached the point where the most promising dam sites have been built . . . [i]ndeed there is reason to think that the storage surfaces provided with the completion of additional dams will generate a total amount of evaporation in a year exceeding the incremental gain in storage resulting from recent construction." WHITE, *supra* note 2, at 4-5.

26. See, e.g., *Tennessee Valley Authority v. Hiram Hill*, 437 U.S. 153 (1978) (upholding the right of citizen groups to prohibit the construction of the Tellico Dam where its construction would be harmful to the endangered Snail Darter fish in violation of the Endangered Species Act); *Udall v. Federal Power Comm.*, 387 U.S. 428 (1967) (blocking federal approval of a hydroelectric project because of its failure to adequately consider the public's interest in preserving wildlife under the Fish & Wildlife Coordination Act and the Anadromous Fish Act.); *Natural Resources Defense Council v. Grant*, 341 F. Supp. 356 (1972) (prohibiting implementation of the Chicod Creek Watershed Management Plan until the Soil Conservation Service had prepared an environmental impact statement in compliance with the National Environmental Policy Act).

27. See Robert Kelley, *The Context and the Process: How They Have Changed Over Time*, in *WATER RESOURCES ADMINISTRATION IN THE UNITED STATES: POLICY, PRACTICE, AND EMERGING ISSUES*, 10, 18 (Martin Reuss ed., Mich. State Univ. Press 1993); see also Frederick, *supra* note 14, at 72.

28. See DAVID W. PRASIFKA, *WATER SUPPLY PLANNING*, xi (Krieger Publishing Co. 1994).

projects.<sup>29</sup> The public concerns that drove the movement focused primarily on preventing environmental destruction and pollution.<sup>30</sup> The movement resulted in the establishment of numerous statutes, agencies and regulations that substantially affect water resources planning and policies. The National Environmental Policy Act ("NEPA")<sup>31</sup> represents the cornerstone of public action. NEPA requires federal agencies to assess the environmental impacts of their actions and gives the public a legal tool for contesting water resource projects by forcing consideration of less environmentally harmful design and program alternatives. Predating the enactment of NEPA by several years, the Wild and Scenic Rivers Act,<sup>32</sup> prevents projects that excessively damage natural amenities on 112 rivers designated under the Act and provides interim protection for 105 rivers being studied for potential listing.<sup>33</sup> Several other significant federal actions during the early 1970s embodied the changing environmental values in American culture. The Clean Water Act of 1972<sup>34</sup> and the Safe Drinking Water Act of 1974<sup>35</sup> brought

to the forefront concerns about pollution of water resources and the quality of water used for human consumption. The Endangered Species Act of 1973<sup>36</sup> highlighted the plight of designated species whose survival or critical habitat is threatened by human activity.

Finally, water resources planning was affected by an emerging movement concerned with the inclusion and consideration of social values, such as public participation in the planning process and the distributive impacts of water resource allocation. During the 1960s there was growing dissatisfaction with the government's administrative procedure process, assailed as having been captured by special interests.<sup>37</sup> The political dynamic formed between legislative committees, administrative agencies and special interest groups was referred to as the "iron triangle."<sup>38</sup> In water resources administration, the concern was that iron triangles created a planning process heavily biased in favor of water "development," to the exclusion of public concerns and values.<sup>39</sup>

29. See Leonard Ortolano, *Water Planning and the Environment*, 105 J. WATER RESOURCES PLAN. & MGMT. DIV. 65 (1979).

The 1960s also represented a period in which scholars from universities and elsewhere began a serious attack on the economic efficiency concept as the basis for ranking water resources plans. Like some of the citizen critics, academics argued that economic efficiency provided an inappropriately narrow basis for ranking alternatives, since many significant environmental and social effects of Federal water resources investments cannot be measured in terms of incremental change in national income. . . . Partly as a consequence of the aforementioned criticisms, the early 1970s witnessed the emergence of some fundamental changes in laws, policies, and regulations governing Federal water resources planning.

*Id.* at 72.

30. See *Appendix* (describing utilitarian value in conservation).

31. National Environmental Policy Act, Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified as amended at 42 U.S.C. §§ 4321-4370d). The statute required for the first time that federal agencies "stop and think" before taking actions which could significantly affect the environment. NEPA imposed procedural requirements on federal agencies by mandating formal documentation of the decision making process, consideration of negative impacts and benefits, and project alternatives. The NEPA regulatory model has been replicated by many states for governing state agency actions. See California Environmental Quality Act ("CEQA"), CAL. PUB. RES. CODE §§ 21000-21177 (West 1991). See *infra* notes 116-22, 204-07 for additional details about CEQA and NEPA.

32. Wild and Scenic Rivers Act, Pub. L. No. 90-542, 82 Stat. 906 (1968) (codified as amended at 16 U.S.C. §§ 1271-1287).

33. See DAVID H. GETCHES, *WATER LAW IN A NUTSHELL* 153 (West 1990).

34. Federal Water Pollution Control Act Amendments, Pub. L. No. 92-500, 86 Stat. 816 (1972) (codified as amended in scattered sections at 33 U.S.C.A. §§ 1251-1387).

35. Safe Drinking Water Act, Pub. L. No. 93-523, 88 Stat. 1661 (1974) (codified as amended at 42 U.S.C.A. §§ 300f to 300j-26).

36. Endangered Species Act, Pub. L. No. 93-205, 87 Stat. 884 (1973) (codified as amended at 16 U.S.C. §§ 1531-1544). The Endangered Species Act has been interpreted to require that once a species is designated as "endangered," federal agencies, and to a lesser degree private citizens, are prohibited from taking actions which would "take, harm, or harass" the species. The Act has not only been used to block water projects, but also to force changes in the management of existing water resources projects. See, e.g., *Tennessee Valley Authority v. Hiram Hill*, 437 U.S. 153 (1978).

37. See generally THEODORE LOWI, *THE END OF LIBERALISM: IDEOLOGY, POLICY AND THE CRISIS OF PUBLIC AUTHORITY* (Norton 1969).

38. See generally JOHN LIEPER FREEMAN, *THE POLITICAL PROCESS: EXECUTIVE BUREAU-LEGISLATIVE COMMITTEE RELATIONS* (Random House 1965). The concept of iron triangles is still widely utilized as a political theory for explaining how particular interests are served through the legislative and administrative process. See DANIEL MCCOOL, *COMMAND OF THE WATERS: IRON TRIANGLES, FEDERAL WATER DEVELOPMENT, AND INDIAN WATER* 6-13 (Univ. of Cal. Press 1987).

39. See DAVID LEWIS FELDMAN, *WATER RESOURCES MANAGEMENT: IN SEARCH OF AN ENVIRONMENTAL ETHIC* 6-7 (The Johns Hopkins Univ. Press 1991); see also Harvey R. Doerksen & John C. Pierce, *Citizen Influence in Water Policy Decisions: Context, Constraints, and Alternatives*, 11 WATER RESOURCES BULL. 5 (1975).



The judicial system responded to these criticisms through a number of important developments.<sup>40</sup> First, the right of participation in agency decision-making, and the ability to seek judicial review of those decisions, was extended to “public interest” representatives.<sup>41</sup> Secondly, courts expanded the coverage and content of procedural formalities to require full agency documentation of planning processes, and provided interested parties the legal means to ascertain and rebut the factual and analytical bases for agency decisions.<sup>42</sup> This revolution in administrative law resulted in public participation, oversight and challenge to water resources planning processes.<sup>43</sup> The diverse interests clamoring for a stake in water resources were slowly empowered to inject new concerns and objectives into the planning process.<sup>44</sup>

By the mid-1970s water resources planners had a vast number of new issues, laws, regulations, procedural requirements and public interests to consider and incorporate into their planning practices. For the first time, limits were placed on water resources development. This was most prominent in the arid West, where the reality of water scarcity finally emerged as a central planning concern.<sup>45</sup> Fiscal constraints, environmental impacts and social concerns all led to limitations upon the continual augmentation of water supplies. The

limits of Industrial Age and Progressive era policies were being realized. Solutions to water resources problems could no longer be sought by merely constructing another dam, building a more extensive supply system or using new technology to extract additional water. Fiscal, environmental and social limits demanded attention.<sup>46</sup> One author and engineer writing in 1969, issued this warning:

The prevalence of this view that major channel and streamflow regulation constitutes the primary means and foundation of water management makes it all the more important to reassess the methods that have governed in the past and to examine the possibilities offered by new ones . . . the prevailing methods are ill-suited to the changing conditions of both the [water] supply and its use.<sup>47</sup>

The “changing conditions” of this era forced a paradigm shift in water resources planning. Rejected were the two old planning methodologies: the traditional engineering approach in which water resources problems were solved through the design of physical projects, and the modified engineering approach where multiple design alternatives were subject to benefit-cost analysis to select

40. See generally Richard Stewart, *The Reformation of American Administrative Law*, 88 HARV. L. REV. 1669 (1975).

41. See *Sierra Club v. Morton*, 405 U.S. 727 (1972). In *Sierra Club*, the Court greatly expanded the definition of constitutionally cognizable injuries that could be the basis of citizen lawsuits to include injured interests that “reflect aesthetic, conservational, and recreational, as well as economic values.” *Id.* at 734, 738.

42. See, e.g., *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402 (1971) (invalidating the Department of Transportation’s decision to place a highway through a public park because it was arbitrary and capricious, and an abuse of agency discretion); *Scenic Hudson Preservation Conf. v. FPC*, 354 F.2d 608 (2d Cir. 1965), cert. denied, 384 U.S. 941 (1966) (holding that the Federal Power Commission failed to adequately consider several important factors in its decision to grant a license for the development of a hydroelectric project on the west side of the Hudson River; the case was remanded to the agency for further proceedings which took five years, but resulted in a substantially modified project).

43. See generally JOHN C. PIERCE & HARVEY DOERKSEN, *WATER POLITICS AND PUBLIC INVOLVEMENT* (Ann Arbor Science 1976).

44. See GOTTlieb, *supra* note 9, at 199-240 (documenting the

emergence of environmentalists, Native Americans and local grass-roots community groups as interests demanding a role in the water planning process).

45. The literature on water resources planning during the late 1960s and 1970s reflects a growing recognition of the limits on the continual expansion of water supplies due to fiscal, environmental and social constraints. See generally WHITE, *supra* note 2; see also RICHARD C. MURRAY & E. BODETTE REEVES, *ESTIMATED USE OF WATER IN THE UNITED STATES IN 1970* (U.S. Geological Survey 1970). “There is chronic and anxious talk of national water shortage. . . . The most menacing aspect of the prophecy . . . is that it may become self-fulfilling.” WHITE, *supra* note 2, at 1-2.

46. See Shabman, *supra* note 22, at 22. “With the late 1960s the social consensus on water development began to collapse. . . . As the nation moved into the 1970’s, the concept of a capital stock in water resources was expanded beyond physical works to include the remaining free-flowing rivers and environmental amenities associated with them. Accompanying this change was the view that water resource decisions must focus on using what we have rather than on seeking to expand the supply of physical works. Such a view challenged the basic, unquestioned, construction premise of the traditional water programs.” *Id.*

47. WHITE, *supra* note 2, at 5.

the most economically efficient type and scale of works. The new direction in water resources planning was synthesized by the 1973 Report of the National Water Commission.<sup>48</sup> The focus of the study was water resources planning that emphasized economic, environmental, social and legal analysis, rather than technological solutions. The Commission's executive director, Theodore M. Schad, noted that the report reflected a belief that "a change in emphasis from water development to preservation is underway and will continue in the future."<sup>49</sup>

New fiscal, environmental and social concerns forced water resources planning to transform from single objective to multi-objective planning.<sup>50</sup> The planning process was expanded to include, as potential strategies, both the management of existing water resources and the creation of new supplies. These strategies balanced supply and demand while achieving economic, environmental and social objectives.<sup>51</sup> Institutional changes were also made in the control of water resources to facilitate the transformation.

Planning to implement the economic efficiency objective was redefined to include both supply augmentation and demand management strategies. Constraints on the development of new facilities from strained budgets, rising construction costs and increased water delivery costs dictated that benefit-cost analysis should consider how improved management of existing resources affected economic

efficiency.<sup>52</sup> Planners were required to examine how much more efficient operation of existing facilities and careful stewardship of existing supplies could satisfy new and changing water demands.<sup>53</sup>

While the economic efficiency objective was being redefined, new environmental and social concerns were forcing their way into water resources planning. The plethora of environmental laws enacted during this period required water resources agencies to reshape their planning processes and include a legal review of proposed plans to ensure statutory compliance.<sup>54</sup> These new environmental laws presented planners with new concerns that had to be addressed in any proposed water resource project or action. These concerns included: protection of endangered species, protection of particular waterways, impacts on fish and wildlife, water pollution, water quality and other potentially negative adverse environmental effects of a proposed development. Environmental considerations reinforced the advantage of water resources management alternatives, as compliance with environmental statutes was often more efficiently and effectively achieved through better management of existing supplies.<sup>55</sup>

Changes in administrative law helped to ensure that new environmental and social concerns were considered in the planning process. Citizen groups now had legal avenues through which to assert their claims and arguments for

48. NATIONAL WATER COMMISSION, *WATER POLICIES FOR THE FUTURE* (Final Report to the President and the Congress of the United States, GPO 1973).

49. Theodore M. Schad, *The National Water Commission Revisited*, 14 *WATER RESOURCES BULL.* 302, 306 (1978).

50. See Kneese, *supra* note 20, at 28-29. See *supra* notes 15-22 and accompanying text for an explanation of the difference between single-objective and multi-objective planning.

51. See generally Lord, *supra* note 5. "Resource development is giving way to resource management. . . . Management planning will be quite different from development planning. Distributive politics will take a back seat to redistributive and, especially, regulatory politics in public decision making. . . . Greater emphasis will be placed upon the establishment of societal goals and objectives." *Id.* at 9.

52. See NATIONAL WATER COMMISSION, *supra* note 48, at 227-315 (making eight recommendations for how to improve the practices and procedures for managing existing water resources to secure greater productivity without augmentation of supplies). The Senate Select Committee on National Water Resources pre-

sented its findings in 1961, and among its principle recommendations was the need to avert future water shortages produced by anticipated growth, through achieving greater efficiency in water use and development. See ROGERS, *supra* note 10, at 56-57.

53. See L. Douglas James, *Needed Directions in Analysis of Water Management Alternatives*, in *MULTI-OBJECTIVE ANALYSIS IN WATER RESOURCES* 46 (Yacov Y. Haimes & David J. Allee eds., Am. Soc'y of Civil Engineers 1982) (arguing that water resources planning must change its emphasis from constructing new facilities, to more efficient management that takes into account possibilities for reallocation, conservation and quality protection).

54. See Ortolano, *supra* note 29, at 72-74 (providing an overview of how environmental objectives were integrated into the water resources planning process); see also Benjamin F. Hobbs & Walter M. Grayman, *Dealing with Social and Environmental Evaluative Criteria*, in *SOCIAL AND ENVIRONMENTAL OBJECTIVES IN WATER RESOURCES PLANNING AND MANAGEMENT*, *supra* note 5, at 308, 309-10.

55. This was especially true in the area of water quality. See GOTTLIEB, *supra* note 9, at 155-98 (providing an excellent account of emergence of water quality as a central concern for water resources agencies during the 1960s and 1970s).

alternative designs or the prohibition of a proposed project.<sup>56</sup> To avoid legal challenges, the planning process was adapted to be more inclusive and responsive to environmental and social concerns by increasing, and often eventually mandating, public participation.<sup>57</sup> Water planning was forced to focus less on efficiency and more on the distributive effects of water projects and programs.<sup>58</sup> The central struggle for water resources planners was to incorporate broader noneconomic environmental and social values into a planning process that was built on traditional benefit-cost analysis designed to optimize economic efficiency.<sup>59</sup>

Structural changes in the control of water resources planning also facilitated implementation of multi-objective planning. In 1965, the Water Resources Planning Act was adopted.<sup>60</sup> The Act created the federal Water Resources Council ("WRC") which brought together seven federal agencies to develop principles, standards and procedures for planning and evaluating water resources development proposals.<sup>61</sup> After extensive study, the WRC issued the final principles and standards in 1973, which were binding on all federal agencies and feder-

ally funded water resources projects.<sup>62</sup> The principles and standards established two objectives to guide water resources planning, national economic development and environmental quality. They also established a detailed planning process for achieving these objectives, requiring for the first time analyses such as formulation of alternative plans, trade-offs among various alternatives and documentation of the range of uncertainties and implications for project alternatives.<sup>63</sup> With the creation of the WRC and the enactment of NEPA,<sup>64</sup> formal inter-agency cooperation became the norm and agencies began to give serious consideration to the suggestions of other agencies and the public regarding changes in project plans.<sup>65</sup>

### C. 1980 to Present—Multi-Objective Planning

By the 1980s, multi-objective planning had become well-entrenched as a process for implementing water resources policies. Three fundamental objectives emerged for inclusion in multi-objective water resource planning process: economic efficiency, environmental protection and social equity. The evolution in

56. See *supra* notes 31-44 and accompanying text.

57. See generally Gene E. Willeke, *Social Aspects of Water Resources Planning*, 105 J. WATER RESOURCES PLAN. & MGMT. DIV. 79 (1979); Gene E. Willeke, *Theory and Practice of Public Participation in Planning*, 100 J. IRRIGATION & DRAINAGE DIV. 75 (1974); but see GOTTLIEB, *supra* note 9, at 246-53 (arguing that "[d]espite the interest in improving its public image, the water industry, however, has been slow to substantively alter either its methods or goals," and concluding that, "[p]ublic participation . . . meant establishing water utility legitimacy, not new policies"). "Citizen participation (or public involvement) was brought about by feelings on the part of citizens, planners, and elected officials alike that the concerns of citizens were not being adequately incorporated into plans for public projects. Eventually, citizen participation was required in all water resources planning conducted by a Federal agency or with Federal funds. This brought about a considerable revision of planning procedures." Willeke, *supra*, at 79.

58. See Willeke, *supra* note 57, at 87-88; see also GOTTLIEB, *supra* note 9, at 253-57 (discussing the issue of water pricing inequities).

59. See Adam B. Jaffe, *Benefit-Cost Analysis and Multi-Objective Evaluation of Federal Water Projects*, 4 HARV. ENVTL. L. REV. 58 (1980). "Benefit-cost analysis has serious limitations, even when used solely as a measure of the economic return of a project. Some of its weaknesses, such as particular improper procedures and the bias resulting from evaluation by construction agencies, could be remedied in principle. . . . The more fundamental problems, such as the difficulties measuring the value of non-priced commodities . . . demonstrate the need for maximum exploration of alternative assumptions." *Id.* at 68. See *infra* notes 137, 142 for a

detailed definition of benefit-cost analysis, and *infra* Section IV.A. for further discussion of the inherent problem of "valuation" in benefit-cost analysis.

60. Water Resources Planning Act, Pub. L. No. 89-80, 79 Stat. 244 (1965) (codified at 42 U.S.C. §§ 1962-1962d-3).

61. The WRC was composed of the Secretaries of Agriculture, Army, Commerce, Energy, Interior, Housing and Urban Development, and the Administrator of the Environmental Protection Agency. See 42 U.S.C. § 1962a (West 1999).

62. See Principles and Standards for Planning Water and Related Land Resources, 38 Fed. Reg. 24,778 (1973).

63. See *id.* The actual impact of the Water Resources Council's Principle and Standards ("P&S") guidelines has been minimal. The P&S guidelines were the subject of great debate throughout the 1970s and were never truly instituted in federal water resources planning processes. It is important, however, to realize that the substantive and procedural issues raised by the WRC and the P&S guidelines have continued to resonate and influence the direction of water resources planning. See generally Eugene Z. Stakhiv, *Achieving Social and Environmental Objectives in Water Resources Planning: Theory and Practice*, in SOCIAL AND ENVIRONMENTAL OBJECTIVES IN WATER RESOURCES PLANNING AND MANAGEMENT, *supra* note 5, at 107; see also ROGERS, *supra* note 10, at 125, 127; Jaffe, *supra* note 59, at 82-85. See *infra* note 167 and accompanying text for further discussion of the relative failure of the P&S and its progeny.

64. See *supra* note 31 and accompanying text for explanation of NEPA.

65. See Ortolano, *supra* note 29, at 75.

water resources planning, however, was mirrored by a transformation in water resources philosophy. The forces of change in the late 1960s and '70s brought an end to the era of big water development projects. Supply augmentation was no longer considered the major policy program for agencies responsible for water resources.<sup>66</sup> The 1980s ushered in not only multi-objective planning, but a new era of water resources stewardship with a shifting policy emphasis from water supply considerations to those of water quality, environmental quality and distributive equity.<sup>67</sup>

The result is a planning process that produces a very different mix of water resources programs and projects.<sup>68</sup> Demand and supply management projects are incorporated into the planning process to help achieve an efficient balance of water supply and demand while preserving environmental quality.<sup>69</sup> Environmental quality and water quality objectives are furthered through the implementation of projects and programs that prevent pollution of water supplies and sources, retain

sufficient in-stream flows, and treat water supplies and wastewater discharges. Equitable and environmental objectives are promoted through the implementation of new legal and regulatory procedures for water resources planning<sup>70</sup> which enhance the spectrum of community interests asserting a stake in the planning process.<sup>71</sup> No longer are business and environmental groups the only ones concerned with how water resources planning is conducted; Native Americans, homeowners, low-income advocates, recreationists, health advocates and other grass-roots community groups are demanding a voice in the process.<sup>72</sup>

The change in direction of water policies and programs has re-emphasized the critical role of multi-objective planning for water resources, but has also made the planning process extremely complex. The expanding number of interests represented in the planning process, the increasingly varied demands for water, and the growing array of programs, technologies and facilities available to help meet the objectives have dramatically

66. See Philip C. Metzger, *The Need for Institutional Modernization*, in SOCIAL AND ENVIRONMENTAL OBJECTIVES IN WATER RESOURCES PLANNING AND MANAGEMENT, *supra* note 5, at 27. See also Christine Olsenius, *Implications and Current Trends*, in SOCIAL AND ENVIRONMENTAL OBJECTIVES IN WATER RESOURCES PLANNING AND MANAGEMENT, *supra* note 5, at 19, 20. "The federal government is getting out of the water construction business. With the exception of waste water treatment, water project development has been at a standstill." *Id.* at 20. "For perhaps the last decade, most experts would concur that few if any unbuilt projects or undeveloped sites for major dams remain that are both environmentally acceptable and economically efficient. . . . Accordingly, for 10 years now there has been no federal funding provided to begin building new water projects, and no new federal projects authorized." Metzger, *supra*, at 27.

67. See GOTTLIEB, *supra* note 9, at 155-240. See generally Warren Viessman, Jr., *Water Management: Challenge and Opportunity*, 116 J. WATER RESOURCES PLAN. & MGMT. 155 (1990). "[T]here are basically no more unallocated supplies of water in the arid West. This means attention is shifting away from development projects and associated economic evaluation problems to the efficient and equitable allocation and reallocation of existing supplies." Kneese, *supra* note 20, at 30.

68. See Frederick, *supra* note 14, at 75-76; see also Rutherford H. Platt, *Geographers and Water Resource Policy*, in WATER RESOURCES ADMINISTRATION IN THE UNITED STATES: POLICY, PRACTICE, AND EMERGING ISSUES, *supra* note 20, at 36, 44-46.

69. Demand management programs and projects such as the reallocation of water among alternative uses, water pricing, water conservation, and public education have helped to meet changing demands or control increasing demands without augmenting existing water supplies. Concurrently, water recycling (through reclamation and reuse), leak detection and repair pro-

grams, and drought management measures (conjunctive use of groundwater and surface storage, water banking, land fallowing, etc.) have been instituted to augment available supplies without developing new water sources. See ROGERS, *supra* note 10, at 101-115 (providing good overview of current water resources management practices); see generally PRASIFKA, *supra* note 28; JAMES WINPENNY, *MANAGING WATER AS AN ECONOMIC RESOURCE* 25-28 (Routledge 1994).

70. See *supra* notes 31-44 and accompanying text.

71. See PETER E. BLACK, *CONSERVATION OF WATER AND RELATED LAND RESOURCES*, 26-28 (Rowman & Littlefield 1987) (discussing how the 1960s and '70s fundamentally changed the perspective of both citizens and water agencies about the role of the public in decision making). "[T]he historic record abundantly demonstrates, water management is becoming more, not less political; the public and their elected representatives, through a growing complex of private and public agencies, locally, regionally, statewide, and nationally, are getting more and more involved. . . . Even the mighty Metropolitan Water District of Southern California is increasingly needing to take account of public desires and to let down the bars guarding its insulated system of elite control." Kelley, *supra* note 27, at 14, 19.

72. For good examples of how an increasingly diverse mix of interests are seeking participation in the water resources planning process, see GOTTLIEB, *supra* note 9, at 177-92 (health advocates and grass-roots community groups), 219-28 (Native Americans), 234-40 (various local grass-roots organizations). See also Ellen L. Fraithe & Frances H. Flanigan, *Perspectives on the Role of the Citizen in the Chesapeake Bay Restoration*, in WATER RESOURCES ADMINISTRATION IN THE UNITED STATES: POLICY, PRACTICE, AND EMERGING ISSUES, *supra* note 20, at 105 (documenting the numerous local organizations which rallied around water resources issues in the Chesapeake Bay area).

increased the factors and variables in the planning process. Moreover, the advent of computers has introduced sophisticated modeling, data collection and data analysis techniques, thereby increasing the intricacy of the planning process.<sup>73</sup> But, as one prominent engineer recently noted, multi-objective planning has been, "made unnecessarily complicated with its own nomenclature and dedicated computer software . . . but no fetish is required: whether specialized software or more general purpose models . . . are used, the different versions of this tool yield essentially equivalent results."<sup>74</sup>

In other words, despite its complexity, multi-objective planning is still an understandable planning concept.<sup>75</sup> As such, the multi-objective planning process can be scrutinized at a conceptual level for how well it serves as a present-day tool for reconciling water resources policy objectives and creating a foundation for subsequent decision-making. This analysis is undertaken in Section IV.

### III. Water Resources Planning in California

#### A. Historical Overview

Although there is no direct documentation of the history of water resources planning processes used in California, the development and implementation of water policies demonstrate that planning methods in California essentially followed a path of development similar to water resources planning at the national level. In the nineteenth century, water resources development in California was strictly a local undertaking. Single-purpose planning was the predominant model. Water projects

were undertaken to serve one of three purposes: harness large quantities of water for hydraulic mining, control flooding to open up prime farmland, or transport water for irrigating dry farmland.<sup>76</sup> The concept of single-purpose water resources planning was underscored by the fact that entrepreneurs executed most water projects to serve personal economic interests; a de facto planning process reinforced by state legislation.<sup>77</sup> Water irrigation projects were constructed by either small, localized irrigation districts created under the Wright Act of 1887,<sup>78</sup> or by large corporate interests which held sixty-two percent of the farmland in California.<sup>79</sup> Development of flood control projects was epitomized by the Green Act of 1868<sup>80</sup> which allowed any person who acquired as little as half a tract of land to create a swampland district for the removal of water from the land. Water supplies for mining were dominated by corporate interests which quickly monopolized water resources control in mining areas after the California Supreme Court upheld the right of landowners to retail their water rights.<sup>81</sup>

By the time growing urban communities forced their way into the water resources arena in the early 1900s, localized single-purpose planning was already being abandoned. The emerging Progressive movement in both California and across the nation sought to transform water resources planning from a decentralized, nontechnical and loosely organized process into a highly organized, technical and centrally planned operation to achieve economy and efficiency.<sup>82</sup> The Los Angeles Aqueduct and San Francisco's Hetch-Hetchy

73. See generally Daniel L. Loucks, *Water Resource Systems Models: Their Role in Planning*, 118 J. WATER RESOURCES PLAN. & MGMT. 214 (1992); Viessman, *supra* note 67.

74. Rogers, *supra* note 23, at 37.

75. See *infra* note 128 for detailed explanation of the concept of multi-objective planning.

76. See NORRIS HUNDLEY, JR., *THE GREAT THIRST: CALIFORNIANS AND WATER, 1770s-1990s* 73-91 (Univ. of Cal. Press 1992).

77. See *id.*

78. The Wright Act of 1887 (current version at CAL. WATER CODE § 20500) authorized the residents of an area to form local irrigation districts, elect a board of directors, issue bonds, and raise revenue for the purpose of purchasing land and water rights, and distributing water.

79. HUNDLEY, *supra* note 76, at 101. The water battle between two giant Central Valley farmers James Haggin and Henry Miller, resulting in the California Supreme Court decision of *Lux v. Haggin*, 69 Cal. 255 (1886), epitomized the corporate dominance and individualization of irrigation water policies. Many large farming interests extended their holdings under the federal Desert Land Act of 1877 (codified as amended at 43 U.S.C. §§ 321-339), which offered 640 acres of dry land for a modest price to anyone who would agree to irrigate a portion of the property. Intended to help small farmers, the Act was primarily used by monopolistic interests.

80. The Green Act of 1868, 1867-68 Cal. Stat. 507.

81. See *Yuba County v. Cloke*, 79 Cal. 239, 243; see also HUNDLEY, *supra* note 76, at 73-77.

82. See generally HAYS, *supra* note 13.

Aqueduct represent this transition in water resources planning. Although the projects were primarily designed to transport municipal water supplies from distant sources, each was also trumpeted as having the additional benefit of bringing cheap power to burgeoning metropolises.<sup>83</sup> Because of the enormity of these projects and their multiple benefits, they were held up as models of society's new found capacity to harness and manage water resources to serve a growing diversity of demands.

As the progressive ideology of economy and efficiency were ingrained into California's water resources policies, multi-purpose planning was institutionalized as the means to effectuate the new policy objective. The Central Valley Project ("CVP") was the first product of this new planning process. The idea for a project in the Sacramento and San Joaquin valleys was first proposed in the 1931 State Water Plan,<sup>84</sup> but the enormity of the project and the collapse of public financing during the Depression eventually required federal intervention, control and financing.<sup>85</sup> The project was designed to control flooding on Sacramen-

to Valley farmland, improve navigability along the Sacramento River, prevent salt-water intrusion into the Delta, as well as capture, store and transport water supplies to dry farmland in the San Joaquin Valley.<sup>86</sup> By the time the CVP neared completion in the 1950s, it included three dams in the Sacramento Valley, two dams in the San Joaquin Valley, four principal canal systems transporting more than three million acre-feet of water annually, and hydroelectric facilities generating enough power to move the water and sell surplus to pay for the project.<sup>87</sup> The CVP has been heralded as the ultimate achievement in multi-purpose planning because "it showed that maximum use could be made of California's water for all beneficial purposes."<sup>88</sup>

While the CVP was being completed, plans were developed for an even more ambitious multi-purpose water project, which became known as the State Water Project ("SWP"). In 1957, the California Water Plan<sup>89</sup> was published, calling for the construction of a project that would "meet present and future needs for all beneficial uses and purposes in all areas of

83. See HUNDLEY, *supra* note 76, at 149-200. The Hetch-Hetchy project was much less a forerunner of the Progressive Era than the Los Angeles Aqueduct. The Los Angeles Aqueduct was approved in 1905 and the first waters flowed into Los Angeles by 1913. The rapid development of this water project was due in large part to Los Angeles' creation of a powerful commission, insulated from popular control, and led by the single-minded and technically driven William Mulholland. In contrast, the Hetch-Hetchy Aqueduct suffered innumerable delays and cost overruns (about \$23 million) during the twenty-five years between the project's proposal and the first deliveries of water to San Francisco in 1934. See *id.*

84. See CALIFORNIA DEPARTMENT OF PUBLIC WORKS, DIVISION OF WATER RESOURCES, BULL. NO. 25, REPORT TO LEGISLATURE OF 1931 ON STATE WATER PLAN (1930).

85. See UNITED STATES DEPARTMENT OF INTERIOR, BUREAU OF RECLAMATION, CENTRAL VALLEY PROJECT, CALIFORNIA (Government Printing Office 1963).

86. The State Water Plan (later renamed the Central Valley Project) was first published in 1931 with the following three purposes: (1) creation of a major reservoir on the Sacramento River (present-day Shasta Lake) to control flooding in the Sacramento Valley and store flood waters that were previously "wasted" by flowing into the San Francisco Bay; (2) use of the reservoir dam to regulate flows in the Sacramento River for improved downstream navigability and prevention of salt-water intrusion into the Sacramento-San Joaquin Delta; and (3) construction of an interconnected canal and reservoir system that would transport water released into the Sacramento River, out of the Delta, and into the San Joaquin Valley for farming irrigation. See generally CALIFORNIA DEPARTMENT OF PUBLIC WORKS, BULL. NO. 25, *supra* note 84. When the Plan was adopted by the state legislature in 1933,

creation of hydroelectric power was added as an additional purpose to ensure federal government support for the project. The enormity and expense of the project eventually required the federal government to assume control and financial responsibility for the undertaking. See HUNDLEY, *supra* note 76, at 252-54.

87. See HUNDLEY, *supra* note 76, at 252-54.

88. ERWIN COOPER, AQUEDUCT EMPIRE: A GUIDE TO WATER IN CALIFORNIA, ITS TURBULENT HISTORY AND ITS MANAGEMENT TODAY 166 (The Arthur H. Clark Co. 1968). The author's effusion over the Central Valley Project as the ultimate expression of Progressive ideology is captured in the following quotation:

The Central Valley Project is more than a physical accomplishment. It has been a demonstration that water resources could be stored and transported almost at will, on an almost unlimited scale. It brought nearer to perfection the techniques of water management and control on behalf of people hundreds of miles removed from the source of supply. It gave assurance that technology could design and build engineering works to meet any needs, provided they were backed by the necessary organizational and financial structure. It showed that maximum use could be made of California's water for all beneficial purposes: irrigation, power development, domestic and industrial consumption, navigation, waste disposal, control of salinity, enhancement of fish and wild life [sic], beautifying the out-of-doors.

*Id.*

89. See CALIFORNIA DEPARTMENT OF WATER RESOURCES, BULL. NO. 3, THE CALIFORNIA WATER PLAN (1957).

the State to the maximum feasible extent."<sup>90</sup> Although the SWP has never been completed as initially proposed,<sup>91</sup> the project was designed to, and has been operated to, simultaneously regulate river flows for flood control, to deliver water for municipal and agricultural uses, to provide drainage for irrigation water, to generate electricity to move water supplies and to control salinity levels in the Delta.<sup>92</sup>

Structural and institutional changes in the control of California's water resources from 1920 to 1960 also reflect the adoption of multi-purpose planning. First, there was a consolidation of hundreds of local water suppliers into regional groups in an effort to achieve efficiency and economy in the capture and management of water resources. In 1911, the state enacted the Municipal Water District Act, followed in 1913 by the County Water District Act

and the California Water District Act.<sup>93</sup> These statutes were intended to coordinate multiple water resources functions for the growing urban areas of the state. The legislation allowed the newly formed districts to capture and manage water resources by purchasing, transporting, purifying and distributing water supplies for domestic and irrigation uses. In 1921 two more state laws, the Municipal Utility District Act and the Public Utility District Act, continued the trend toward multi-purpose local water resource agencies.<sup>94</sup> These Acts combined water resources capture and management with the furnishing of other general utility services such as electricity, sewer and wastewater treatment to the districts' residents.<sup>95</sup>

Institutional restructuring to achieve multiple purposes at the local level reached its

90. *Id.* at 37.

91. To secure voter approval of bond financing for the State Water Project ("SWP"), then Governor Brown decided to scale-down the water project from \$4 billion to \$1.75 billion, while retaining broad language in the authorizing legislation that would allow the Department of Water Resources to construct additional facilities as may be necessary to meet future water needs. See HUNDLEY, *supra* note 76, at 280-81. The environmental and social concerns which emerged in the late 1960s, however, ensured that this "second phase" (often referred to as the Peripheral Canal) of the SWP would be bitterly contested. Two attempts to authorize completion of the SWP have been rejected, in 1982 by the voters and in 1984 by the state legislature. See *id.* at 312-30. In December 1994, the Bay-Delta Accord was enacted to manage water resources in the Sacramento-San Joaquin Delta, requiring that the SWP and CVP reduce water exports by about 400,000 acre-feet in years of average precipitation. See *Delta Update*, WESTERN WATER 3 (May/June 1995). The tenacious legal and regulatory battles which led to the Bay-Delta Accord, and its requirement for reductions in water exports from the Delta, led many to believe that the "second phase" of the SWP would remain only on paper. Institution of the CALFED Bay-Delta Program in 1995, however, and its continuing progress toward reaching a long-term solution to problems in the Bay-Delta, has resurrected hopes that additional water supplies may be available through augmentation of the SWP. One of the three alternative Bay-Delta plans calls for construction of an "isolated facility," which is the modern day equivalent of the Peripheral Canal. See CALFED Releases Draft of Preferred Alternative, California Env'tl. Insider, Vol. 12, Nos. 13 and 14, at 3-4 (Dec. 23, 1998). See *infra* notes 130-33 and accompanying text for further explanation of the CALFED Bay-Delta Program and discussion of the proposed alternatives.

92. See CALIFORNIA DEPARTMENT OF WATER RESOURCES, BULL. NO. 132-63, THE CALIFORNIA STATE WATER PROJECT IN 1963 (1963).

93. Municipal Water District Act, 1911 Cal. Stat. 1290 (codified as amended at CAL. WATER CODE § 71000); County Water District Act, 1913 Cal. Stat. 1049 (current version at CAL. WATER CODE § 30000); California Water District Act, 1913 Cal. Stat. 815 (current version at CAL. WATER CODE § 34000).

94. Municipal Utility District Act, 1921 Cal. Stat. 245 (current version at CAL. PUB. UTIL. CODE §§ 11501-14403.5); Public Utility District Act, 1921 Cal. Stat. 906 (current version at CAL. PUB. UTIL. CODE §§ 15501-18055). The East Bay Municipal Utility District ("EBMUD") is a good example of a multipurpose agency formed pursuant to the Municipal Utility District Act. In 1923, EBMUD was formed to finance construction of the Mokelumne Aqueduct, which carried water from the Sierra foothills to the East San Francisco Bay. Since then, EBMUD has expanded its operations beyond the capture and transport of water supplies to include purifying and distributing water to 1.2 million users, generating 160 million kilowatts of hydroelectricity, wastewater treatment for 600,000 customers, watershed land management of 54,605 acres, and operating five public recreation areas. See East Bay Municipal Utility District (visited Feb. 23, 2000) <<http://www.edmud.com.eball.html>>.

95. A good example of the consolidation in water resources functions is the Imperial Irrigation District ("IID"). Formed in 1911 under the Wright Act of 1887, *supra* note 78, this agency began as a small irrigation district intended to serve the growing agricultural interests in the Imperial Valley. The IID, however, started to assert monopolistic control over water resources for the valley after water flows into the area substantially increased from improvements to the Imperial Dam in the 1930s and completion of the All-American Canal in 1941. See COOPER, *supra* note 88, at 72-74. Since then, the IID has created a 1625 mile distribution system supplying 2.5 million acre-feet of water for both agricultural uses (five thousand farms) and municipal uses (nine cities), a massive drainage system for the farmlands in the valley, and power generation and distribution facilitates to deliver more than 300 kilowatts of electricity to industry and residents. See ROBERT GOTTLIEB & MARGARET FITZSIMMONS, THIRST FOR GROWTH: WATER AGENCIES AS THE HIDDEN GOVERNMENT IN CALIFORNIA 71-74 (Univ. of Ariz. Press 1991).

zenith in 1927 when the state legislature created the Metropolitan Water District of Southern California ("MWD").<sup>96</sup> MWD was charged with the mission to fully meet all regional domestic, municipal and industrial water needs beyond those met through local supplies by acquiring new imported water supplies and constructing transmission, storage and treatment facilities. Additionally, MWD was authorized to generate hydroelectric power to transport and retail the water.<sup>97</sup> Through expansion and annexation over the next sixty years, this super-regional agency has gained direct control over sixty percent of all water supplies for nearly ninety percent of the population in Southern California.<sup>98</sup>

Restructuring the institutional control of water resources to facilitate multi-purpose planning also occurred at the state level. In 1945, the State Water Resources Control Board ("SWRCB") was created to assert state control over the functions of studying and coordinating all water development.<sup>99</sup> In evaluating the feasibility of water resources projects, the Board considered all possible beneficial uses that could be fulfilled by the project and utilized benefit-cost analysis to determine which projects to fund.<sup>100</sup> To fulfill its multi-purpose mandate, the SWRCB published a comprehensive inventory of California's water resources<sup>101</sup> and a detailed accounting of the State's projected water demands.<sup>102</sup> Creation of the Department of Water Resources ("DWR") in 1956<sup>103</sup> culminated the state's institutional restructuring for multi-purpose planning. DWR assumed the functions of fifty-two formerly independent state agencies (including the SWRCB) responsible for some aspect of water

planning and development.<sup>104</sup> This was an unprecedented consolidation of water resources planning, development and management under a single agency. It was under the wide-ranging power of the new DWR that California was able to construct and manage the massive State Water Project, as it had been unable to do several decades earlier with the Central Valley Project.<sup>105</sup>

By the early 1960s water agencies at both the local and state level were structured to implement water resources policies focused on promoting economic efficiency through the development and utilization of water resources. Zealous application of traditional benefit-cost analysis facilitated the achievement of this singular policy objective. The outcome was massive water projects such as the CVP and SWP, pursued because their multiple "beneficial uses" made it easier to claim the projects optimized economic efficiency. Consolidation of water planning and management in agencies such as the MWD and DWR helped insure that the state's water resources would be developed and managed for multiple purposes in an economically efficient manner.

## B. The Modern Era

It was not until the mid-1970s that multi-objective planning began to emerge in California. The late emergence of this planning process in California was likely due to several factors. First, the SWP had just begun delivering water to Southern California in 1973, and the unfinished "second phase" of the SWP kept open the possibility that a new round of water development projects would begin in the near

96. See Metropolitan Water District Act, 1927 Cal. Stat. 694 (codified as amended at CAL. WATER CODE APP. §§ 109-1 to -551).

97. See CAL. WATER CODE APP. § 109-25 (West 1990).

98. See METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, SOUTHERN CALIFORNIA'S INTEGRATED WATER RESOURCES PLAN, Draft Report No. 1107, Vol. 1, E1-E4 (Dec. 1995) [hereinafter "MWD IRP PLAN, VOL. 1"]. Even more reliant on MWD's imported supplies is the San Diego region where roughly ninety percent of the region's water supply is imported. See Anne T. Thomas, *Water, Politics & Land Use: A Changing Landscape*, LAND USE F. 313 (Fall 1992). The water supply figures cited can vary depending upon hydrologic conditions, available water supplies, storage capacities and climate conditions. See *id.*

99. See State Water Resources Act of 1945, 1945 Cal. Stat. 2827, 2828 § 3.

100. "It is further declared that the State should engage in the study and coordination of all water development projects . . . in order that . . . appropriations are made . . . upon those projects which are most beneficial to the State, and which will bring maximum benefits to the people . . . when the benefits are in excess of estimated costs." *Id.* § 2.

101. See CALIFORNIA WATER RESOURCES BOARD, BULL. NO. 1, WATER RESOURCES OF CALIFORNIA (1951).

102. See CALIFORNIA WATER RESOURCES BOARD, BULL. NO. 2, WATER UTILIZATION AND REQUIREMENTS IN CALIFORNIA (1955).

103. See 1957 Cal. Stat. 421 (codified as amended at CAL. WATER CODE § 120).

104. See CAL. WATER CODE § 123 (West 1990).

105. See generally *supra* note 86, and accompanying text.



future. It was not until 1982, in a decisive referendum vote by the citizenry, that the idea of a permanently uncompleted SWP became a reality.<sup>106</sup> Secondly, in the early 1970s there were still authorized, but unbuilt, water projects to which agencies looked for additional supplies in meeting projected growth.<sup>107</sup> The undeveloped water persuaded some to believe that additional supplies would be available to meet demands well into the future, and the potential for more multi-purpose water projects still looked bright in 1970.<sup>108</sup>

Nonetheless, the forces of change that swept in multi-objective planning and altered water resources policies at the federal level,<sup>109</sup> had similar ramifications in California. Upward spiraling water resources development costs placed new emphasis on cost-effectiveness strategies. Multi-purpose water projects were increasingly expensive. The highly complex and multi-faceted developments faced increasing resistance from environmental and community groups, extending the time period between approval and completion, and subjecting project costs to massive inflation.<sup>110</sup> Water manage-

ment programs and projects began to receive attention as viable alternatives to supply augmentation for achieving an economically efficient balance between projected supply and demand. Conservation, reallocation, conjunctive use, reclamation and water pricing strategies were slowly incorporated into water resources planning in an era of fiscally constrained water development.<sup>111</sup>

The reinvigorated environmental movement in California also had a substantial impact upon water resources planning. In the late 1960s, environmentalism returned to the policy arena of California and some of its first targets were the state's massive water projects. There were several important legislative manifestations of the movement. In 1970, the legislature enacted the sweeping California Environmental Quality Act ("CEQA").<sup>112</sup> Like its federal counterpart NEPA,<sup>113</sup> CEQA was the primary means for citizens to force state and local public decision-makers to document and consider the environmental impacts of their actions.<sup>114</sup> A year later, California again followed the federal government and enacted its own version of the

106. See *supra* note 91 for details regarding the full history behind the uncompleted "second phase" of the SWP.

107. For example, the CVP contained authorizations for projects that were either underway or just beginning in 1970, including the New Melones Dam on the Stanislaus River, the Auburn Dam on the American River, and the Tuscan Buttes Project. See Gurmukh S. Gill et al., *The California Water Plan and Its Critics: A Brief Review*, in CALIFORNIA WATER: A STUDY IN RESOURCE MANAGEMENT 3, 8 (David Seckler ed., Univ. of Cal. Press 1971); HUNDLEY, *supra* note 76, at 351-52. Additionally, the SWP had been contracted to deliver (if fully completed) 4.23 million acre-feet of water. Studies in the early 1970s showed that only about half of that amount was being delivered. See *id.* at 287, 313. Some still pointed to plans for future development of rivers in the northwestern part of the state such as the Upper Eel and the Trinity. See COOPER, *supra* note 88, at 260-61.

108. See generally COOPER, *supra* note 88. "The Eel River has already been designated as the first to be tackled. . . . An initial Upper Eel Basin project, expected to yield close to one million additional acre-feet of water for the state, is expected to be started just as the finishing touches are put on the Feather River Project—around 1970. The Upper Eel development should carry the state into the 1990s. Assuming an ever-mounting thirst, there lies beyond the first Eel impoundment a possible additional diversion of 1.8 million acre-feet from the Trinity River . . ." *Id.* at 260-61.

109. See *supra* notes 23-44 and accompanying text.

110. See Richard E. Howitt & Henry Vaux, *Competing Demands for California's Scarce Water*, in WATER QUANTITY/QUALITY MANAGEMENT AND CONFLICT RESOLUTION: INSTITUTIONS PROCESSES, AND ECONOMIC ANALYSIS 271, 279 (Ariel Dinar & Edna Tusak Loehman

eds., Praeger 1995). Work on the CVP began in 1937 and was not operational until 1951, with additional facilities still being built in the early 1970s. See Gill et al., *supra* note 107, at 6-8. Originally the state authorized \$170 million for the project, but costs nearly exceeded one-half billion by the time the CVP made its first water deliveries. See HUNDLEY, *supra* note 76, at 254-255. The uncompleted "second phase" of the SWP (the Peripheral Canal) was initially priced at \$179 million when authorized in 1966, in 1973 the costs rose to \$210 million and, when the voters blocked the project in 1982, the costs were estimated at nearly \$2.5 billion. See *id.* at 327. Currently, the "isolated facility" alternative of the CALFED Bay-Delta Program estimates that construction of a peripheral canal around the Delta could cost \$10.5 billion. See *The Delta Fix: A Snap Shot of the CALFED Bay-Delta Program and Status*, CALIFORNIA WATER CLEARINGHOUSE (May 1998). See *infra* notes 130-33 and accompanying text for further explanation and discussion of the CALFED Bay-Delta Program.

111. See GOTTLIEB, *supra* note 95, at 192-210.

112. CAL. PUB. RES. CODE §§ 21000-21178 (West 1990).

113. See *supra* note 31 and accompanying text.

114. Unlike NEPA, however, CEQA has not been interpreted as merely a "procedural" statute. See *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519 (1978). CEQA has been interpreted to contain substantive provisions with which agencies must comply, including denying approval for projects with significant adverse environmental impacts, unless feasible alternatives or mitigation measures can substantially lessen the impacts. See *Sierra Club v. Gilroy City Council*, 22 Cal. App. 3d 30 (1990).

Wild and Scenic Rivers Act.<sup>115</sup> The legislation prohibited diversions on sections of five rivers, most of which had been identified for future water resources development.<sup>116</sup>

The environmental movement also pursued its goal of natural resources protection in the state courts and public arena. Most significantly, the California Supreme Court reinvigorated and enlarged the scope of the "public trust doctrine," putting all water agencies on notice that there were environmental and social constraints upon the beneficial use of vested water rights.<sup>117</sup> Also important was a California Supreme Court decision that required CEQA to be interpreted so as to afford the fullest possible protection to the environment, resulting in an extension of CEQA to cover virtually all major water resources actions.<sup>118</sup> When unsuccessful in achieving environmental objectives through the courts, environmentalists often took their case directly to the public. In 1982, voters approved a referendum to defeat the completion of the State Water Project, and two years later the state legislature rejected a measure to revive the proj-

ect.<sup>119</sup> Additionally, the grass-roots action of environmental organizations almost prevented the construction of New Melones Dam on the Stanislaus River and delayed its eventual completion for almost thirteen years.<sup>120</sup>

Finally, an emerging concern over the social ramifications of water resources planning manifested itself in California, focusing upon the planning process and the distributive impacts of decisions arising from the process. During the 1970s, there was an increased awareness that water resources planning was conducted without any public participation by agencies not directly accountable to affected communities. Concern over the insularity of the planning process was heightened by a sense that special interest groups, pursuing self-serving projects and programs, were intimately involved in water resources planning. There was a newfound feeling that public participation was critical to counter this undue influence.<sup>121</sup> Moreover, the public discovered that growing out of this "captured" planning process were large water subsidies for influential special interests. Public bond financing

115. Wild and Scenic Rivers Act, 1972 Cal. Stat. 2510 (codified as amended at CAL. PUB. RES. CODE §§ 5093.50-5093.70). See *supra* notes 32-33 and accompanying text for the corresponding federal act.

116. The protected rivers include all or portions of the American, Klamath, Trinity and Eel. See CAL. PUB. RES. CODE § 5093.54. The Middle Fork of the Eel had been initially earmarked for development by the SWP and water planners were continually looking toward the Trinity and Klamath as the last remaining untapped major rivers in California. See CALIFORNIA DEPARTMENT OF WATER RESOURCES, *The California State Water Project in 1969*, BULL. NO. 132-69 (1969); see also Gill et al., *supra* note 107, at 26.

117. See *National Audubon Soc'y v. Superior Court of Alpine County*, 33 Cal. 3d 419 (1983). In *National Audubon*, the court held that as trustee for the people, the state has a duty in making water resource allocations to balance public trust uses (navigation, recreation, fish and wildlife and aesthetics) against the public interest served by out-of-stream uses. More importantly, as circumstances changed, the state could rebalance the interests and reallocate water resources as appropriate, even as against "vested" water rights. A "vested" water right is a water right considered to have property-like characteristics, in that private ownership and control of the water right is defensible against a deprivation (taking) without due process of law. The court in *National Audubon*, however, held that all water rights in California were held subject to historic public trust uses. In essence, the property interest in a vested water right is limited to the extent that it does not unduly compromise public trust uses in that water.

118. See *Friends of Mammoth v. Board of Supervisors*, 8 Cal. 3d 247 (1972). In *Friends of Mammoth*, the court held that CEQA's environmental analysis provisions not only applied to

government projects, but also to agency actions such as the approval or issuance of permits, leases and other entitlements taken in response to private initiatives. See *infra* notes 204-07 and accompanying text for more details regarding the applicability and scope of CEQA.

119. See HUNDLEY, *supra* note 76, at 328-29.

120. See *id.* at 351-56. Proposition 17 was placed on the ballot in 1974 by environmental organizations. The measure would have blocked the New Melones Dam but was narrowly defeated at the polls by a five percent margin. The environmental groups then took their fight to the State Water Resources Control Board ("SWRCB"), the courts and, eventually, Congress. See *id.*

121. See WATER RESOURCES CENTER, *WATER DEVELOPMENT AND THE ENVIRONMENT: ISSUES OF WATER POLICY IN CALIFORNIA*, Report No. 27, 21-23 (Univ. of Cal., Davis, Feb. 1974); see also GOTTLIEB, *supra* note 95, at 21, 109-46.

No aspect of the decision-making process arouses more concern than the question of public participation: When and how should the public become involved? How much public participation is reasonable or effective? Can public involvement really provide a balance against pressures from special interest groups? . . . When the agencies, the vast resources they control, and the potential social impact of their decisions attract public attention, as they have in the past decade, several critical groups of outsiders become important participants in the debate over agency accountability. The actors raise two questions: *Who is the agency to be held accountable to?* and *What is the agency accountable for?*

GOTTLIEB, *supra* note 95, at 140.

and pricing structures heavily favored water-intensive users such as agriculture and industry. In the late 1970s, constricting supplies, several years of drought, and the imposition of conservation and water restrictions on users combined to create a public outcry for reformation of these inequitable policies.<sup>122</sup> Water resources historian Norris Hundley, Jr. summarized the changing water policy climate in California in this manner:

Court decrees eliminated major water supplies and threatened others, while the public, reflecting national concern with environmental abuse and increasing skepticism about the old, unquestioned belief in growth for its own sake, rejected new projects and forced urban, state, and federal strategists to emphasize better management of available resources—the increasingly central theme and thrust of water policy in California . . . .<sup>123</sup>

Public, legislative and judicial attitudes toward water resources were markedly different as water agencies began to plan for water resources in the 1980s. It was clear that environmental and social concerns would have to

122. See GOTTlieb, *supra* 95, at 202-07 (documenting pricing structures and subsidies to domestic, commercial and industrial users served by municipal water agencies); see also HUNDLEY, *supra* note 76, at 380-85 (documenting pricing structures and subsidies to agricultural interests, primarily served by federal water projects).

123. See HUNDLEY, *supra* note 76, at 299-300.

124. See generally WATER RESOURCES CENTER, *supra* note 121; Frank H. Bollman, *On the Demand for Water in Its Natural Environment*, in CALIFORNIA WATER: A STUDY IN RESOURCE MANAGEMENT 84 (David Seckler ed., Univ. of Cal. Press 1971). The following quotes evidence the growing need to develop a planning process which could synthesize multiple and conflicting objectives that were emerging in water resources policies:

The need exists to devise methods of objectively scrutinizing extramarket values and of weighing the market and extramarket values. . . . Another lesson in planning emerges from the consideration that all market and extramarket costs and benefits be presented. This process requires that all practicable alternatives must be appraised. To achieve a purpose, planning should evolve around alternatives rather than the project itself.

*Id.* at 94-95.

be incorporated into the water resources planning process. If the concerns were ignored, environmentalists and community groups now had the legal tools and a growing political influence to compel their consideration. The challenge for water resources planning was to incorporate environmental and social objectives, while still achieving economic efficiency. Water agencies and decision-makers began to realize that a well-designed multi-objective planning process was the key to meeting this challenge.<sup>124</sup>

By the mid-1980s, multi-objective planning had become common for many water resources agencies. The state aided in this process by requiring water agencies to consider both supply augmentation and demand management strategies in adopting their long-term resource plans. For example, in 1983 the Urban Water Management Planning Act<sup>125</sup> was adopted, requiring all urban water suppliers to prepare and maintain a plan that described and evaluated reasonable and practical efficient uses, as well as reclamation and conservation activities.<sup>126</sup> In approving the Act, the legislature declared that the policy of the state was to actively pursue conservation and efficient use of water, and that conservation and efficiency were to be guiding criteria in water resource decisions.<sup>127</sup> Three years later, the

Water planning and development go on today in a political and social arena populated by groups of people with widely differing viewpoints, and by public and private agencies with differing and limited responsibility. Both environmentalists and water project planners tend to focus on single aspects. . . . This procedure, however, is no longer practical. Resource abundance is a dream of the past, and resource scarcity is a fact of the present and future. A better approach to reconciliation of opposing viewpoints is needed—a fact which already is recognized by many of those concerned.

WATER RESOURCES CENTER, *supra* note 121, at 23-24.

125. 1983 Cal. Stat. 3555 (codified at CAL. WATER CODE §§ 10610-10656). The Act requires urban water suppliers with more than 3000 service connections to prepare and update every five years an urban water management plan which includes supply and demand projections, a description of water deficiencies in times of drought, and the ability of the water agency to meet those deficiencies. Any plan which projects a need for additional water supplies must contain an evaluation of alternative methods for supply augmentation including: reclamation, transfers, retrofits, conservation, and pricing.

126. See CAL. WATER CODE § 10615 (West 1991).

127. See CAL. WATER CODE § 10610.4 (West 1991).

Agricultural Water Management Planning Act<sup>128</sup> was established, imposing similar duties upon agricultural water suppliers and reaffirming the duty of these agencies to use conservation and efficiency as guiding criteria in planning.<sup>129</sup>

The recent CALFED Bay-Delta Program is representative of the evolution of multi-objective water resources planning in California. Launched in 1995, this collaborative effort of the state and federal governments has sought to undertake the Herculean task of developing “a long-term solution to problems in the Bay-Delta Estuary related to fish and wildlife, water supply reliability, natural disasters, and water quality.”<sup>130</sup> The four objectives adopted by CALFED to be achieved through its long-term Bay-Delta solution are illustrative of the scope of issues embraced by current multi-objective planning:

1. Water Quality—Provide good water quality for all beneficial uses.
2. Ecosystem Quality—Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable popu-

lations of diverse and valuable plant and animal species.

3. Water Supply Reliability—Reduce the mismatch between Bay-Delta water supplies and current and projected uses dependent on the Bay-Delta system.
4. Bay-Delta System Vulnerability—Reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees.<sup>131</sup>

In its most recent report, CALFED identifies eight elements for implementing its proposed long-term solution: levee system integrity, water quality, ecosystem restoration, water use efficiency, water transfers, watershed management, storage and conveyance.<sup>132</sup> The most controversial are the storage and conveyance elements that will generate additional water supplies for the SWP and CVP.<sup>133</sup>

128. 1986 Cal. Stat. 3323 (codified at CAL. WATER CODE §§ 10800-10855).

129. See CAL. WATER CODE §§ 10814, 10802 (West 1991).

130. CALFED *Bay-Delta Program Overview*, CALFED BAY-DELTA PROGRAM (Oct. 22, 1998) (visited Feb. 23, 2000) <<http://calfed.ca.gov/general/overview/html>>. CALFED is an outgrowth of the 1994 Bay-Delta Accord between agricultural, environmental and urban interests that set operating standards for the Bay-Delta facilities in the following areas: springtime water exports from the Delta, regulation of salinity concentrations, maintenance of springtime flows for salmon runs, and closure of in-Delta facilities for fish populations. The Bay-Delta Accord also sought to comply with the Endangered Species Act by improving the operational flexibility of Delta facilities to better monitor and reduce impacts on listed species, and to implement some additional measures to mitigate impacts not directly related to water exports from the Delta.

CALFED is intended to further the Bay-Delta Accord by developing a long-term physical solution for harmonizing the four interrelated problem areas in the Bay-Delta: water quality, water supply reliability, levee system integrity and ecosystem quality. The first phase of CALFED, completed in March of 1998, developed the following three basic structural alternatives from which a preferred alternative would be selected: (1) rely on the existing Delta conveyance facilities and change the timing of diversions to minimize environmental impacts, (2) widen some Delta conveyance channels to reduce the environmental impacts of water diversions by the SWP and CVP, and to improve the flows for water exports, and (3) construct an “isolated channel” which diverts water around the Delta to the SWP and CVP export facili-

ties. See generally *The Delta Fix*, *supra* note 110. Each of the alternatives also provides for increased water supply storage facilities, with 5 million acre-feet of additional surface storage and 750,000 acre-feet of groundwater storage split between facilities north and south of the Delta.

The second phase of CALFED is evaluating the three basic alternatives and developing a preferred alternative. The preferred alternative has abandoned a one-time fixed solution and instead seeks a “staged” implementation that relies heavily on adaptive management. Under this concept, a final decision is delayed on the construction of water storage and additional conveyance facilities while other less controversial measures are implemented. During the “first stage,” the need, cost, and impact of additional storage and conveyance facilities will be further evaluated and a final determination made within approximately seven years. See *Revised CALFED Bay-Delta Program Phase II Report*, CALFED BAY-DELTA PROGRAM (Dec. 18, 1998) (visited Feb. 23, 2000) <<http://calfed.ca.gov>>.

131. *Primary Objectives*, CALFED BAY-DELTA PROGRAM (visited Feb. 23, 2000) <<http://calfed.ca.gov/general/objectives>>.

132. See *Revised CALFED Bay-Delta Program Phase II Report*, *supra* note 130, at 48-86.

133. See *CALFED Releases Draft of Preferred Alternative*, *supra* note 91, at 4; see also *Delta Dams Proposal Gathering Momentum*, L.A. TIMES, Nov. 25, 1998 (MWD and other water agencies praise the idea to include substantial expansion of storage facilities in CALFED solution, while environmentalists say “it doesn’t make sense, economically or environmentally, to commit to such a huge investment before we know whether other approaches will work just as well”).

### C. Current Water Resources Planning Processes

Over the past decade the central struggle for water resources planning has been to create a multi-objective planning process that adequately considers the economic, environmental and social concerns voiced in the policy arena. Currently, there are several common planning processes used by California water agencies at the state, regional and local levels.<sup>134</sup> These methodologies represent the evolution of water resources planning described in the previous sections (planning to satisfy numerous purposes and multiple objectives) by incorporating the important concept of constrained optimization. "Constrained optimization" is defined as either optimizing one objective while setting other objectives as constraints upon the system, or weighing different objectives into one objective function to optimize.<sup>135</sup> What follows is a brief description of several commonly utilized water resources planning processes.

Least-Cost Planning ("LCP") is a procedure that compares the costs (construction, opera-

tion, maintenance, environmental and social) of developing new water supply projects, with demand management alternatives. This planning process is based upon the principle of minimizing costs in achieving a specific purpose, by seeking the combination of supply projects and demand management programs with the lowest overall cost.<sup>136</sup> In essence, LCP is a form of cost-effectiveness analysis updated for an era with multiple water policy objectives.<sup>137</sup> Unlike traditional cost-effectiveness analysis, LCP theoretically does not require all costs to be reduced to a dollar amount. Instead, LCP often attempts to use relative values (ordinal or cardinal) to rank and evaluate various non-monetary environmental and social project effects.<sup>138</sup> As a result, environmental and social objectives such as water quality, social impacts and likelihood of project success (e.g., amount of public opposition, difficulty of environmental compliance) can be placed as constraints upon the optimization of the least-cost objective.<sup>139</sup>

Reliability planning is a method currently used by water agencies to balance estimated

134. See, e.g., CALIFORNIA DEPARTMENT OF WATER RESOURCES, BULL. NO. 160-93, VOL. 1, 273-39, THE CALIFORNIA WATER PLAN UPDATE (1994) [hereinafter "CALIFORNIA WATER PLAN (1994)"]; MWD IRP PLAN, VOL. 1, *supra* note 98; METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, PLANNING AND RESOURCES DIVISION, THE REGIONAL URBAN WATER MANAGEMENT PLAN FOR THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA (October 1995) [hereinafter "MWD URBAN WATER MANAGEMENT PLAN"]. The MWD IRP Plan was relied upon to develop MWD's Urban Water Management Plan required pursuant to California Water Code § 10610.

135. See Rogers, *supra* note 23, at 37.

136. See Daniel M. Rodrigo et al., *Integrated Resources Planning and Reliability Analysis: A Case Study of the Metropolitan Water District of Southern California*, in ADVANCES IN THE ECONOMICS OF ENVIRONMENTAL RESOURCES, Vol. 1, 49, 50 (1996).

137. Cost-effectiveness can be defined as the means to achieve a given goal with the minimum waste, effort, expense or costs. Joseph P. Biniek, *Benefit-Cost Analysis: An Evaluation*, in CONTROVERSIES IN ENVIRONMENTAL POLICY 136, 148 (Sheldon Kamieniecki et al. eds., SUNY Press 1986); see also Edward S. Quade, *Introduction and Overview*, in COST-EFFECTIVENESS ANALYSIS: NEW APPROACHES IN DECISION-MAKING I (Thomas A. Goldman ed., Praeger 1967) ("[cost-effectiveness] consists of an attempt to minimize dollar costs subject to some mission requirement . . . or, conversely, to maximize some physical measure of output subject to budget constraints"). Cost-effectiveness requires that a specific purpose be established before employing the analysis. For example, the purpose could be to supply water for 20,000 additional residences over the next ten years. Cost-effectiveness analysis would quantify all the costs of proposed plans that could achieve the purpose, and select the plan that had the least total costs.

It is critical to distinguish between cost-effectiveness analysis and benefit-cost analysis. The former evaluates *which proposal* achieves a specific purpose at the least cost, the later evaluates *whether implementing a proposal* would result in more benefits than costs. For cost-effectiveness, the ends or benefits to be achieved are held constant, and the analysis is concerned solely with achieving the least-cost ("most efficient") means to achieve the ends. See HENRY M. LEVIN, COST-EFFECTIVENESS: A PRIMER 17-26 (Sage Publications 1983). In contrast, benefit-cost analysis is conducted to assess whether a specific end should be included in a project by comparing the monetary benefits with the monetary costs of achieving it. The end is included only if its achievement would result in more benefits than costs. See LEE G. ANDERSON & RUSSELL F. SETTLE, BENEFIT COST ANALYSIS: A PRACTICAL GUIDE 14-17 (Lexington Books 1977). Thus, a proposed alternative could be considered cost-effective yet be rejected under benefit-cost analysis because the alternative would result in the total costs exceeding benefits. Both analytical methods, however, further the economic efficiency objective. See *infra* note 154 and accompanying text. For further discussion of benefit-cost analysis, see *infra* note 142 and accompanying text.

138. See CALIFORNIA WATER PLAN (1994), *supra* note 134, at 275. It is important to note, however, that use of monetary values for environmental and social factors is always preferred because mixing monetary and relative values compromises the integrity of the LCP procedure. Moreover, the assignment of relative values is virtually no less subjective than trying to assign a monetary value to environmental and social factors.

139. For an example of the LCP planning process, see Rodrigo et al., *supra* note 136, at 57-58.

future water supply and demand, given projected water shortages due to fluctuating supply availability and changing needs. The reliability planning process first determines the most effective and efficient way to achieve an additional increment in water service reliability using the LCP methodology previously described.<sup>140</sup> The second step ascertains whether the benefits of avoiding shortage-related costs (e.g., business costs, residential costs and environmental costs) justifies the expense of adding the increment of reliability.<sup>141</sup> The second step is essentially a straightforward process of benefit-cost analysis.<sup>142</sup> A ninety-eight percent reliability level, for example, means that, given projected demands, available supplies and hydrologic conditions over the next 100 years, a water agency has determined that it is economically efficient (benefits exceed costs) to fulfill all anticipated demands in ninety-eight of the hundred years.<sup>143</sup> Reliability planning is essentially a procedure by which water agencies weigh different objectives (reliability, environmental protection and economic development) into the optimization of one objective function (economic efficiency).

Finally, Integrated Resource Planning ("IRP")

has been recently incorporated into water resources planning. The IRP process utilizes both LCP and reliability planning methods to arrive at the best strategy for balancing future water supply and demand, given multiple objectives to be achieved. The goal of IRP is to design a comprehensive water resources plan which achieves a desired water reliability level at the least-cost, given the range of potential water supply and demand management options and the environmental, institutional and political constraints to implementing those options.<sup>144</sup> The starting point for the IRP process is an established reliability goal. The agency then develops the least-cost resource mix of supply augmentation and demand management strategies within the established constraints (environmental, political and institutional) that achieves the desired reliability goal.<sup>145</sup>

The water resources planning processes described above raise two significant questions that will be addressed in Section IV. First, each planning process involves the problem of "valuing" costs or benefits that are difficult to reduce to dollar amounts or to assign relative values. This most often affects environmental and social factors for

140. Water service reliability can be defined as "the degree to which the performance of a supply system results in the delivery of water service to its customers in the amounts desired, within acceptable quality standards." *Id.* at 62.

141. See CALIFORNIA WATER PLAN (1994), *supra* note 134, at 274.

142. Benefit-cost analysis can be defined as simply a process of quantifying and tabulating all "costs" and "benefits" associated with the effects of a proposed project or plan, with the analytic result being that a project or plan is not acceptable unless cumulative benefits exceed total costs. In practice, however, the analytic process can be very complex and difficult. One author describes the process as follows:

In formal cost-benefit analysis, the analyst, using market and other data, estimates, on a willingness-to-pay basis, the gains and losses associated with all the major effects of a policy, program, or regulation. The analyst must go through a series of steps, which include, 'the *identification* of all nontrivial effects, *categorization* of these effects as benefits or costs, *quantitative estimation* of the extent of each benefit or cost associated with an action, translation of these into *common metric* such as dollars, *discounting* of future costs and benefits into the terms of a given year, and a *summary* of the costs and benefits to see which is greater.

The resulting sums must also be *compared across alternatives*. These tasks are Herculean. An enormous amount of highly skilled work goes into foreseeing the possible consequences of a program (which may differ considerably given other policies and decisions) and esti-

imating the benefits and costs associated with those consequences. A good cost-benefit analysis, which may run into several volumes, can be an impressive document.

Sagoff, *supra* note 6, at 33 (citing Richard N.L. Andrews, *Cost-Benefit Analysis and Regulatory Reform*, in COST-BENEFIT ANALYSIS AND ENVIRONMENTAL REGULATIONS: POLITICS, ETHICS, AND METHODS 107, 108 (Daniel Swartzman et al. eds., The Conservation Foundation 1982)). One of the central issues surrounding the usage of benefit-cost analysis is a determination of project effects that should, or are capable of being, quantified and calculated as a benefit or cost. The proper scope of benefit-cost analysis has become highly debated and criticized as environmental and social values have been translated into policy objectives to be achieved through the planning process. For a good synthesis of this debate, see Jaffe, *supra* note 59, at 59-63. This issue is discussed further, *infra*, Section IV.A.

143. This is the reliability level that the Metropolitan Water District of Southern California has established for wholesale deliveries to its member agencies. See METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, SOUTHERN CALIFORNIA'S INTEGRATED WATER RESOURCES PLAN, Draft Report No. 1107, Vol. 2, 2-4 to 2-5 (Dec. 1995) [hereinafter "MWD IRP PLAN, VOL. 2"].

144. See Susan L. Robinson, *Integrated Water Resource Planning in Las Vegas*, in INTEGRATED WATER RESOURCES PLANNING FOR THE 21ST CENTURY 548, 550 (Michael F. Domenica ed., Am. Soc'y of Civil Engineers 1995); see also MWD IRP PLAN, VOL. 1, *supra* note 98, at 1-7.

145. See MWD IRP PLAN, VOL. 2, *supra* note 143, at 2-4.

which there is no readily available market or valuation process. Second, the multi-objective planning framework is designed so that environmental and social objectives serve as “constraints” upon the “optimization” of the economic efficiency objective. There are no procedures for optimizing environmental or social objectives. Both of these issues raise fundamental questions as to the capacity of the current water planning processes to adequately incorporate environmental and social policy objectives.

#### IV. Critique of Current Water Resources Planning Processes

Environmental and social concerns are emerging as a fundamental part of the water

resources policy landscape. As documented in Sections II and III, new voices have demanded and asserted a role in the water resources policy-making processes. The result has been a shift in philosophy from continual development of new water supplies to balancing supply and demand through a combination of supply augmentation and demand management strategies. Current water resources policy literature is replete with statements about the need to incorporate and be sensitive to environmental and social values.<sup>146</sup> In fact, environmental and social objectives are often announced as “guiding principles” for water resources decision-making.<sup>147</sup>

Yet, with all the attention given to these concerns, why is there a continuing sense that environmental and social values are not adequately

146. See, e.g., BATES ET AL., *supra* note 3, at 178-198; Kelley, *supra* note 27, at 18-19; Rogers, *supra* note 23, at 38-39; David H. Getches, *Water Resources: A Wider World*, in NATURAL RESOURCES POLICY AND LAW: TRENDS AND DIRECTIONS, *supra* note 6, at 124, 139-46; PRASIFKA, *supra* note 28, at 239-51; WINPENNY, *supra* note 69, at 1-28. See generally Ingram et al., *supra* note 6; Daniel P. Loucks, *Sustainability Criteria in Project Planning*, in INTEGRATED WATER RESOURCES PLANNING FOR THE 21ST CENTURY, *supra* note 144.

147. See Urban Water Management Planning Act and Agricultural Water Management Planning Act, *supra* notes 125-29 and accompanying text. In 1992, MWD Board of Directors adopted eleven goals for its planning and operation, one of which was an “[e]nvironmental goal to assure adequate consideration of environmental effects and appropriate mitigation of its activities.” METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA—BOARD OF DIRECTORS, GOAL AND OBJECTIVES (Los Angeles 1992). Additionally, the Board adopted seven guiding principles, including the following environmental principle: “Environment: Establishes an approach to integrating environmental values and awareness into Metropolitan’s decision-making and makes a commitment to provide water to accommodate regional growth.” *Id.* The MWD IRP also contains several statements about the centrality of public participation to the IRP process. For example, the Plan states, “[b]ecause of the diverse needs and institutional arrangements in the region, the success of the IRP would only be achieved through an open and participatory process that involved the major stakeholders,” and further, “[i]n total, over 450 participants representing environmental, business, agricultural, community and water interests, provided crucial input to the process.” MWD IRP PLAN, Vol. I, *supra* note 98, at 1-8, 3-2.

In a similar fashion, the State Water Plan contains important statements about the achievement of environmental and social objectives, and the inclusion of public participation. The “Forward” of the Plan contains the following statement:

[The Plan] was developed with extensive public involvement . . . An outreach advisory committee made up of representatives of urban, agricultural, and environmental interests was established . . . to assist the Department of Water Resources in preparing [the Plan] . . . . The committee met regularly to review and comment on the content and the adequacy of work in progress. Public hearings in each of the State’s ten major hydrologic regions were held by the California

Water Commission to receive comments from the public. . . . The inclusion of environmental water needs, the commitment to implementation of extensive water conservation measures, and public involvement in developing this plan reflect current socioeconomic priorities.

CALIFORNIA WATER PLAN (1994), *supra* note 134, at iii-iv. Most recently, the CALFED Bay-Delta Program established a mission statement with the following environmental objective to be achieved by the adopted solution for the Bay-Delta problem: “Improve and increase aquatic and terrestrial habitats and improve the ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.” *Mission Statement, Objectives and Solution Principles*, CALFED BAY-DELTA PROGRAM REVISED PHASE II REPORT EXECUTIVE SUMMARY (visited Feb. 23, 2000) <<http://calfed.ca.gov/current/execsum.html>>. CALFED has also published the following summation of how the program has included public participation in its development of a solution to the Bay-Delta problem:

The public has a central role in the development of a long-term solution. A group of more than 30 citizen-advisors selected from California’s agriculture, environmental, urban, business, fishing, and other interests with a stake in finding long-term solutions for the problems of the Bay-Delta Estuary have been charged under the Federal Advisory Committee Act as the Bay-Delta Advisory Council (“BDAC”). BDAC advises the CALFED Program on its mission and objectives, the problems to be addressed and proposed actions. BDAC also provides a forum for public participation, and reviews reports and other materials prepared by CALFED staff. . . . In the first phase, the CALFED Program . . . conducted meetings and workshops to obtain public input . . . and held public scoping sessions to determine the focus and content of the EIS/EIR. . . . During Phase II . . . the release of the documents was followed by a 105-day public comment period. Seventeen public hearings were held around the state during the public comment period.

CALFED *Bay-Delta Program Overview*, *supra* note 130. See *supra* notes 130-34 and accompanying text for further discussion and explanation of the CALFED Bay-Delta Program.

reflected in the outcome of water resources policies? This sense of non-inclusion of environmental and social values is not new; it has been a persistent issue since the late 1960s.<sup>148</sup> Have decision makers just given lipservice to these values? Are statements made just to placate the latest interest groups? This is unlikely given the increasing extent to which those voicing environmental and social concerns are able to influence, or be included in, the policy-making process. The doors of the decision-making room have been opened to criticism, scrutiny and public participation.<sup>149</sup>

This article suggests that environmental and social values contained in water *policies* are not adequately incorporated into water resources *planning*. While critical focus has been given to the policy-making process and has resulted in the inclusion of environmental and social values in policy objectives, there has not been sufficient attention given to the policy implementation process. Planning is the means by which policies are operationalized and serves as a foundation for subsequent decision-making. Without a concomitant change in planning processes, changes in values toward water as reflected in policy objectives are likely to have little impact upon final outcomes. The result is a widening gulf between patterns of water use and evolving sociological values.<sup>150</sup>

148. In 1973, shortly after environmental and social concerns became a part of the water resources dialogue, the report of the National Water Commission, highlighted the inadequacy of the consideration given to these issues when it stated that "[t]he nation's record of taking ecological processes and environmental values into account in water development and use has been unsatisfactory . . . [and] plans often do not reflect the interest of the general public, large segments of which have little voice in it." NATIONAL WATER COMMISSION, *supra* note 48, at 205, 366. In 1979, critics similarly concluded, "[t]he environmental quality objective is a firmly established fact in today's planning scene, though a formal methodology for dealing with environmental problems is still lacking. . . . [Additionally,] [t]he extent to which these [social] impacts are considered in a project formulation is not well defined, but it appears that social impacts are still not considered in depth by planners." Ray K. Linsley, *Two Centuries of Water Planning Methodology*, 105 J. WATER RESOURCES PLAN. & MGMT. Div. 39, 42-43 (1979). And most recently, water resource planners noted that, "[t]here are two major areas where the current [planning] approach seems to be in trouble . . . (ii) incorporating environmental and social values directly into planning." Rogers, *supra* note 23, at 35.

The critical question examined in this section is whether current planning processes have the capacity to adequately consider, include and give effect to the environmental and social values voiced in the policy arena. The following critique of current multi-objective water resources planning methodologies answers this question in the negative for two primary reasons. First, water resources planning has continued to rely heavily upon the use of quantitative analytical tools. This reliance forces planners to attempt to quantify non-market environmental and social factors, resulting in a less than desirable inclusion of environmental and social objectives in the planning process. Second, multi-objective planning in water resources has remained a process of constrained optimization in which only one objective is optimized, subject to the constraints of secondary objectives. Economic efficiency continues to be the primary objective, with environmental and social objectives serving only as constraints and receiving a minimum level of consideration in the planning process.

#### A. Valuation of Environmental and Social Factors

Two current water resources planning methods, LCP and reliability planning, continue to necessitate the quantification of environmental and social factors, so they can be

149. See BATES ET AL., *supra* note 3, at 152-77; GOTTLIEB, *supra* note 95, at 137-46; GOTTLIEB, *supra* note 9, at 218, 234, 240 & 246-253. "Policy decisions are more susceptible than ever to public influence. First, the overlay of environmental law has already opened the process so that there are public hearings before most big decisions. Second, the public and groups representing it (citizen associations, water-user groups, and environmental organizations, for example) are increasingly informed and skilled at participation and advocacy." BATES, ET AL., *supra* note 3, at 177.

150. Political scientists have long recognized the need for values to be included throughout the decision making process:

It is not merely in the phase of problem identification that the choice of standards is important. Each step in the process of decision making depends on the initial stipulation of values to be served. We cannot just "weigh" or "compare" policy alternatives. We must weigh and compare them against something. At the end of analysis, we cannot merely make decisions. We also have to justify them.

Charles W. Anderson, *The Place of Principles in Policy Analysis*, 73 AM. POL. SCIENCE REV. 711, 712 (1979).



compiled with numeric economic factors to produce an aggregate outcome.<sup>151</sup> Using analytical tools that require quantification of all factors is problematic when attempting to incorporate environmental and social objectives in the planning process. Environmental and social objectives cannot be easily translated into quantifiable numbers.<sup>152</sup> These objectives are derived from sociological values and are not premised upon particular costs or benefits that might result from their implementation. The "value" accorded to environmental and social objectives is not established by marketplace mechanisms, but is instead weighted through a process of public deliberation.

LCP and reliability planning both contain a process of cost-effectiveness analysis;<sup>153</sup> reliability planning additionally involves an additional second step of benefit-cost analysis.<sup>154</sup> Both cost-effectiveness and benefit-cost analysis are designed to produce a conclusion derived from aggregated data that allows a decision maker to determine that Plan A is preferable to Plan B or Plan C because it is more cost-effective or has a higher benefit-cost ratio.<sup>155</sup> The outcome of each analysis is expressed as a numerical figure, requiring quantification of all factors.<sup>156</sup> Moreover, the integrity of the analytical result is dependent upon the inclusion of every cost or benefit, no

matter how intangible or unquantifiable.<sup>157</sup>

Cost-effectiveness analysis, or fiscal efficacy testing, has been utilized in water resources planning since its inception. Planning has always sought to find the least costly means for achieving a purpose. When single-purpose planning was the norm, the only concern of planners was to design water resources projects that required the least amount of fiscal outlays or resource inputs to accomplish the purpose.<sup>158</sup> Cost-effectiveness has continued to be a foundation in water resources planning, even as the purposes and objectives of water policies have changed.

When multi-purpose planning emerged in the early 1900s, it was found that cost-effectiveness analysis was appropriate for analyzing the fiscal impacts of the project, but was not capable of evaluating all the potential costs and benefits of a multi-purpose project. Benefit-cost analysis was developed to fill this void, and was officially incorporated into water resources planning in the 1930s by the federal government and in 1945 by the California legislature.<sup>159</sup> This analytic tool allowed planners to tabulate costs and benefits that were outside the traditional resource costs of time, labor and material inputs. Moreover, it allowed planners to grapple with the increasingly diverse set of public benefits and future costs

151. For LCP, see *supra* notes 136-39 and accompanying text. For reliability planning, see *supra* notes 140-42 and accompanying text.

152. See Loucks, *Sustainability Criteria in Project Planning*, *supra* note 142, at 154. "Such benefit-cost analyses are only suitable when dealing with easily quantifiable expenditures and returns over time. They cannot be applied when dealing with environmental issues and resources that are not priced in the market place . . ." *Id.* at 143.

153. See *supra* notes 137, 140 and accompanying text.

154. See *supra* notes 141-42 and accompanying text.

155. See RICHARD LAYARD & STEPHEN GLAISTER, *COST-BENEFIT ANALYSIS 1-2* (Cambridge Univ. Press, 2d ed., 1994). "The general question that a cost-benefit analysis sets out to answer, is whether a number of investment projects, A, B, C, etc., should be undertaken and, if funds are limited, which one, two, or more among these specific projects that otherwise qualify for admission, should be selected." EDWARD J. MISHAN, *COST-BENEFIT ANALYSIS* 58 (Praeger 1976). Cost-effectiveness is broadly defined as an "analytic study designed to assist a decision maker in identifying a preferred choice among alternatives." Quade, *supra* note 137, at 1.

156. See Steven Kelman, *Cost-Benefit Analysis in Environmental, Safety, and Health Regulation: Ethical and Philosophical*

*Considerations, in COST-BENEFIT ANALYSIS AND ENVIRONMENTAL REGULATIONS: POLITICS, ETHICS, AND METHODS*, 137, 143 (Daniel Swartzman et al. eds., The Conservation Foundation 1982). "In order for cost-benefit calculation to be performed, all costs and benefits must be expressed in a common metric, typically dollars." *Id.*

157. See Michael F. Sheehan, *Economism, Democracy and Hazardous Wastes: Some Policy Considerations, in CONTROVERSIES IN ENVIRONMENTAL POLICY*, *supra* note 137, at 108, 114. Writing about the process of quantifying nonmarket factors, the author cited two economists who concluded:

In some cases, it may be best to avoid quantifying some intangibles as long as possible, carrying them along instead in the form of a written paragraph of description. . . . [but] We will find no escape from the numbers. . . . Ultimately the final decision will implicitly quantify a host of intangibles; there are no incommensurables when decisions are made in the real world.

*Id.* at 114 (citing EDITH STOKEY & RICHARD ZECKHAUSER, *A PRIMER FOR POLICY ANALYSIS* 153 (W.W. Norton 1978)).

158. See *supra* notes 11-12 and accompanying text.

159. See *supra* note 20 and accompanying text.

that accrued from massive, long-term water plans.<sup>160</sup> Benefit-cost analysis was extended to include the following factors: (1) intertemporal distribution of resource production and consumption; (2) discounted future costs and benefits of facilities planned but scheduled for later development; (3) project benefits and costs that arise from physically interdependent economic activities; and (4) costs or benefits associated with *not* adding a particular feature to the proposed project.<sup>161</sup> Benefit-cost analysis became a tool for determining whether a particular facility or component should be included in the multi-purpose plan because it increased total benefits more than the costs. Cost-effectiveness analysis was limited to determining the least-cost means of implementing the plan, once its scope had been defined.<sup>162</sup>

Both these analytic methods were developed to achieve the dominant water policy objective of the pre-1960 era, economic efficiency, which seeks to ensure that society

receives an overall net economic benefit from water resources plans.<sup>163</sup> Cost-effectiveness and benefit-cost analysis are ideally suited to serve this objective because they translate every factor in an analysis into a numerical value, produce an aggregate outcome and enable planners to definitively conclude whether a proposed water resources plan is economically efficient.<sup>164</sup> When multi-objective water policies first emerged in the late 1960s, however, planners immediately noted the difficulty encountered in trying to address newly articulated environmental and social objectives within the existing planning paradigm.<sup>165</sup> The problem was how to incorporate environmental and social factors into the cost-effectiveness and benefit-cost analyses, when such factors are neither priced in the market place nor readily translatable into numerical values.<sup>166</sup>

There were limited attempts to develop a formal planning method for addressing non-market factors outside cost-effectiveness or

160. See OTTO ECKSTEIN, *WATER RESOURCE DEVELOPMENT: THE ECONOMICS OF PROJECT EVALUATION* 19-46 (Harvard Univ. Press 1958); see also WHITE, *supra* note 2, at 41-42.

161. See ECKSTEIN, *supra* note 160, at 19-46.

162. See *id.* at 2-8.

163. The term "economic efficiency" as used here refers to the "Kaldor-Hicks" notion of an efficiency criterion, whereby a proposed plan is deemed efficient and therefore desirable "if the gains exceed the losses, so that the gainers could compensate the losers and retain a residual gain." JOHN KRUTILLA & ANTHONY FISHER, *THE ECONOMICS OF NATURAL ENVIRONMENTS: STUDIES IN THE VALUATION OF COMMODITY AND AMENITY RESOURCES* 28-29 (Resources for the Future 1975). The Kaldor-Hicks notion of economic efficiency is the criterion upon which benefit-cost analysis is based. See ANDERSON, *supra* note 137, at 13. Economists also refer to another efficiency criterion, known as "Pareto-optimality," whereby a proposed plan is efficient only if gains to one group can be made without burdening or being opposed by anyone. Use of this stringent Pareto-efficiency criterion, however, has been criticized as leading to policy or planning paralysis. See *id.*; *Appendix* (equity or fairness) (arguing that "literal adherence to the Pareto-superiority criterion could be paralyzing").

164. NATIONAL WATER COMMISSION, *supra* note 48, at 380-81. It is important to note that numerical outcomes produced by cost-effectiveness and benefit-cost analysis have often been attacked as erroneous or misleading. The basis of this criticism is that it is relatively easy to manipulate "values" used in these analyses to produce a desired result. Even where an analysis is done perfectly, the results may be misleading because of the possibility of willful or negligent misuse of the process. See Daniel Swartzman, *Cost-Benefit Analysis in Environmental Regulation: Sources of Controversy*, in *COST-BENEFIT ANALYSIS AND ENVIRONMENTAL*

*REGULATIONS: POLITICS, ETHICS, AND METHODS*, *supra* note 156, at 53, 67-68. Not only are there severe difficulties in valuing nonmarket environmental and social factors as discussed in this section, but even the method of assigning values to economic factors has been subject to criticism. See *id.* at 59-61; Jaffe, *supra* note 59, at 60, 62.

165. "The benefit-cost ratio limits itself to questions of economic efficiency. It does not take into account those non-economic activities such as environmental quality. It presents an incomplete picture of the planning scenario. Economic impacts are considered; noneconomic impacts are not." MULDER ET AL., *supra* note 11, at 14-15. "Planning tends to bury in the arithmetic of benefit-cost analysis important issues that must be decided on a non-quantitative and judgmental basis." NATIONAL WATER COMMISSION, *supra* note 48, at 366.

166. See Shabman, *supra* note 22, at 30-34; Daniel P. Loucks, *Analytical Methods for Multiobjective Planning*, in *SOCIAL AND ENVIRONMENTAL OBJECTIVES IN WATER RESOURCES PLANNING AND MANAGEMENT*, *supra* note 4, at 169; WATER RESOURCES CENTER, *supra* note 121, at 11-12. At a California policy conference on water, development and the environment, a water resource planner with EBMUD framed the issue this way:

Are the present evaluation procedures for determining cost-benefit ratios antiquated? I do not believe it is the procedures, but some of the items that we are trying to crank into the procedures . . . It will be of great value, however, for economic evaluation procedures used by the state, federal and other agencies over the past 20 years or more to be modified to better quantify some of the environmental impacts. This will not be easy .

*Id.* at 12.

benefit-cost analyses, but implementation of these procedures was never widespread.<sup>167</sup> Instead, planners have retained the centrality of cost-effectiveness and benefit-cost analyses in water resources planning<sup>168</sup> and focused their efforts on three strategies: (1) developing tools that more accurately quantify and measure non-economic environmental and social factors; (2) incorporating environmental objectives through compliance with regulatory requirements; and (3) incorporating social objectives through public participation components. The shortcomings of the first strategy will be addressed in the remaining part of this section. Discussion of the second and third strategies is deferred until the next section.<sup>169</sup>

To incorporate environmental and social objectives in the planning process, planners have attempted to develop new methods for "valuing" these essentially nonmarket factors.

167. There were two principle efforts made at the national level. In the 1960s, Senate Document 97 was developed and initiated by President Kennedy. See *supra* note 24 and accompanying text. The document recognized that economic considerations were only one factor in project evaluation and that benefit-cost analysis should be limited to its proper context. Yet, there were few actual changes that resulted from Senate Document 97 and benefit-cost analysis remained the sole analytic tool for several more decades. See Jaffe, *supra* note 59, at 68.

The *Principle and Standards for Planning Water and Related Land Resources* [hereinafter "P&S"] was approved by President Nixon and published in 1973. See *supra* note 62. The P&S attempted to establish two separate evaluation processes for water resources planning known as "accounts." One of the accounts was to include effects on the environment, which were to be quantified to the extent possible and described qualitatively where necessary. The P&S also called for the separate evaluation of "social well-being." See Jaffe, *supra* note 59, at 70-71. But the promises of the P&S remained largely unrealized until the Principles and Guidelines replaced them in 1980 and reinstated economic efficiency as the sole evaluation criteria for water resource planning. See *id.* at 71; Knesse, *supra* note 20, at 29. For a good discussion of how the "accounts system" of planning was designed to operate, see MULDER ET AL., *supra* note 11, at 15-6. For an example of a water resources plan that attempted to implement and follow the P&S, see DAVID C. MAJOR & HARRY E. SCHWARZ, *LARGE-SCALE REGIONAL WATER RESOURCES PLANNING* 33-48 (Kluwer Academic Publishers 1990).

168. As noted above, both the LCP and reliability planning processes currently used in California rely upon these analytic tools. See *supra* notes 136-43 and accompanying text. Articles and books on resources planning continually note that benefit-cost analysis remains the primary evaluation tool. See, e.g., Partha Dasgupta & Karl-Göran Mäler, *The Environment and Emerging Development*, in *COST-BENEFIT ANALYSIS*, *supra* note 155, at 319 (arguing that unless environmental resources are viewed as "economic goods" they will continue to be neglected in policy design and implementation); BLACK, *supra* note 71, at 177-214 (presenting ben-

The following example demonstrates how this is often accomplished. For a proposal to divert and store 500,000 acre-feet of water from a river, the evaluation process would first attempt to quantify the environmental and social impacts of this diversion by placing an economic value on tangible factors such as fish and wildlife losses, new or destroyed recreational opportunities, as well as jobs created, retained or lost. Additionally, to capture "values" that are less tangible, a contingent valuation method such as a preference survey might be used. Preference or contingent valuation surveys are a means by which planners can determine people's willingness-to-pay (economic preference) to gain certain benefits or avoid particular costs for which there is no readily available market.<sup>170</sup> In the present hypothetical, a preference survey could seek to quantify what people would be willing to pay to leave the 500,000 acre-feet of water

efit-cost analysis as the fundamental process for water resources project evaluation); see also FELDMAN, *supra* note 39, at 157-67 ("despite criticisms by many political scientists and economists of the misuse, misapplication, or overreliance upon this methodology by government agencies, benefit-cost analysis remains secure because it is a relatively simple and lucid way to depict advantages and disadvantages of natural resources development"); Jaffe, *supra* note 59, at 71 ("[t]raditional [benefit-cost] analysis has remained the primary evaluation tool. . . . The formulation of . . . plans . . . has been limited to identifying variations of the . . . plan which are "least bad" with respect to environmental values. . . . The objectives of . . . social well-being . . . have been ignored").

One water resources planner recently attempted to document some of the general criteria used for evaluating proposed water plans, the majority of which the author defines as relying upon some form of cost-effectiveness or benefit-cost analysis: (1) the economic efficiency criterion involves the straightforward process of ensuring that economic benefits exceed costs, where both are discounted at the proper rate, (2) social equity analysis is seen as evaluating whether there is capacity to reallocate water use to "higher value uses [that] produce net social benefits," and (3) consideration of environmental factors is regarded as a process of quantifying "environmental costs as elements in economic costs, to be taken into account in cost-benefit analysis and price-fixing." WINPENNY, *supra* note 69, at 75-90.

169. See *infra* notes 181-229 and accompanying text for this analysis.

170. "The contingent valuation method explicitly elicits information concerning the minimum level of compensation required by an individual to forgo receiving a particular level of a public good or the maximum amount the individual would be willing to pay to obtain the nonmarket good or service." G. CORNELIUS VAN KOOTEN, *LAND RESOURCE ECONOMICS AND SUSTAINABLE DEVELOPMENT: ECONOMIC POLICIES AND THE COMMON GOOD* 150 (U.B.C. Press 1993). See also generally RONALD G. CUMMINGS ET AL., *VALUING ENVIRONMENTAL GOODS: AN ASSESSMENT OF THE CONTINGENT VALUATION METHOD* (Rowman & Allanheld 1986).

instream for environmental benefits or, conversely, what people would be willing to pay to increase the reliability of their water service or avoid a certain level of water rationing.

Despite similar vigorous attempts to quantify environmental and social factors for inclusion in the established planning methods, there remains a continuing sense that environmental and social objectives have not been adequately addressed.<sup>171</sup> This shortcoming can be traced to water resources planning processes that operate under the premise that all policy objectives are derived from economic values. Environmental and social objectives, however, are derived from sociological values.<sup>172</sup> The distinction is critical because the process by which economic and sociological values are formulated points to the necessity for a different planning process to achieve these objectives.

Economic values (the desire for obtaining a good or service, or avoiding an economic cost) can be assigned a weight in monetary terms which measures society preferences for the good or service in a dollar amount. Economic values have been historically accorded monetary weights, and continual market transactions ensure that the assigned weight is a relatively accurate reflection of society's preference. In contrast, sociological values (the desire for achieving a social benefit or avoiding a social cost) have not historically been

weighted in monetary terms; rather, preferences for those values have turned upon the merits of arguments that support the value. The "market" in which these merits are traded and accorded weight is a forum for discussion and debate, not monetary transactions.<sup>173</sup>

This distinction between types of values makes clear that not only must environmental and social values be evaluated in a deliberative forum, the planning process must also have some deliberative methodology to properly translate and incorporate these values in planning outcomes. Former Yale economics professor Charles Lindblom argued, in his famous article *The Science of "Muddling Through,"*<sup>174</sup> that for complex social problems it is impossible to clarify values in advance of the planning process. The values people articulate vary with circumstances, so that differences among relative values cannot be reconciled outside a specific context.<sup>175</sup> Instead, weighing, ranking and selecting values to be promoted is done through a choice among planning alternatives. For complex social problems, choosing the means to solve the problem is an inherently value-laden process that simultaneously defines the objectives to be achieved.<sup>176</sup>

If environmental and social values are to be reflected in policy outcomes, they must be incorporated in the planning process. This would require the development and implementation of procedures which allow

MWD used preference surveys in the IRP process, to "determine willingness to pay for services that are typically difficult to measure, such as recreation, environmental protection, and resource reliability." Rodrigo et al., *supra* note 136, at 71. MWD also used preference surveys in its reliability planning to quantify as many of the impacts from water rationing as possible. For example, it used a contingent valuation survey to determine that households would pay on average \$10 to \$20 per month every other year to avoid severe water shortages. MWD also relied on another survey that estimated that a fifteen percent shortage of water supply to Southern California's industrial sector would result in a loss of 16,000 jobs and over \$3 billion in production. See CALIFORNIA WATER PLAN (1994), *supra* note 134, at 309. For another example of preference surveys used in water resources, see Wesley N. Musser et al., *Contingent Valuation in Resolving Local Public Water Problems*, in WATER QUANTITY/QUALITY MANAGEMENT AND CONFLICT RESOLUTION: INSTITUTIONS, PROCESSES, AND ECONOMIC ANALYSIS, *supra* note 110, at 467.

171. See *supra* note 146 for a list of critics who have highlighted this continuing failure in water resources planning. For a general critique on the failure of contingent valuation meth-

ods to adequately reflect environmental and social concerns in analytic and decision making processes, see Kelman, *supra* note 156, at 143-48.

172. "Sociological values" refer to those beliefs and convictions that we hold about what our society should do; our collective identity and aspirations as a community. Sociological values are public values arrived at through a collective agreement about what actions the community should take to promote these values. Distinguishable are economic values which can be expressed "collectively," but are arrived at through the aggregation of individually expressed preferences.

173. See Sheehan, *supra* note 157, at 115; Mark Sagoff, *Economic Theory and Environmental Law*, 79 MICH. L. REV. 1393, 1417 (1981).

174. Charles E. Lindblom, *The Science of "Muddling Through,"* in CLASSIC READINGS IN URBAN PLANNING 35 (Jay M. Stein ed., McGraw-Hill, Inc. 1995).

175. See *id.* at 38-39.

176. See *id.* at 40.

for participation, debate and deliberation among affected interests. The application of economic analysis tools, such as cost-effectiveness, benefit-cost and preference surveys must be limited to circumstances in which the marketplace, through countless expressions of individual preferences, ensures the monetary values assigned are an accurate reflection of our collective economic predisposition.<sup>177</sup>

To argue that environmental and social objectives can be satisfied through the existing analytic framework by identifying economic factors labeled as “social” or “environmental” ignores the fact that these objectives are defined without reference or consideration of their economic effects. Environmental and social objectives were not established by referencing the possible economic benefits that might be gained or costs that might be incurred if the objectives were achieved. Instead, they were derived from sociological values that express our collective will as a society. They are normative values that embody an ideal for what we would like our society to achieve, independent of costs or benefits. Thus, economic valuation of environmental

and social objectives does not accurately reflect the weight that society accords them.<sup>178</sup>

This is not to say that economic impacts labeled as “environmental” or “social” should be ignored. To the contrary, the continual expansion of economic analysis to include the valuation of economic impacts that are difficult to measure for lack of ready market is a positive trend. Internalizing externalities is critical to understanding the full economic import of our actions.<sup>179</sup> But this process should not be considered an adequate achievement of environmental and social objectives through the planning process. Methods that create a deliberative process, rather than a technical process, must be utilized.

Current water resources planning has attempted to provide a deliberative forum through the inclusion of “public participation” processes. This is a step in the right direction. However, as explained in the next section, the planning framework within which public participation occurs has limited the capacity of this process to fully manifest environmental and social objectives in planning outcomes.<sup>180</sup>

177. Professor Stephen Kelman, in critiquing the benefit-cost analysis process, noted that the process of trying to quantify nonmarket factors erroneously assumes “there is no difference between how people value things in private, individual transactions and how they would wish a social valuation of those same things to be made in public, collective decisions.” Kelman, *supra* note 156, at 145. Kelman notes that this assumption grows naturally out of the “highly individualistic microeconomic tradition.” *Id.* He suggests a better alternative, that receives greater support, is when “public, social decisions provide an opportunity to give certain things a higher valuation than we choose, for one reason or another, to give these things in our private, individual activities.” *Id.* More recently, water policy analyst David Feldman supported Kelman’s conclusion when he wrote that economic analysis:

[I]nadequately accounts for environmental impact and fails to elucidate the objectives of public policy. It also ignores the range of concerns that people have about the uses of natural resources. For this reason, it cannot be normatively defended by reference to some compelling social good that is reached through careful deliberation.

FELDMAN, *supra* note 39, at 6.

178. Harvard Law professor Laurence Tribe has pointed out that to incorporate social values in analytic techniques in the form of preferences requires relying on the flawed premise that “characterizing all values as expressions of human preferences does not affect their content or distort their perspective.” Laurence H. Tribe, *Ways Not to Think About Plastic Trees: New*

*Foundations for Environmental Law*, 83 YALE L.J. 1315, 1329 (1974). Over a decade earlier, water resources economist Otto Eckstein supported Tribe’s conclusion when he wrote that benefit-cost analysis cannot be the only criterion in water resources decisions because there are social ideals to be considered that “are based on ethical value judgments which are clearly outside the realm of economics.” ECKSTEIN, *supra* note 160, at 39.

More recently, University of Chicago philosophy professor Alan Gerwith similarly argued that to evaluate social objectives such as “life health, safety, education, and many others,” solely on a monetary criterion, ignores the moral considerations which underlie these objectives. Alan Gerwith, *Two Types of Cost-Benefit Analysis*, in *UPSTREAM/DOWNSTREAM: ISSUES IN ENVIRONMENTAL ETHICS* 205, 208 (Donald Scherer ed., Temple Univ. Press 1990). He points out that “there are other, normatively prior ways of assessing basic human values—ways that view these values as objects of rights and hence as setting normatively necessary duties to protect the values, quite apart from monetary considerations.” *Id.* at 209. For these reasons, Gerwith concludes that there must be a separate process of analyzing economic considerations (monetary opportunity costs) and moral considerations (authoritative, substantive, and distributive questions). *See id.*

179. *See* HAL R. VARIAN, *MICROECONOMIC ANALYSIS* 259-63 (W.W. Norton 1984) (discussing the concept of externalities as representing economic costs that are excluded from a decision maker’s consideration and how cost internalization techniques make possible more efficient decisions where economic factors have no functioning markets).

180. *See infra* notes 219-29 and accompanying text.

## B. Environmental and Social Objectives as "Constraints"

### 1. The Planning Framework

Beginning in the late 1960s, water resources policies began to include environmental and social objectives in addition to historical economic goals, necessitating the development of a planning process that could effectively address multiple objectives. The multi-objective planning framework that evolved over the next several decades has been succinctly described as a process of "constrained optimization," whereby a single objective is optimized subject to the constraints of other objectives.<sup>181</sup> This process has been more cynically described as selecting one objective to be optimized, with a final outcome that is "least bad" with respect to the other objectives.<sup>182</sup>

MWD's recent Integrated Resource Planning ("IRP") process provides a good example of constrained optimization of multiple objectives. The IRP states that "[t]he major objective for the IRP was developing a comprehensive water resources plan that ensures: (1) reliability, (2) affordability, (3) water quality, (4)

diversity of supply, and (5) adaptability for the region, while recognizing the environmental, institutional and political constraints to resource development."<sup>183</sup> Although water quality, affordability and reliability have sometimes been referred to as environmental or social purposes, their usage in the IRP demonstrates that these terms are primarily economic goals in this context.<sup>184</sup> Grouped together, the five numbered purposes embody the economic efficiency objective that the IRP process optimizes, subject to environmental, institutional and political constraints.<sup>185</sup>

The following statement demonstrates how the process of constrained optimization operated in the IRP:

The institutional, political, and environmental constraints in the development of a resources strategy are all important factors that need to be addressed. For example, although imported supplies may appear to be lower in costs than some local resources, the success of imported resources development may be difficult

181. See *supra* notes 18, 23 and accompanying text. The following is a more complete description of the constrained optimization planning process:

- 1) Define the objectives to be obtained to satisfy public demands and needs;
- 2) Define both resource and institutional constraints that will affect obtaining of any of the objectives;
- 3) Determine possible relationships and impacts of the constraining factors on achieving the desired objectives; and
- 4) Optimize the goal, which means satisfying the individual objectives with respect to the parameters set by the constraining factors.

See generally DAVID C. MAJOR, MULTIOBJECTIVE WATER RESOURCES PLANNING (American Geophysical Union 1977). For an explanation and example of how multiple objective optimization has been effectuated, see MAJOR & SCHWARZ, *supra* note 167, at 33-48 (describing a water resources planning process in which three objectives are to be achieved: economic efficiency, regional well-being, and environmental quality).

182. See Jaffe, *supra* note 59, at 71.

183. MWD IRP PLAN, VOL. 1, *supra* note 98, at 1-7.

184. "Affordability" is defined as the "goal of achieving reliability in the least-cost manner for the entire region." MWD IRP PLAN, VOL. 1, *supra* note 98, at 3-26. Assessing the affordability of water was accomplished by a comparison of local water costs to other regions throughout the nation, a contingent valuation survey of willingness-to-pay to avoid water shortages, and

a comparison with other utility costs. See *id.* at 3-35 to 3-39. The emphasis was clearly on making the region's water supply cost-competitive.

"Water quality" is defined as the achievement of a level of water quality which allows implementation of "cost-effective local groundwater conjunctive use storage and water recycling projects" to avoid the need for more expensive treatment of high salinity water. *Id.* at 3-24, 3-26. The social benefits of water quality result from compliance with State and Federal water quality requirements. See MWD IRP PLAN, VOL. 2, *supra* note 143, at 2-5 to 2-6. While the need to consider social objectives was noted ("Metropolitan's treated water facilities must also consider the public's level of satisfaction"), it is unclear how, or even if, this objective was considered in the IRP process. See *id.*

Social objectives such as "equity" are mentioned in the context of MWD's rate structure, but "equity" is never defined in this context and it is unclear how equitable concerns factored into the IRP process. See *id.* at 2, 2-9. Moreover, "equity" and "fairness" are listed elsewhere as "business principles" with the emphasis on reliability and maintaining a balance between cost and benefits. See *id.* at 2-3; MWD IRP PLAN, VOL. 1, *supra* note 98, at 5-7. As noted before, the "reliability" goal is derived through its own constrained optimization process in which the cost-effectiveness objective is optimized. See *supra* notes 140-42 and accompanying text.

185. The MWD IRP uses "political constraints" to identify what could be more appropriately termed social or community constraints. The term connotes a concern for the political acceptability of the IRP (i.e., the degree to which the plan is acceptable to the communities that it will impact).

to achieve without a strong commitment to utilize feasible local resources (conservation, water recycling, and groundwater) first.<sup>186</sup>

Embodied in the above statement is a notion that economic efficiency would be optimized by relying heavily on imported water resources. However, optimization of this objective is constrained by environmental and political (social) objectives. Thus, the IRP must include some amount of local water resources sufficient to satisfy the constraining objectives. Another example of constrained optimization is seen in the IRP's consideration of conservation strategies. Conservation is valued only in its capacity to contribute to the economic efficiency of the IRP.<sup>187</sup> Environmental benefits that flow from conservation are relegated to a minor consideration in the analysis, whereas economic measures are the primary means for valuing conservation proposals.<sup>188</sup> Thus, conservation is undertaken primarily to optimize the economic efficiency objective, with recognition that it will also satisfy constraining environmental and social objectives. The result of the IRP's constrained optimization planning process is a final water resources plan that is marginally less harmful to the environment and marginally more acceptable to the community. Excluded are strategies that actually optimize environmental or social objectives.<sup>189</sup>

The constrained optimization framework for achieving multiple planning objectives

presents a serious challenge to the incorporation of sociological values. For economic objectives to be "constrained" by either environmental or social objectives, or vice versa, a common basis for evaluation must be established. As was discussed in Section IV.A., where possible, the common practice has been to monetize environmental and social objectives. The results of this practice, however, have been unsatisfactory.<sup>190</sup> Alternatively, several efforts have been made to evaluate qualitative aspects of environmental and social objectives separately from economic objectives, and then attempt to reconcile quantitative and qualitative measures.<sup>191</sup> This planning procedure, however, was vigorously resisted and eventually failed for want of acceptance.<sup>192</sup>

With a need to address multiple planning objectives, and a failure to develop adequate analytic tools for environmental and social objectives, water resources planners looked for other processes that could provide a means for giving environmental and social objectives sufficient consideration. Planners sought to identify procedures that, if completed, would be accepted as having accorded sufficient weight to these objectives.<sup>193</sup> By focusing upon the adequacy of *process*, planners were relieved from struggling with developing standards for evaluating whether sufficient *substantive* consideration was given to environmental and social objectives. Planners seized upon the environmental review process as codified in CEQA and NEPA<sup>194</sup> as the primary procedure

186. MWD IRP PLAN, VOL. 1, *supra* note 98, at 3-27.

187. "Metropolitans' average level of investment for conservation projects should not exceed the regional benefits measured over the life of the project(s)." *Id.* at 5-9.

188. "Regional benefits of conservation projects should be measured by: (1) a reduction in capital investments due to a deferral and/or down-sizing of regional infrastructure; (2) a reduction in O&M expenditures needed for treatment and distribution of imported water; (3) a reduction in expenditures associated with developing alternative regional supplies; and (4) environmental benefits from reduced demands on the ecosystem." *Id.* at 5-8.

189. Part of the limitation in optimizing environmental and social objectives through the IRP process is not only its use of the constrained optimization model used but also that the IRP presumes that water demand is a fixed rather than variable factor. See *infra* notes 219-29 and accompanying text (discussing the consequences that follow from a fixed demand premise).

190. See *supra* notes 151-80 and accompanying text.

191. See *supra* note 167.

192. See Stakhiv, *supra* note 63, at 107. The author discusses the failure of planners to develop and implement planning processes which would evaluate environmental and social objectives separate from economic objectives. Instead, the constrained optimization model has been the only planning methodology employed since the 1970s with economic efficiency as the primary objective to be optimized. The author cites problems and issues such as the inadequacy of analytic tools, the need to retain the analytic rigidity offered by quantitative mathematical models, the fact that it is easier both theoretically and computationally to maximize economic objectives, and the difficulty of effectively integrating quantitative and qualitative measurements. See *id.* at 107-18.

193. See *id.*

194. See *supra* notes 112-14, 118 and accompanying text (explaining CEQA), and *supra* note 31 (explaining NEPA).

for consideration of environmental objectives,<sup>195</sup> and developed various public participation processes as the procedure for consideration of social objectives.<sup>196</sup>

The functional result of this water resources planning structure is that economic efficiency remains the primary objective to be optimized through water resources planning. Environmental and social objectives serve only as procedural "constraints." The method for incorporating environmental and social objectives into the planning process focuses on procedural compliance rather than substantive evaluation. Through regulatory environmental review and inclusion of public participation mechanisms, water agencies are considered to have provided sufficient incorporation of environmental and social objectives. The planning process is devoid of methods that evaluate the substance and sufficiency of the consideration given to environmental and social concerns through these procedures. As a result, environmental and social objectives are ensured only a minimal level of consideration through procedural compliance; "optimization" of these objectives is not contemplated. Environmental and social objectives are relegated to functioning only as constraints on the optimization of economic efficiency.

Elevation of economic efficiency and minimization of environmental and social objectives has not been an explicit policy choice, but rather it is an implicit result of the planning framework. Water agencies make clear in their statements the need to incorporate environmental and social values in water resources policies. Policy objectives which embody these values are adopted with no indication that they are ranked as less desirable to achieve than other objectives.<sup>197</sup> But the planning framework used by water agencies works as an implicit choice to limit consideration given to environ-

mental and social objectives. The implicit relationship between the structural framework of planning, and the ideas, perspectives and values which are articulated through the planning process, is cogently summarized in the following passage:

The structure of organizational arrangements implicitly determines the basis for distinguishing the sets of events to be controlled, the order of preferences for ranking the values to be achieved by organized activities, and the standards for determining the relevancy of information to be communicated in the decision-making process. Since patterns of organization have a fundamental influence upon the development of perspectives, values, and ideas regarding resource policies and patterns of resource development, any question of comprehensive planning must involve comparable questions about the design of organizational arrangements.<sup>198</sup>

## **2. A Case Study—Minimizing Environmental and Social Objectives**

The MWD IRP process provides a good case study of how the constrained optimization framework identifies standards that accord environmental and social objectives minimum consideration and relegates them to serving as constraints upon optimization of economic efficiency. It also provides some insight into how the use of the constrained optimization planning operates as an implicit policy choice to emphasize economic efficiency and minimize environmental and social objectives.

195. Water planners have noted that the regulatory regime is now the primary means by which environmental values are incorporated in the planning process. See, e.g., Stakhiv, *supra* note 63, at 109 ("[T]he [NEPA] EIS is once again viewed by the environmental protection agencies as the mechanism to ensure that environmental and social objectives play a role in project planning."); Kneese, *supra* note 20, at 29 (NEPA, through its EIS requirement, is the "primary way in which environmental considerations enter into the planning of . . . water resources projects").

196. See *infra* notes 215-29 and accompanying text.

197. See *supra* note 147 (providing several examples of how environmental and social concerns have been explicitly promoted as a part of the water resources planning process). There is no indication in these planning processes that environmental and social concerns are viewed as less desirable than other policy objectives.

198. Ostrom, *supra* note 10, at 49.



### a. Environmental Objective

In 1992, the MWD adopted seven guiding principles to serve as a framework for the agency's decision-making process and provide broad statements about MWD's aspirations.<sup>199</sup> The guiding principle for the environment seeks to establish "an approach to integrating environmental values and awareness into Metropolitan's decision-making."<sup>200</sup> While the MWD's guiding principle aspires to integrate environmental *values*, when the principle was translated into an objective for the IRP process, the aspirations disappeared. The environmental objective adopted for the IRP is to "minimize the environmental *impacts*" of the water resources plan which are produced by the IRP process.<sup>201</sup> The guiding principle is interpreted as requiring only "careful consideration of all . . . project-specific environmental impacts and regulations."<sup>202</sup> A more broad-based consideration of environmental values is specifically rejected by the IRP, which states that its role is limited to being "consistent with regional management plans that address the cumulative environmental and social impacts for the region."<sup>203</sup>

The focus of the IRP environmental objective on the minimization of impacts and regulatory compliance indicates that the objective is designed to satisfy the existing environmental regulatory requirements as embodied

in CEQA and NEPA. The objective intends to integrate environmental concerns as they are codified, not to integrate environmental values as articulated by the affected communities. CEQA and NEPA force government agencies to consider, before acting, potential environmental *impacts* of the action. Statutory compliance with these acts, however, is less than optimal from the standpoint of comprehensively incorporating environmental *values* into the planning process. First, NEPA and CEQA apply only to specific actions; mere planning or contemplation of action is outside the statutes' purview.<sup>204</sup> Moreover, under CEQA only "discretionary" government actions, as opposed to "ministerial," are subject to the Act.<sup>205</sup> Second, the statutes only require an analysis of *physical* environmental impacts—social impacts alone do not need to be considered.<sup>206</sup> Third, the laws allow identified impacts to be mitigated and, where not mitigable, a project can nonetheless be approved for overriding reasons.<sup>207</sup> In essence, the current environmental regulatory regime is not designed to force the incorporation of environmental values into project planning, but rather to ensure there are not substantial environmental impacts that result from the planning process. The difference is significant.

Values are normative criteria for planning, representing the beliefs of the community.

199. See METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA—BOARD OF DIRECTORS, *supra* note 147.

200. *Id.*

201. MWD IRP PLAN, VOL. 1, *supra* note 98, at E-9, 3-22 (emphasis added).

202. MWD IRP PLAN, VOL. 2, *supra* note 143, at 2-14.

203. *Id.* at 2-14. See also *infra* notes 219-29 and accompanying text (discussing additional ramifications of this planning limitation as it relates to control of water demand).

204. See *Kleppe v. Sierra Club*, 427 U.S. 390 (1976) (holding that NEPA only applies to proposals for specific action and that the agency determines whether a "proposal for action" has been made, subject to arbitrary and capricious review by the courts); see also Guidelines for Implementation of the California Environmental Quality Act, CAL. CODE REGS. tit. 14, § 15352 (1998)[hereinafter CEQA Guidelines](CEQA applies only when a public agency commits itself "to a definite course of action").

205. A ministerial act is one "involving little or no personal judgment by the public official as to the wisdom or manner of carrying out the project. The public official merely applies the law to the facts as presented but uses no special discretion or judgment in reaching a decision." CEQA Guidelines, *supra* note 204, §

15369; see also *Leach v. City of San Diego*, 220 Cal. App. 3d 389 (1990) (holding the city's decision to draw water from a reservoir ministerial in nature and thus exempt from CEQA, despite the potential harmful impacts to the ecosystem around the reservoir).

206. See Council on Environmental Quality ("CEQ") Regulations, 40 C.F.R. § 1508.14 (1999)( "[under NEPA] economic or social effects are not intended by themselves to require preparation of an environmental impact statement."); see also *Metropolitan Edison v. PANE*, 460 U.S. 166 (1983); *San Franciscans for Reasonable Growth v. City and County of San Francisco*, 209 Cal. App. 3d 1502, 1521-2 n. 13 (1989) (holding project's creation of demand for new housing implicated "social and economic, not environmental concerns" that are "outside the CEQA purview").

207. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332 (1989) (holding that NEPA requires an agency to consider all reasonable alternative and appropriate mitigation measures, but that there is no mandatory duty to implement them, even if they are feasible); see also CEQA Guidelines, *supra* note 204, § 15093 (stating that agencies may approve a project without mitigating significant adverse environmental impacts by adopting a statement of "overriding considerations"); *Citizens of Goleta Valley v. Bd. of Supervisors ("Goleta II")*, 52 Cal. 3d 553 (1990).

Impacts are positive criteria for planning, representing the quantifiable harms to the community, what citizens want to avoid, and the collective preferences of the community. Incorporating values into project planning allows a community to strive to achieve an ideal, even if that ideal requires internalizing quantifiable harms or costs imposed by a project, harms that in the abstract the community would seek to avoid. In contrast, planning to minimize impacts ensures only that a community's preferences are maximized in a specific project because quantifiable costs are reduced.

If values are incorporated into planning, a proposed alternative that optimizes economic efficiency with minimal environmental and social impacts may be rejected. A community's

desire to promote or achieve certain environmental and social values may require the proposal to internalize extra economic costs or harms. For example, a proposed project to build an additional reservoir and fill it with imported water supplies may be rejected despite findings that the project balances future water supplies and demand with the greatest economic efficiency, causes minimal or no environmental and social harms,<sup>208</sup> and promotes some environmental and social goals.<sup>209</sup> The proposed project may also be rejected because it does not adequately address more broad-based, as opposed to project-specific, environmental and social values. These values could include concerns such as conservation,<sup>210</sup> fairness and intergenerational equity,<sup>211</sup> and sustainability or carrying

208. The plan could have minimal impacts because the reservoir is located in an area where there would be minimal environmental damage, no dislocation or endangerment of any households, and increased imported water supplies would be achieved by installing water savings devices in another region, and transferring the conserved water, with no resultant job losses. MWD has argued somewhat persuasively that its soon-to-be completed Eastside Reservoir Project will have similar results. Specifically, the project calls for the construction of an 800,000 acre-foot reservoir in an uninhabited valley in rural southeastern Riverside County, to be completed in 2002. See MWD IRP PLAN, VOL. 2, *supra* note 143, at 5-3 to 5-5; 1 CALIFORNIA WATER PLAN, *supra* note 134, at 306-312. The MWD claims that water to fill the reservoir will come primarily from water transfers from the Coachella Valley. In 1990, the MWD began a water conservation program with the Imperial Irrigation District ("IID"), which will conserve 75,570 acre-feet annually for use by MWD. The MWD also secured an agreement to place a concrete lining in the All-American Canal, which was to be completed in 1999 and conserve 25,700 acre-feet annually for use by MWD. See MWD URBAN WATER MANAGEMENT PLAN, *supra* note 134, at 74-75.

209. The plan could promote environmental and social goals because imported water prices would keep retail water prices lower compared to other plans, thereby increasing economic and job growth in the area (a social benefit). Additionally, if the imported supplies were transferred from existing uses in another region, the need to extract new supplies from in-stream flows could be avoided (an environmental benefit).

210. Conservation measures as an alternative to imported supplies would have been considered in the planning process, but were likely not adopted due to the fact that imported supplies could be obtained at a lesser cost with minimal environmental and social impacts. If, however, conservation measures were not evaluated merely for their "economic value," but instead were considered for their potential to achieve broader environmental and social values, the final water plan may have been different.

211. See *supra* notes 208-09 (stating that the proposed plan did achieve some equitable outcomes). The transfer of water saved through conservation measures ensured that no job losses resulted from the plan, and securing the lowest cost water resource helped to ensure future economic and job growth for

the area. What is unclear, however, is whether the full-range of equitable concerns were considered in the planning process. Equity values have been broadened over the past several decades to include fairness among the present generations as well as fairness to future generations. For example, transferring water from one region to another involves reallocation of the potential for future growth. One region has acquired the capacity to expand water uses, while another region has limited its ability to accommodate future growth in water consumption. Moreover, assuming that water uses differ between the regions, the water transfer results in the reallocation of water from one type of use to another. Thus, a transfer of water involves fundamental decisions about where and how water should be used, invoking concerns with the equitable impact of those decisions. Assuming the transferred water is planned for use in the immediate future, the water transfer also invokes issues of intergenerational equity. See NATIONAL RESEARCH COUNCIL, WATER TRANSFERS IN THE WEST: EFFICIENCY, EQUITY, AND THE ENVIRONMENT 14-15, 38-69 (National Academy Press 1992); see also generally PHILIP C. METZGER, OPTIONS FOR PROTECTING SOCIAL VALUES IN WESTERN WATER TRANSFERS OUT OF AGRICULTURE (The Conservation Foundation 1987) (arguing that efficiency concerns alone cannot be the basis for determining water transfers and that mechanisms must be put in place that ensure equitable and environmental values are considered in the decision making). Robert Paehlke recently noted that a fundamental difficulty in attempting to integrate equitable concerns within the current economic analysis framework is that

Any risk to employment is taken to be tragic, regardless of the tragedy attendant on continued employment (as in cutting of the last of the old-growth forests). In effect the problem lies in the equity of the distribution of both work and income. It may be the single largest political problem involved with the integration of equity values and environmental values, and thus deserves a great deal of attention in the future.

Robert C. Paehlke, *Environmental Values and Public Policy, in ENVIRONMENTAL POLICY IN THE 1990s* 351, 364-65 (Norman J. Vig & Michael E. Kraft eds., Congressional Quarterly Inc. 1994).

212. It is unclear whether sustainability values would have

capacity.<sup>212</sup> A planning process which allows full consideration of these values would likely result in a very different proposed water resources project.

If planning is done only to minimize impacts, any plan or project that minimizes environmental and social impacts will never be rejected despite its failure to promote or achieve the community's values. For example, the hypothetical water project described above would be deemed optimal because impacts were minimized to the greatest extent possible. The fact that the project failed to consider more comprehensive environmental and social values of the community is irrelevant because those concerns are outside the scope of the planning process. Even if the community forced water resources policies to address these larger concerns through the adoption of explicit policy objectives or statutory language, the constrained optimization planning process automatically reduces consideration of these concerns to the minimum amount possible. The result is that water resources planning provides the commu-

nity no opportunity to assess whether it would rather incur some impacts in exchange for achieving or promoting its values. Without incorporation of values in planning, a community is able only to satisfy its preferences, not to express its will.

### b. Social Objective

There is no explicitly adopted "social objective" for the IRP process, but it is clear that social values are intended to be incorporated through the public participation process. The public participation component of the IRP process is repeatedly emphasized as critical to addressing the concerns of affected communities.<sup>213</sup> Although public participation in the IRP is not statutorily required, public participation elements are becoming increasingly commonplace in legislative acts, even those that deal with water resources.<sup>214</sup> Agencies are aware that public participation in the planning process is now expected so, when not required by regulation, agencies often elect to make this a part of their planning process.<sup>215</sup>

been considered. The transfer of water from one region to another would obviously help achieve sustainable *growth*. But sustainable growth is very different from the concepts of sustainable development and carrying capacity. Sustainable growth incorporates only the economic values of a community and does not seek to balance those with the social and cultural values as sustainable development seeks to do. See R.E. Munn, *Towards Sustainable Growth*, 26A ATMOSPHERIC ENVIRONMENT 2275, 2277 (1992).

213. See MWD IRP PLAN, VOL. 1, *supra* note 98, at 1-1, 1-8, 3-2, 3-3. The following statements are examples of the emphasis purportedly given to public participation in the IRP: "[b]ecause of the diverse needs and institutional arrangements in the region, the success of the IRP would only be achieved through an open and participatory process that involved the major stakeholders," and "[n]ew approaches that take a broader perspective and involve the public in the decision-making process are being used by water agencies to solve the problems of supply shortages and water quality." *Id.* at 1-8, 1-1.

214. See, e.g., CAL. WATER CODE § 10004(b)(2) (West 1991) (requiring department to release a preliminary draft of the California Water Plan, as updated, upon request, to interested persons and entities throughout the state for their review and comment); CAL. WATER CODE § 10005.1 (West 1991) (requiring department to conduct a series of hearings with interested persons, organizations, local, state, and federal agencies, and representatives of the diverse geographical areas and interests of the state before preparing the California Water Plan); CAL. WATER CODE § 10642 (West Supp. 1995) (requiring that in preparing an Urban Water Management Plan, each water supplier must encourage the active involvement of diverse social, cultural and economic elements of the population within the service area prior to and during the preparation of the plan, and hold a public hearing on the plan); CAL. WATER CODE § 10842 (West 1991)

(requiring public hearing prior to the adoption of an Agricultural Water Management Plan); CAL. WATER CODE §§ 10753.2, 10753.5 (requiring public hearing both before a Groundwater Management Plan is prepared and before it is formally adopted); see also *infra* note 222 (describing public participation required by CEQA and the federal Administrative Procedure Act).

215. See *supra* note 147 (describing public participation in the CALFED process which was under no obligation to receive any public input other than as required under CEQA).

As a result, public participation elements are used by water planning agencies as a legitimization tool for the articulation and integration of social values. Planning processes are legitimized in regard to social values by the extent to which public participation is solicited.<sup>216</sup> For example, the MWD is careful to highlight at the beginning of its IRP document that three regional assemblies were held, and over 450 individuals participated in an effort to "gain consensus on resource policy issues, provide direction for future work, and to endorse regional objectives, principles, and strategies."<sup>217</sup> Similar to regulatory compliance for environmental objectives, solicitation of public participation is now generally recognized as the minimum requirement for consideration of social objectives.

Unlike regulatory compliance, however, public participation can be an effective tool for incorporating sociological values such as ecology, equity, conservation and sustainability.<sup>218</sup> As was previously discussed, sociological values are weighted and accorded merit through discussion and debate; without a deliberative process, sociological values cannot be translated into policies and planning outcomes.<sup>219</sup> Public participation elements can help foster a

forum of discussion and debate by providing the community an opportunity to shape, review and critique the planning process. But the effectiveness of public participation as a vehicle for sociological values depends upon several factors: the diversity of public participation solicited, the extent to which articulated sociological values are actually incorporated and reflected in the planning process, and the planning framework which shapes the discussion and debate.<sup>220</sup>

It is easy to get mired down in attempting to evaluate the first two factors by reference to a water agency's explicit actions. For example, did the agency do a good job of soliciting diverse public participation? Was sufficient general notice of the hearings provided to the public, or specific notice sent to interested parties? Were public hearings held at times when participation would be meaningful? Did the agency give sufficient consideration and incorporate, where possible, the articulated sociological values? Were changes made in the planning processes or outcomes in response to public participation? There has been significant debate and criticism surrounding what constitutes sufficient and quality public participation,<sup>221</sup> and the State of California has

216. In its preface, the IRP takes note of this trend toward including public participation processes. "Across the country, it is clear that traditional approaches to water supply planning are not well-suited to the complex issues that face the water industry today. New approaches that take a broader perspective and involve the public in the decision-making process are being used by water agencies to solve the problems . . ." MWD IRP PLAN VOL. 1, *supra* note 98, at E-1. Other planning documents have made similar statements. See, e.g., 2 CALIFORNIA WATER PLAN (1994), *supra* note 134, at 2 ("[The 1994 California Water Plan] was developed with extensive public involvement including an outreach advisory committee made up of urban, agricultural, and environmental interests . . . the California Water Commission held hearings in each of the State's ten hydrologic regions . . . to receive public comments. . . . [and] after considering comments received from over 100 individuals, the commission developed several recommendations which added policy guidance for the final water plan update"); MWD URBAN WATER MANAGEMENT PLAN, *supra* note 134, at 10-11 (documenting that public review and comments were solicited in preparation of the plan, a public hearing was held, and that "all comments were taken into consideration in the preparation of the final report"); WEST BASIN MUNICIPAL WATER DISTRICT—1994 ANNUAL REPORT (Carson 1994) (stating that "during the 1994 construction of the water recycling projects, the District held more than 25 evening community forums, open houses and inspection trips . . . [and that] public access to information included annual hearings to approve wholesale water rates and a per parcel standby charge").

217. MWD IRP PLAN, VOL. 1, *supra* note 98, at E-8 to E-9, 3-2 to 3-3.

218. See *supra* note 6 and Appendix (describing, in detail, what issues these values encompass).

219. See *supra* notes 181-98 and accompanying text.

220. See Norman Wengert, *Participation and the Administrative Process*, in WATER POLITICS AND PUBLIC INVOLVEMENT, *supra* note 43, at 29; see also Gene E. Willeke, *Identification of Publics in Water Resources Planning*, in WATER POLITICS AND PUBLIC INVOLVEMENT, *supra* note 43, at 43. UCLA Professor of Urban Planning, John Friedmann argues that planning "is an inherently moral practice . . . in the sense that it affects the way we live—relations among people and their institutions." John Friedmann, *Planning in the Public Domain: Discourse and Praxis*, in CLASSIC READINGS IN URBAN PLANNING, *supra* note 174, at 74, 75. If the centrality of moral discourse to planning is recognized, says Friedmann, it follows that all "effective planning is therefore a negotiated process among affected parties who have different values, concerns, and interests at stake." *Id.* at 76. Thus, planners cannot create planning processes that impose technical or utopian solutions, but rather planners' expertise and vision should only be components of a process which formulates solutions through negotiated planning. See *id.* at 76-77.

221. See PIERCE, *supra* note 43, at 3-19.

responded by adopting regulations that force agencies to be explicit about the consideration given to public input.<sup>222</sup>

While this debate is important, a more central factor has been overlooked. The *planning framework*, within which public participation occurs, fundamentally affects the diversity and quality of public participation and the extent to which articulated sociological values are capable of being included in planning processes and outcomes. In essence, the water resources planning framework dictates the scope of issues relevant to the planning process and the capacity of the planning process to address those issues.<sup>223</sup>

The current water resources planning framework is too narrow and limits the consideration of sociological values. The MWD IRP provides a good example. The planning framework for the MWD IRP is built on the constraining assumption that demand is a derived function that cannot be altered. Projected water demand is calculated using an econometric

model that takes into account statistical data regarding demographic and economic trends, hydrologic conditions and water conservation measures.<sup>224</sup> The quantity of future water supplies forecasted by the demand model provides the baseline from which the IRP planning processes begins.<sup>225</sup> The water resources planning framework can be summarized as follows: *given an established future water demand, what water resource strategies can generate sufficient supplies to meet that demand?*

Completely outside the MWD IRP planning framework are options that would actually control water demand. In fact, the IRP makes clear that any measures to control growth in water demand are beyond the purview of the planning process.<sup>226</sup> The planning process is essentially a discussion about trade-offs between various supply strategies. Arguably, factoring water conservation effectiveness in the demand model helps “control” future demand, but this is really an accounting function that only calculates expected *reduction* in demand

222. See *supra* note 215. While most statutorily required public participation elements only require a public hearing or receipt of written public comment several regulatory regimes have gone further to mandate written agency response to substantive issues raised through public participation. See, e.g., CEQA Guidelines, *supra* note 204, § 15088 (stating that a written “evaluation and response to public comments is an essential part of the CEQA process . . . [and] failure to comply with the requirements can lead to disapproval of a project”); 5 U.S.C. § 553 (requiring federal agencies that conduct informal rulemaking to provide written response to significant and material public comments); see also *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011 (D.C. Cir. 1978). Moreover, agency responses must be specific, fact-based, and provide a reasoned analysis of why the suggestions were rejected. See, e.g., CEQA Guidelines, *supra* note 204, § 15088(b) (requiring a “good faith, reasoned analysis in the response,” and noting that “[c]onclusory statements unsupported by factual information will not suffice”); 5 U.S.C. § 553 (requiring agencies’ informal rulemaking action to be supported by a sufficiently rational and cogent explanation considering all the evidence and alternatives presented to the agency); see also *Sierra Club v. Gilroy City Council*, 222 Cal. App. 3d 30, 46 (1990); *Motor Vehicle Manufacturers Assn. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (1983).

223. See *supra* note 198 and accompanying text.

224. The MWD uses an econometric model known as MWD-MAIN, which is based upon the national state-of-the-art demand forecasting model IWR-MAIN used by numerous water resources agencies throughout the country. The model forecasts water demand based on projected demographic and economic trends. This result is adjusted given projected climate data and anticipated effectiveness of water conservation programs. See Rodrigo et al., *supra* note 136, at 53-56; see also MWD IRP PLAN VOL. 1, *supra* note 98, at E-5 to E-6, 2-1 to 2-12. For the IRP, water conservation estimates were based upon the full implementation of best management practices (“BMP”) which include: (1) increased

plumbing efficiency through plumbing codes for new structures and retrofits for existing structures, (2) interior/exterior water audits and incentive programs for residential, industrial, and commercial/institutional customers, (3) distribution system leak detection and repair, (4) metering, (5) conservation pricing, (6) large landscape water conservation requirements for new developments, and (7) public education and information. See *id.* at 3-4.

225. See MWD IRP PLAN VOL. 1, *supra* note 98, at 3-4.

226. The MWD takes a firm position that control of water demand is not a part of the IRP planning process. The position adopted by the MWD is that besides implementation of water conservation measures, growth in demand is dictated by policies outside the arena of water resources. As a result, water resources planning is essentially limited to planning for adequate water supplies, not comprehensively addressing all factors attendant to the natural resource:

In accordance with Metropolitan’s policies on water supply, Metropolitan is responsible for ensuring adequate and reliable supply of water to meet increasing demands within the service area. . . . Metropolitan does not initiate or implement “no growth” policies. By adopting plans or policies intended to limit water supplies to levels that would not meet the projected demands . . . Metropolitan would be engaging in de facto regional growth control that is beyond its legal capacity. Consequently, Metropolitan’s policy regarding the regional growth [i.e., growth in water demand] is not to dictate levels of supply, but rather to plan its facilities in accordance with the adopted regional growth plans.

MWD IRP Plan Vol. 2, *supra* note 143, at 2-15 (emphasis added).

resulting from water conservation programs. Not part of the debate are options to control the underlying forces that drive increasing water demands.<sup>227</sup>

By removing demand from the planning framework, the range of concerns that can be considered relevant and redressable through the IRP process is severely limited. Any concern must be accommodated within a water strategy that provides sufficient supplies to satisfy projected demand. Many sociological values relevant to water resources policy, however, require a broader framework for adequate consideration. Consequently, no matter how procedurally comprehensive a public participation element is included in the planning process, a constrained framework that excludes consideration of water demand prevents sociological values from having a substantive impact on planning outcomes.

For example, addressing sustainability concerns requires that supply *and* demand are balanced at a level that does not diminish natural resources over time. The concern is not only diminishment of water resources, but how the use of water resources can diminish other natural resources and ultimately impact the carrying capacity of the regional environment.<sup>228</sup> An appropriate level of water resources consumption for sustainability purposes cannot be achieved if water demand is not planned concurrently with water supplies. Similarly, consideration of equity and fairness values necessitates that demand be included in the water

resources planning framework. Water resources planning involves fundamental decisions about where and how water will be utilized. A planning process limited to designing the best supply strategy to fulfill an expected demand does not allow for equitable considerations of whether the distribution of that demand (i.e., the capacity for future growth), both geographically and among types of uses, is equitable or socially desirable.<sup>229</sup>

The critique of water resources planning provided in this section contains several important lessons for the new voices that have sought to infuse sociological values into water resources decisions. While these groups and individuals have been instrumental in articulating environmental and social values that are increasingly accepted as legitimate policy objectives, the analysis indicates that their voices still lack the power to completely translate those objectives into policy outcomes. Environmental and social objectives are relegated to receiving minimal and insufficient consideration by the existing water resources planning framework which relies heavily on quantitative analysis, retains the centrality of constrained optimization of multiple objectives, and excludes water demand from the planning process.

Even though policy outcomes have failed to adequately incorporate environmental and social objectives, it has been easy for proponents to use the existing planning process to

227. Water resources agencies often argue that actions to control water demand are beyond their legal capacity. See *supra* note 226. The claim is based on a conclusion that such actions would constitute de facto land use planning, which is an exercise of police powers that water resources agencies do not possess as limited powers agencies. The validity of this legal position, however, is not firmly established. While it is clear that water agencies cannot engage in land use planning, water agencies do have discretion to decide whether or not to augment water supplies. See *Building Indus. Ass'n of N. Cal. v. Marin Mun. Water Dist.*, 235 Cal. App. 3d 1641 (1991); *Wilson v. Hidden Valley Mun. Water Dist.*, 256 Cal. App. 2d 271 (1957). What remains ambiguous is whether a water agency's decision not to seek new water sources must be grounded in specific utility-related reasons (e.g., actual or threatened water shortages, or impacts upon existing users), or whether the decision can simply be made in the best interests of the community based on reasonably expressed opinions of residents and elected water officials. Cf. *Building Indus. Ass'n*, 256 Cal. App. 3d at 1645-47; *Wilson*, 256 Cal. App. 2d at 285; *Swanson v. Marin Mun. Water Dist.*, 56 Cal. App. 3d 512 (1976); *Lukrawka v. Spring Valley Water Co.* 169 Cal. 318, 332 (1915); see *Thomas, supra* note 98, at 318.

Whether or not water agencies *currently* have the legal capacity to control demand is ultimately irrelevant. The legal capacity can be given to water agencies if needed. More pertinent is whether water agencies' failure to *consider* controlling demand is a normatively defensible position. Under the analysis provided in this section, the answer is no. Exclusion of demand from water resources planning is normatively indefensible because it prohibits adequate consideration of sociological values in the planning process. As a result, current planning outcomes cannot be defended with reference to a set of ethical principles that elucidate the desired consequences of the proposed actions. Instead, planning outcomes are defended only upon the grounds that they are economically efficient, a justification based upon economic preferences and not ethical principles. See *generally* FELDMAN, *supra* note 39, at 2-3.

228. See *Appendix* (discussing further sustainable development and carrying capacity).

229. See *Appendix* (discussing further values relating to equity and fairness).

legitimize the results. Public participation components and full compliance with environmental regulations strengthen the existing planning process as a legitimization tool. Proponents can emphasize that a project was given full environmental review under the existing complex regulatory structure, and that concerned citizens had ample opportunity to ensure that environmental and social concerns were raised and incorporated into the planning process through public participation procedures.

The central problem is that the current planning framework, which marginalizes environmental and social objectives, is not the result of an explicit policy choice that can be openly challenged as to whether or not it serves the public interest. The planning framework evolved over several decades and operates implicitly to minimize the consideration given to sociological values. This implicit nature of the policy choice makes it difficult to change. No matter how strongly environmental and social values are voiced in the policy arena, or solidified in policy objectives, the planning process works to minimize their impact. Moreover, proponents of the status quo can use the planning process to legitimize outcomes. If the voices of environmental and social values are to be heard, it will be in finding the capacity to change fundamentally the structure of water resources planning. The next section provides a suggestion for how this might be accomplished.

### **V. Restructuring the Planning Process—Merging Water Resources and Land Use Planning**

The basic structure for water resources planning has not undergone significant revision since environmental and social values first emerged in water policies during the late 1960s. The process has remained primarily technical and quantitative, relying upon analytical tools that necessitate numerical valuation of factors to produce aggregate outcomes. Multiple water resources objectives have been

addressed through a process of constrained optimization, whereby economic efficiency is optimized subject to the constraints of environmental and social concerns. There have been some important modifications in the planning process, including mandated environmental impact analyses and public participation processes, but the framework for water resources planning has nonetheless been unable to embrace fully the environmental and social values articulated in society.

Water resources planning must undergo a fundamental restructuring to accommodate the continuing emergence of environmental and social values in water resources policies. The deficiencies in current water resources planning processes are in danger of creating patterns of water use that are not in accord with changing sociological values. A bit of wisdom offered on this point over three decades ago is still pertinent today:

Because of the rich interrelationship among the various values or goods which can be derived from water, administration [planning] of water resources will require a complex system of organization in order to realize the diverse values . . . . As patterns of demand change, patterns of organization will also change. . . . *If we are organized so that we can inform and articulate our interests both as consumers and citizens, we should be able to arrive at those settlements in water resources that represent the requirements for comprehensive development at any given time.*<sup>230</sup>

The quote highlights the need to ensure that structures for water resources planning are organized so that communities can express their interests both as consumers and citizens. In other words, the planning framework must allow full consideration of both economic and sociological values so that we arrive at “those settlements in water resources” which reflect our communal will.

230. Ostrom, *supra* note 10, at 50 (emphasis added).

Two pivotal principles that must be embodied in a new planning structure were highlighted in Section IV. First, there must be a deliberative process by which environmental and social objectives can be incorporated into water resources planning. Quantitative analyses must be limited to the achievement of economic objectives. Numerical valuation methods may include social or environmental impacts that have quantifiable economic effects, but these processes cannot be the only way in which environmental and social objectives are addressed. Sociological values must be weighted and translated into planning outcomes through a process of discussion and debate.

Second, the planning framework must allow for comprehensive consideration and evaluation of how environmental and social objectives can be achieved through the planning process. The procedure of constrained optimization cannot be maintained. This framework not only sustains reliance on quantitative analytic methods and implicitly promotes economic efficiency as the overriding planning objective, it results in environmental and social objectives receiving only minimal consideration. The recent trend toward public participation in water resources planning is a step in the right direction, but this process must also undergo restructuring. The framework for public participation is limited to addressing only issues that are relevant and redressable through water supply strategies. Discussion and debate over controlling the forces that drive demand are separated from water resources planning, severely limiting the capacity to articulate and incorporate sociological values in water resources planning outcomes.

Merging water resources and land use planning holds promise for achieving the restructuring described above. Concurrent planning of land use and water resources can

remove some of the barriers to achieving environmental and social objectives. Moreover, merging the two disciplines provides an opportunity to create a set of comprehensive ethical principles to guide the process by which society uses and preserves two of its fundamental and inherently linked natural resources. The following discussion explains why land and water should be planned together, and the benefits that would flow from this integrated planning process. At the end, some brief suggestions are offered for further research about implementation of a merged land use and water resources planning process.

### A. Why a Merger Is Needed

The quote at the beginning of this paper is a reminder that it has long been recognized that "land, water, and people go together."<sup>231</sup> Without an adequate water supply, human activity and existence are not sustainable.<sup>232</sup> This reality is especially obvious in California, where average annual precipitation in the southern half of the state is about 13.4 inches,<sup>233</sup> compared to average annual rainfalls of forty to sixty inches for states east of the Mississippi River.<sup>234</sup> The vital link between land, water and people is made ironclad in California by the tenuous geographic connection between water resources and human activity. To a degree unprecedented in history, life in California depends on the continuous maintenance of giant systems that connect distant water sources to people and their activities. Roughly seventy-five percent of the natural water runoff occurs in the northern one-third of the state, while seventy-five percent of the water demand is created in the southern two-thirds.<sup>235</sup>

Water use is directly related to the character of land use, and conversely land use has a major effect upon water resources. The quantity and quality of the available water supply determines the types of supportable land uses, while permitted land uses determine a region's existing

231. *Report by the Mississippi Valley Committee, supra* note 1.

232. *See Water, Water Everywhere, EARTH EXPLORER* (Feb. 1992). "Water is abundant, yet it can be more precious than gold. That's because water isn't always in the right place in the right form at the right time. . . . Without water, life would vanish." *Id.*

233. *See CALIFORNIA WATER PLAN, supra* note 134, at 50

(Figure 3-2).

234. *See* MARC RIESNER & SARAH BATES, *OVERTAPPED OASIS: REFORM OR REVOLUTION FOR WESTERN WATER 4* (Island Press 1990).

235. *See* CALIFORNIA WATER PLAN, *supra* note 134, at 9 (Table 1-4), (Figure 3-2).



and projected water demand.<sup>236</sup> Functionally, however, the connection between these two resources has never been made. Several years ago, an article in the Los Angeles Times noted, "it may seem inconceivable to some, but this state—where three-fourths of the population lives in desert or near-desert climes—has always gotten by without a law linking growth to water. For more than a half a century, Californians have operated on the premise that if you build a city the water will come."<sup>237</sup>

Planning for these two integrally related natural resources occurs in virtual isolation. Each process is pursued without explicit consideration of its impact upon the other. Water resources planning is undertaken with the goal

of providing a reliable adequate and quality supply for all anticipated uses.<sup>238</sup> Simultaneously, land uses are sanctioned under the premise that planned water supplies are adequate and will be available to meet future uses.<sup>239</sup> Maintaining the exclusivity of the two planning processes is reinforced by the fact that, with a few notable exceptions, water demands have almost always been satisfied.<sup>240</sup>

Over the past several years, there have been efforts to begin forging a link between water resources and land use planning. These regulatory efforts have focused primarily on information-sharing between planning agencies. Under current law, land use planning agencies have the option of referring proposed

236. See, e.g., NATIONAL WATER COMMISSION, *supra* note 48, at 368 ("[H]ow lands are used will in large measure determine where and how much water will be demanded and for what purposes."); Frank E. Maloney & Richard Hamann, *Integrating Land and Water Management*, Publication No. 54, 3-4 (Florida Water Resources Research Center, March 1981); JACQUELINE LEAVITT, *OPTIONS LOST: OPPORTUNITIES REMAINING, A PRELIMINARY STUDY OF WATER-AND-LAND PLANNING IN THE LOS ANGELES REGION* (U.C.L.A. 1973) (documenting how water resources planning dictated land use decisions and patterns of development in the City of Los Angeles); MULDER ET AL., *supra* note 11, at 1 ("When the water resources planner tries to be effective, he finds that many hydrologic, economic, ecologic, and social linkages clearly cause water resources development and management programs to have major effects on land use. Conversely, land use has a major effect on water resources, and both types of planning affect the use of other resources.")

237. Mark Arax, *Effort to Link Growth, Water Sparks Battle*, L.A. TIMES, Aug. 14, 1995, at A1.

238. See *supra* notes 130-33. Even the most recent and environmentally sensitive effort at water resources planning still analyzes the water resources problem within the framework of how to provide enough water for all the uses. The only difference from several decades ago is that the number and types of uses have changed. Now there needs to be enough water available to satisfy environmental as well as traditional demands. See Revised CALFED Bay-Delta Program Phase II Report, *supra* note 130, 11-14 (stating that water reliability supply objective is to make enough water available for environmental, urban, and agricultural uses, water quality objective is to provide "good water for all beneficial uses," and ecosystem restoration objective is focused on managing the water supplies for the protection of wildlife). Left out of this vast planning process is how to reduce water demand, other than through water conservation and water recycling, rather than increase or better manage existing supplies. The absence of a broader view to include the forces that continue to increase water demand in California is puzzling, especially given CALFED's self-proclaimed goal of "providing a long-term solution to the Bay-Delta problems."

239. On November 24, 1998, almost 25,000 homes with no secured or guaranteed water supplies were approved for development in the Santa Clara Valley where groundwater is precious and imported supplies are not readily available. In Los Angeles County, the Board of Supervisors approved a massive 21,615 home development by the Newhall Land & Farming Co. with both advo-

cates and opponents agreeing that there is currently not enough water to supply the entire project. While Newhall Land officials stated they would seek imported supplies and the Board of Supervisors claimed it would not issue building permits without proof that Newhall Land was not overdrafting the groundwater basin, everyone acknowledges that county officials have little control over Newhall Land's groundwater extractions. See T. Christian Miller, *Supervisors O.K. 21,000-Home Development*, L.A. TIMES, Nov. 25, 1998, at A1. While Ventura County Supervisors complained bitterly about the recklessness with which the Newhall Land project was approved, on the very same day, they approved the 3,000-home Ahmanson Project just across the county line. See *Ventura County Oks Ahmanson Project*, L.A. TIMES, Nov. 25, 1998 at A1.

240. From 1987 to 1992, the state experienced severe drought during which some water users had to cut consumption anywhere from ten percent to twenty-five percent. See Sue McClurg, *Water and Growth*, WESTERN WATER 4 (May/June 1995). The state suffered a similar shortage from 1976 to 1977. While this drought emphasized the potential for widespread water scarcity, most areas did not experience severe or mandatory water rationing. Most demand reduction was achieved through voluntary conservation practices. See MWD URBAN WATER MANAGEMENT PLAN, *supra* note 134, at 115-28. Despite the virtual certainty that similar droughts will occur in the future, MWD has not backed away from its written promise to ensure a ninety-eight percent water service reliability level for all existing and anticipated customers. See *supra* note 143. Maintaining this promise allows land use planning decisions to proceed without consideration of water supply problems. As a result, the cumulative impact of continually increasing supplies and demands is never explicitly considered in either the water resources or land use planning process.

land use plans to affected water agencies for comment and review.<sup>241</sup> Water agencies are required to respond to the referral with a description of existing water supplies and uses, and the quantity and timing of all proposed additional water supplies.<sup>242</sup> Additionally, certain large-scale projects that necessitate full environmental review under CEQA, and either the adoption of a specific plan or an amendment to a general or specific plan, must be evaluated by a water agency for determination as to whether sufficient water supplies will be available to meet the expected increased demand.<sup>243</sup>

241. See CAL. GOVT. CODE § 65352(a) (West Supp. 1995). The statute requires that prior to the adoption or substantial amendment of a general plan, a planning agency may refer the proposed action to any public water system that would be affected by the proposed action. The "general plan" is the basic land use charter that embodies fundamental decisions that govern and shape the direction of land use within the jurisdiction of a local government (city or county). See *City of Santa Ana v. City of Garden Grove*, 100 Cal. App. 3d 521, 532 (1979). The general plan is considered a local government's "constitution for all future developments" because all subsequent land use actions (e.g., specific plan, zoning ordinance, subdivision map, development agreement) must be consistent with the objectives, principles, and standards set forth in the general plan. *Citizens of Goleta Valley v. Bd. of Supervisors*, 52 Cal. 3d 553, 570 (1990); see also *Leshner Communications, Inc. v. City of Walnut Creek*, 52 Cal. 3d 531, 544 (1990). The contents of a general plan, including a mandatory land use element, are set forth in the California Government Code, starting at section 65300. CAL. GOVT. CODE § 65300. The land use element provides the central framework for the entire general plan by identifying the distribution and intensity of all land use activities through objectives, policies, programs, diagrams and maps. See JAMES LONGTIN, LONGTIN'S CALIFORNIA LAND USE § 2.11[1] (Local Government Publications, 2d ed. 1987).

242. See CAL. GOVT. CODE § 65352.5 (West Supp. 1995). The following information must be provided by a water agency receiving a referral: (1) the current urban water management plan, see *supra* note 125, (2) the current capital improvement plan, (3) description of all sources of water supplies currently available under wet, normal, and dry years, (4) description of quantity of surface and groundwaters provided to customers during the previous five years, (5) description of all proposed additional sources of water and estimated quantities and dates when the supplies will be available, (6) description of total customers currently served, by category (agricultural, commercial, industrial and residential), (7) quantification of reduction in total water demand for each customer category that will result from implementation of urban water management plan. See CAL. GOVT. CODE § 65352.5 (West Supp. 1995).

243. See CAL. WATER CODE §§ 10910-13 (West Supp. 1995). The intricate and limited applicability of this measure is important to understand because it results in primarily procedural rather than substantive coordination of land use and water resources planning. First, the statute only applies to large-scale developments, classified as residential developments of more than 500 units, commercial developments over 500,000 square feet and employing over 1,000 persons, hotels with more than

These efforts, however, are just a first step. Sharing of information between water and land use planners is important, but it most likely will not result in water resources planning processes that enable the full articulation and achievement of sociological values. First, the current efforts attempt to work within the existing planning paradigm. While the information available to water resources and land use planners is more comprehensive, planning processes for the two natural resources remain structurally isolated. Planning for water and land uses is still conducted by different agencies, at differing times, for different periods of time, by

500 rooms, and industrial projects over 650,000 square feet and employing over 1,000 persons. See CAL. WATER CODE § 10913. Second, a large-scale development will only trigger the statute if: (1) the project results in a net increase in population density or building intensity, (2) the local government has determined an environmental impact report is required under CEQA, and (3) the process necessitates the adoption of a specific plan or an amendment to a general or specific plan. See CAL. WATER CODE § 10910(a)-(b). In other words, for the statute to apply a project must be very large, not contemplated within current land use plans, and found to have environmental impacts sufficient to trigger full review under CEQA. These complex requirements limit the statute's applicability to only a narrow range of developments.

Once the statute is triggered, affected water agencies must do a demand reliability assessment which indicates "whether its total projected water supplies available during normal, single-dry, and multiple-dry years included in the 20-year projection contained in the urban water management plan will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses." CAL. WATER CODE § 10910(d). If the water agency determines there are insufficient water supplies for the proposed development, the water agency must provide information concerning all "measures being undertaken to acquire and develop" the necessary water supplies. See CAL. WATER CODE § 10911(a).

A finding of sufficient or insufficient water supplies to serve the development, however, is merely procedural. It is the responsibility of the *land use planning agency* to make a final determination, "based on the entire record," as to whether there will be sufficient water supplies for the proposed project. See CAL. WATER CODE § 10911(c). A water agency's conclusion is not dispositive. Even if there is a finding of insufficient water supplies, the land use planning agency can determine that the insufficiency does not constitute an adverse environmental impact under CEQA and approve the project. See CAL. PUB. RES. CODE §§ 21082.2, 21083 (West 1991); see also CEQA Guidelines, *supra* note 204, §§ 15382, 15064. Alternatively, the agency could find the insufficiency of water supplies constitutes an adverse environmental impact but nonetheless approve the project because the impact can be eliminated or substantially lessened, or there are overriding considerations. See CEQA Guidelines, *supra* note 204, §§ 15091, 15093. Thus, even if these labyrinthine procedures find there is an insufficient water supply for a proposed project, the substantive impact of this determination is potentially minimal or nonexistent.

Finally, the most limiting aspect of this statutory scheme is that it focuses upon short-term planning. Water resources and

different methodologies, pursuing objectives and goals adopted under differing considerations by different methods, agencies and constituencies.

The critical defect in the structural separation of planning processes is the limited capacity to consider interrelationships between land use and water resources *during the planning process*. The current framework requires one resource to be planned before the other. Land use planners consider the most up-to-date water resources plans before acting,<sup>244</sup> and water planners evaluate the relevant land use plans to determine forecasted demands.<sup>245</sup> Devoid from this iterative process is the potential to consider both water resources and land uses, and how they interrelate and affect each other, *before* plans are made for the utilization or preservation of either resource. The consequence of our current scheme is that sociological values such as conservation, ecology, equity and sustainability, all of which are impacted by

the fundamental interrelationship among land, water and people, are incapable of being fully incorporated into planning processes and outcomes.<sup>246</sup>

Water resources and land use planning must be completely merged to create a process which simultaneously considers land use impacts on water resources, and water resources impacts on land uses. It is only through this comprehensive planning framework that evolving sociological values can be articulated and incorporated into planning outcomes.<sup>247</sup> First, a combined natural resources planning structure would allow environmental and social objectives the opportunity to be considered outside the quantitative analytic processes which currently dominate water resources planning. Land use planning does not rely on quantitative analysis but rather has developed in the opposite direction, emphasizing discussion, deliberation and community involvement. The importance

land uses are coordinated *only if there is an actual proposed development project*. Coordination is reactive rather than proactive. The statute does not seek to develop a more proactive and long-term integrated planning process whereby sociological values could play a role in determining whether the combined land use and water resource demands are socially desirable. The interrelationship between the two resources is considered only in a project-specific context.

244. See *supra* notes 240-42.

245. See *supra* notes 224-25 and accompanying text.

246. See *Appendix* (summarizing these sociological values and explaining how they are derived from the interrelationship between natural resources and human activity).

247. See generally MULDER ET AL., *supra* note 11. In the authors' study on the possibilities for integration of land use and water resources planning, they suggest three principles to support this concept:

(1) Ecological Balance. Separate and uncoordinated resource planning activities are likely to lead to an imbalance in resource use because the availability of one resource in a natural ecology is closely related to the use of another. This interdependence among resources may be less clearly delineated or understood if planning activities are undertaken for single resources and individual localities. Integrated resources planning is necessary to achieve and maintain ecological balance and to optimize resource use and insure the carrying capacity of a region is not over-taxed.

(2) Equity. The concept of equity assumes there is some fair or just distribution of resources to individuals, groups, organizations and society. The nature of the distribution is politically defined and constrained by various traditions. Planning activities strongly affect

resource distribution so that the equity issue is a matter of some importance in the planning process. Questions of equity are becoming more difficult to resolve as resources become scarce. Fragmented and uncoordinated planning in an interdependent resource system frequently results in spill-over effects that change the distribution of resources.

(3) Effectiveness. Effectiveness should be a measure of the accomplishment of desired functions and goals. As planning for scarce resources becomes more complex, with increasing objectives and changing values, integrated planning becomes critical to achieving effectiveness by: (a) resolving conflicting functions, goals and objectives, and (b) coordination and cooperation through improved methods, procedures, and institutional arrangements.

*Id.* at 45-46.

and necessity of public participation in land use planning has long been recognized and pursued.<sup>248</sup>

Second, a merged water resources and land use planning structure has the potential for breaking the stranglehold of the constrained optimization framework on water planning. Economic efficiency has not been a primary objective in land use planning. Instead, economic, social and environmental values are given far more equal treatment through this planning process. Since its inception, the purpose behind land use planning has been to promote the public health, safety and general welfare of the community.<sup>249</sup> While the economic benefits of planned development are recognized,<sup>250</sup> they are often viewed

as secondary to the primary objectives of land use planning.<sup>251</sup> For example, communities often consciously forego economic gains in order to achieve environmental and social objectives.<sup>252</sup> Incorporation of environmental and social objectives is not limited to mere consideration of "impact," but rather these objectives are recognized as legitimate ends to be satisfied through the planning process.

Third, a combined planning structure would allow concurrent planning of water supply and demand. The existing narrow framework within which water resources planning occurs would be eliminated. Demand would no longer be a derived function upon which all subsequent planning is based because the land uses that create water demand would be

248. As early as the 1960s, the need and desirability of public participation and representation in land use planning was recognized and asserted. See Paul Davidoff, *Advocacy and Pluralism in Planning*, 31 J. AM. INST. PLANNERS 4 (1965) (arguing that city planners should encourage pluralism by giving voice, power and representation to the concerns of the numerous interest groups who have a stake in the planning process); see also MULDER ET AL., *supra* note 11, at 30-1 (describing the techniques used for obtaining citizen involvement in land use planning). Davidoff, a professor of city planning, cogently observed that public participation involves an active planning process, not a passive assessment of citizens' preferences:

If the planning process is to encourage democratic urban government then it must operate so as to include rather than exclude citizens from participating in the process. "Inclusion" means not only permitting the citizen to be heard. It also means that he be able to become well informed about the underlying reasons for planning proposals, and be able to respond to them in the technical language of professional planners.

Davidoff, *supra*, at 5.

249. The power to control land uses was first recognized in 1926 by the United States Supreme Court in *Euclid v. Ambler Realty Co.*, 272 U.S. 365 (1926). The legal basis for all land use planning is the police power, exercised to protect the public health, safety and welfare of the community. See *Berman v. Parker*, 348 U.S. 26 (1954). Courts have consistently construed the "police power" broadly, recognizing the ability of government to regulate for the purpose of preserving and promoting "community values." Justice Douglas speaking for the Court in *Berman* stated "[t]he concept of the public welfare is broad and inclusive . . . [and] [t]he values it represents are spiritual as well as physical, aesthetic as well as monetary." *Id.* at 33. Several decades later, Justice Douglas reemphasized this point in *Village of Belle Terre v. Boraas*, 416 U.S. 1, 9 (1974), when he stated that under the police power a community is empowered to take land use actions which establish areas "where family values, youth values, and the blessings of quiet seclusion and clean air make the area a sanctuary for people."

250. See generally RICHARD BABCOCK, *THE ZONING GAME: MUNICIPAL PRACTICES AND POLICIES* (Univ. of Wis. Press 1966) (describing how property values can substantially benefit from good land use practices).

251. For example, the General Plan serves as the land use "constitution" for local governments in California and consists of seven elements. None of the elements are specifically oriented to achieve economic objectives. Instead, the general plan elements focus primarily on promoting social and environmental objectives. The specific elements include: land use, circulation (transportation), housing, conservation, open-space, noise and safety. See LONGTIN, *supra* note 240, at § 2.11. Additionally, the typical planning enabling act emphasizes the promotion of social welfare objectives, with economic considerations given secondary consideration. For example, consider the Standard City Planning Enabling Act, created in 1928 by the U.S. Department of Commerce, which states that:

The plan shall be made with the general purposes of guiding and accomplishing a coordinated, adjusted and harmonious development of the municipality and its environs which will, in accordance with present and future needs, best promote the health, safety, morals, order, convenience, prosperity, and general welfare, as well as efficiency and economy in the process of development.

U.S. Department of Commerce, A Standard City Planning Enabling Act § 7 (Government Printing Office, rev. ed., 1928).

252. The most direct example of communities making a trade-off between economic and social objectives, is the numerous "slow growth" ordinances which have been enacted throughout California. The measures intentionally limit the amount of development in a community through such means as limiting housing permits, downzoning residential areas, size restrictions for commercial developments, urban limit lines or greenbelts, and industrial square foot limitations. See MADELYN GLICKFIELD & NED LEVINE, *REGIONAL GROWTH . . . LOCAL REACTION: THE ENACTMENT AND EFFECTS OF LOCAL GROWTH CONTROL AND MANAGEMENT MEASURES IN CALIFORNIA 27-33* (Lincoln Land Institute 1992). The primary reasons given by citizens for their support of slow growth measures include: "quality of life preservation," "preservation of open space," "reduction in traffic congestion," and "preservation of environmental areas." These preferences indicate that citizens were willing to limit economic objectives to achieve overriding environmental and social objectives. See *id.* at 50-52.

planned simultaneously with water supply strategies. Communities would be empowered to consider the interrelationships between land, water and people, and would have a process by which those interrelationships could be reflected in planning outcomes. Such a broad-based planning process would provide a forum in which sociological values such as conservation, ecology, equity and sustainability would be relevant, articulated and achievable.<sup>253</sup>

Finally, merging water resources and land use planning would create an opportunity for establishing a set of ethical principles to guide the planning process for two fundamental and life-sustaining resources. Current water resources planning is normatively indefensible because it prohibits adequate consideration of sociological values in the planning process. As a result, planning outcomes cannot be defended with reference to a set of ethical principles

253. See Harvey M. Jacobs, *Planning the Use of Land for the 21st Century*, 47 J. SOIL & WATER CONSERVATION 32 (1992). Jacobs, a professor of urban and regional planning, makes the argument that land use planning should serve as the nexus for resolving the interplay between social, economic and environmental values. He asserts that planners "need to ask not just 'what is the ecological carrying capacity of the land' and 'what is the economically efficient use of land' but 'what is a socially equitable way to plan for the land's use.'" *Id.* at 34. Similar to the arguments asserted in this paper for water resources, Jacobs concludes that:

In general, the mission of the postmodern land use planning professional is to acknowledge that land use planning is not and cannot be a technocratic, scientific exercise. Land is a unique ecological resource, but it is also a unique social resource. Land use planning often acts as the stage for fundamental and complex social debate about individual and social rights and the articulation of ideals about democracy and social justice.

*Id.*

254. See FELDMAN, *supra* note 39, at 2-3. In his book on water resources management, Feldman argues that:

A normatively defensible water policy should seek to conform to a higher plateau of democratic aspiration, a plateau on which the values of justice are articulated through a participatory framework for making decisions, which broadens the perspectives of participants and deepens their understanding of issues encompassed by water resources decisions. A normatively defensible water policy cannot be merely efficient . . . it should also be equitable and ecologically sound.

*Id.* at 158.

255. See generally RICHARD E. FLATHMAN, *THE PUBLIC INTEREST: AN ESSAY CONCERNING THE NORMATIVE DISCOURSE OF POLITICS* (John Wiley & Sons, Inc. 1966) (arguing that competing demands for resources presided over by public officials require that officials justify their decision, or any claim of acting in the "public interest," based on a set of moral or ethical principles which can be

that elucidate the desired consequences of proposed actions. Instead, water resources planning outcomes are defensible only on the grounds they are economically efficient, a justification based upon economic preferences and not ethical principles.<sup>254</sup>

Public officials understand that political decisions must be based on ethical principles that establish the legitimacy and rationality of their actions.<sup>255</sup> The ideological basis for enacting policies must be sufficiently clear that the public can understand the desired consequences of government action or inaction.<sup>256</sup> In the absence of an ideological basis, officials generally engage in several types of behaviors to either obfuscate, or avoid having to explain, the ethical legitimacy or rationality of decisions. First, planning processes are undertaken with little public participation or oversight.<sup>257</sup> Second, planning outcomes are couched in

understood by the public at-large). Historian Robert Kelley pointed out the implication for water resources planners of the need to create normatively defensible outcomes when he warned:

Water policy makers and managers, therefore, must take the political culture seriously, and train themselves—as well as student engineers—to understand and work with it, not as something illegitimate, but as something growing out of the very core of who we are. The political culture and human nature are much more decisive in the public equation than the benefit-cost analyses students in the technical fields are trained, almost alone, to conduct. Human affairs have a complexity far too great to be encompassed in such simple calculations; water planners, in an America increasingly flexing its democratic muscles and by daily exercise making them ever stronger, are being challenged to think in new ways.

Kelley, *supra* note 27, at 19.

256. See generally Duncan MacRae, Jr., *Scientific Communication, Ethical Argument, and Public Policy*, 65 AM. POL. SCI. REV. 38 (1971) (discussing the need for clear articulation of ethical bases for public policy arguments which prevents "reliance on a collection of vague and mutually inconsistent principles, which can be used for *ad hoc* rationalizations rather than genuinely pointing to a single clear implication in a particular case").

257. See generally FELDMAN, *supra* note 39, at 1-21. Feldman notes that benefit-cost analysis has often been used as means of justifying planning outcomes because it is a relatively simple and lucid way to depict advantages and disadvantages of natural resources development. See *id.* at 157. See also discussion *supra* Part IV.A. (criticizing the inadequacy of benefit-cost analysis in water resources planning). Additionally, current environmental regulatory compliance and public participation methods can act as a legitimization process for water resources planning outcomes, and thereby avoid the need to articulate ethical justifications for the results. See discussion *supra* Part IV.B. The MWD IRP Plan also provides a good example of how highly technical planning processes and outcomes can obfuscate and avoid the need to justify the results based upon a set of ethically defensible principles.

very technical and confusing language.<sup>258</sup> Third, some other framework of legitimization and justification is adopted to avoid an ethical or ideological explanation.<sup>259</sup> All three types of legitimizing behaviors are often evidenced in water resources planning.

By merging water resources and land use planning, a normatively defensible planning process is created that includes, for the first time, a forum in which broad-based sociological values can be articulated and incorporated into planning outcomes. Left behind is the current water resources planning framework which gives recognition to environmental and social objectives, but works implicitly to minimize their consideration. While no planning structure can guarantee normatively defensible outcomes, by eliminating a planning framework which subverts sociological values and by creating a planning process in which sociological values are given the opportunity for full consideration, there is a greater chance that planning outcomes will be normatively defensible.<sup>260</sup>

## B. Creating an Integrated Planning Process

The analysis of an appropriate and workable framework for concurrent planning of water resources and land uses is largely beyond the scope of this article. The author has sought to confine this work to the development of a conceptual and philosophical understanding of why the current water resources planning process is inadequate, and how a merging with land use planning might address some of those inadequacies. It will require additional research to test the viability of merging water

resources and land use planning.

The first step is a comprehensive and comparative evaluation of land use planning practices to determine which procedures and methods are important to an efficient, effective and normatively defensible land use planning process. A thorough understanding of the land use planning context and culture must be discerned and evaluated. The second step should provide an analysis of the social, institutional and methodological implications of merging water resources and land use planning. An effective analysis would help determine: (1) whether a planning framework could be created that makes explicit the interrelationship between the water resources and land resources; (2) whether the framework could establish and optimize objectives that are based on economic and sociological values derived from that interrelationship; and (3) whether an efficient and effective institutional structure for governing the integrated planning process could be established.<sup>261</sup>

## VI. Conclusion

Writing in 1993, the authors of *Searching Out the Headwaters* noted that "[n]ever before have people better understood the social and ecological consequences of water policies and decisions."<sup>262</sup> The truth of this statement is evidenced by the heightened scrutiny given to water resources policies and the changing values included in the policy debate. Environmental and social values are increasingly reflected in the policy objectives adopted by water resources agencies throughout the state.

258. See FELDMAN, *supra* note 39, at 1-21.

259. See *id.*

260. William Lord, former Director of the Water Resources Research Center in Arizona, observed the need for a planning process which articulates and explicitly considers values:

We sell ourselves short in our decision-making analyses when we consider values to be given. Values should be elicited, to be sure, but we should give as much or more attention to testing and revising our values as we give to identifying, evaluating, and selecting the alternative means for pursuing them.

Lord, *supra* note 5, at 6.

261. There has been some research and academic writing on the integration of land use and water resources planning, but

most of it is either dated or too general to be readily applicable. See, e.g., MULDER ET AL., *supra* note 11; Maloney & Hamann, *supra* note 235; LEAVITT, *supra* note 235; see generally Seymour Schwartz et al., *Controlling Land Use for Water Management and Urban Growth Management: A Policy Analysis*, Technical Completion Report for Project W-487 (Water Resources Center, Univ. of Cal. August 1977); OVADIA A. SALAMA, *PLANNING AND HUMAN VALUES: AN INQUIRY IN THE PHENOMENA OF URBAN GROWTH AND THE POSSIBILITY OF ITS CONTROL THROUGH WATER AND LAND RELATED ACTIONS* (Abt Associates, Inc. 1974). It is likely that a region-specific analysis is necessary as was undertaken in this article, especially given the special relationship between land use and water resources in Southern California. See *supra* notes 232-34 and accompanying text. The information contained in these works, however, can provide a good framework for beginning an analysis.

262. BATES ET AL., *supra* note 3, at 201.

The author's statement is also borne out in the continuing dissatisfaction with water resources policy outcomes. Advocates of incorporating environmental and social values are frequently told that such values are incompatible with water resources decisions.

The current water resources planning process and analytic methods minimize the consideration of environmental and social objectives. The planning framework fails to embrace the forces that drive water demand and relegates planning outcomes to choices between various supply strategies. Economic objectives continue to dominate the planning process with solutions for water resources problems evaluated on the capacity to optimize economic efficiency with the constraints of environmental and social values.

While water resources planning over the last century has been modified to accommodate changing values toward the use of water, the inclusion of environmental and social values has proven to be especially challenging. Progress has been made, but a more formidable task lies ahead. The current water resources planning process works implicitly to shape and influence policy outcomes. The process is difficult to contest because the advancement of economic objectives, at the expense of environmental and social values, is not the product of an explicit policy decision. Moreover, water

resources planning is considered highly technical, requiring complex models and computer software. It is commonly believed that too much tampering with the process will result in water resources decisions that have potentially devastating consequences.

Without changes in the current planning process, however, there will be little substantive change in planning outcomes. Sweeping reorganization is needed in water resources planning to ensure that water resources decisions reflect changing communal values. While the perfect planning procedure for full inclusion of environmental and social values may not currently exist or be understood, this procedural incapacity must not prevent necessary changes. If we continue to turn a blind eye to the growing gap between water use and social values, we will eventually undermine the legitimacy of water resources planning and policies. Conceptually, the inherent connection between water resources and land use is already understood. Many of the emerging environmental and social values emanate from the interrelationship of these natural resources. Merging water resources and land use planning holds potential for creating a normatively defensible decision-making process. It is time to take steps toward forging that fundamental link.

**APPENDIX: Definition of Terms**

No attempt will be made to comprehensively define environmental and social values as they relate to natural resources. Such a task would be daunting because each set of values described below has been the subject of many books and articles that give the values important in depth treatment and analysis. The following information only provides a brief statement on several environmental and social values that have been identified in the context of water resources policies. The purpose is to provide the reader with a sense of "environmental and social values" as that term is used in this article, and to provide a reference where the reader can further explore each topic.

**Sustainability.** While the idea of sustainable resource use has been a part of water resources planning for a long time through the application of sustained yield management of watersheds and groundwater basins, the concept of sustainable development is much broader and far-reaching. See Daniel P. Loucks, *Sustainability Implications for Water Resources Planning and Management*, 18 NAT. RESOURCES F. 263 (1994). "Sustainable development seeks to maintain natural capital stocks over time for the benefit of both present and future generations. Sustainable development is, in part, a response to the criticism that traditional efficiency standards of welfare economics presume that consumption of resources is efficient; the concept is also an attempt to redefine efficiency to include environmental protection across generations." A. Dan Tarlock, *Environmental Law, But Not Environmental Protection*, in NATURAL RESOURCES POLICY AND LAW: TRENDS AND DIRECTIONS 162, 178 (Lawrence J. MacDonnell & Sarah F. Bates eds., Island Press 1993). Sustainable development does not imply sustainable growth. "Growth conveys the idea of physical or quantitative expansion of the economic system. By contrast, development is a qualitative concept incorporating notions of improvement and progress and including cultural and social, as well as economic dimensions." Andrew Blowers, *The Time for Change*, in PLANNING FOR A SUSTAINABLE ENVIRONMENT 2, 5 (Town & Country Planning Ass'n 1993). Sustainability seeks to develop values that fundamentally reshape lifestyles (socio-cultural norms) in accordance with the limitations necessitated by a sustain-

able society. See generally Dennis Pirages, *Sustainability as an Evolving Process*, 26 FUTURES 197 (1994).

**Carrying Capacity.** Many of the values in sustainable development are also embodied in the concept of carrying capacity, which has been defined as "the number of people who, sharing a given territory, can be supported at any time on a sustainable basis, taking into account known resources, as well as socio-cultural factors." MICHAEL CARLEY & IAN CHRISTIE, *MANAGING SUSTAINABLE DEVELOPMENT* 43 (Univ. of Minn. Press 1993). Carrying capacity forces planners to focus on existing social values and priorities to determine the threshold at which further growth and development would destroy community values or damage the ecosystem beyond its regenerative capacity. See PETER W. HOUSE & EDWARD R. WILLIAMS, *THE CARRYING CAPACITY OF A NATION: GROWTH AND THE QUALITY OF LIFE* 4, 42-43 (Lexington Books 1971). While there is no clear methodology for addressing the myriad issues raised by the carrying capacity theory, the concept provides an important analytical framework for beginning to understand the notion of trade-offs overtime. It forces the planning process to approach problems holistically, seeking to identify social, cultural and economic trade-offs that must be made today in order for a region to continue developing into the future. See STEPHEN MILLS ET AL., *SAVING FOR THE FUTURE* (Sierra Club Local Carrying Capacity Campaign 1995).

**Ecology.** Similar to sustainable development and carrying capacity, the concept of ecology attempts to highlight the interrelationship of human and biotic environments. It attempts to force recognition that any environmental impact is inherently a human impact. The ethic of ecology "argues that people are obliged to protect natural systems, even beyond whatever 'payoff' there may be for humans as a part of nature . . . [and that] people are expected to do something because it is right even when it conflicts with their immediate self-interest." BATES ET AL., *supra* note 3, at 188. An example of this would be to forgo additional agricultural production in order to preserve a biologic environment that supports migratory birds. The first and most famous articulation of the ecology ethic is found in Aldo Leopold's *A Sand County Almanac*. ALDO LEOPOLD, *A SAND COUNTY ALMANAC AND SKETCHES HERE AND THERE* (Oxford Univ.



Press 1949). From this collection of essays are the oft-quoted lines that are held out as the first articulation of the ecology ethic: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." *Id.* at 201. A branch of the ecology ethic, known as "deep ecology," goes further in arguing that anthropocentric values must be replaced with biocentric values that recognize the intrinsic worth and rights of all species. See Merle Jacob, *Sustainable Development and Deep Ecology: An Analysis of Competing Traditions*, 18 ENVTL. MGMT. 477, 479-82 (1994).

**Equity or Fairness.** Equality is often used to refer to how income or wealth is distributed. In relation to natural resources, equity is often measured in terms of access or capacity to use natural resources. The concept of equity is also called "distributive justice." See generally JOHN RAWLS, *A THEORY OF JUSTICE* 3-10 (Harvard Univ. Press 1971) (arguing that social justice is to be regarded as providing a set of principles "whereby the distributive aspects of the structure of society are to be assessed"). Equality can also refer to all persons having an equal voice or right to be heard in a decision-making process, and a right to have their views judged on the merits, without bias or prejudice. See MARK SAGOFF, *THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW AND THE ENVIRONMENT* 39-40 (Cambridge Univ. Press 1990). Five principles for achieving equity in water resources decisions have been identified: (1) reciprocity—distributive advantages and costs should be shared by all community members, (2) value-pluralism—rights to use water for whatever purpose should be respected as long as the resource is not degraded or harmed, (3) participation—water claims consistent with stated values should always be accommodated in resource allocation, (4) promises—agreements made in good faith should be obeyed, and (5) responsibility—present uses of water should take account of future generations. See Helen H. Ingram et al., *Replacing Confusion with Equity: Alternatives for Water Policy in the Colorado River Basin*, in *NEW COURSES FOR THE COLORADO RIVER: MAJOR ISSUES FOR THE NEXT CENTURY* 177, 186-89 (Gary D. Weatherford & F. Lee Brown eds., Univ. of N.M. Press 1986).

**Intergenerational Equity.** The concept of intergenerational equity evolves from the notion that use of natural resources by the current generation has impacts on the availability and use of those resources by future generations. Three principles of intergenerational equity have been identified. First, each generation must conserve the diversity of the natural and cultural resources base, so that it does not unduly restrict the options available to future generations in solving their problems and satisfying their own values. Second, each generation must maintain and pass on a natural environment comparable in quality to that which it inherited. Finally, each generation must preserve the right of access to the legacy of past generations and conserve this access for future generations. See Edith Brown Weiss, *Intergenerational Fairness and Water Resources*, in *SUSTAINING OUR WATER RESOURCES* 3-10 (Nat'l Academy Press 1993).

**Conservation.** Conservation is often associated with the simple concept extending the usable life of natural resources through their effective management. This is often referred to as the utilitarian value in conservation. See Fred T. Wildes, *Recent Themes in Conservation Philosophy and Policy in the United States*, 22 ENVTL. CONSERVATION 143, 145 (Summer 1995). Several authors have noted, however, that:

Today, conservation comprehends a wider view of resources. The focus is no longer exclusively on fulfilling immediate human wants. There is a deeper recognition that humans are a part of a larger system and are obliged to conserve natural resources for their own good as well as the good of future generations and other species.

The principle of conservation calls for meaningful consideration of consequences of proposed water uses. It demands that the advantages and disadvantages of every water use be carefully weighed. It asks that a proposed use be considered in relation to the whole community, that the use be no more than necessary, that its harmful effects on others be minimized or avoided.

BATES ET AL., *supra* note 3, at 181.