

An Evolutionary Perspective on Social Values

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The incorporation of social and environmental objectives in water resources planning and management has been, and will continue to be, the result of several evolutionary processes. The most general of these processes is the evolution of rational-analytic thinking as a form of problem solving behavior. A second evolutionary process is the development of institutional and analytical procedures for making public decisions. The most specific process is the evolution of federal water resources planning procedures in the United States. These processes are examined, the changing institutional environment within which water resources planning and management occurs is characterized, and implications are drawn for future incorporation of social and environmental objectives.

Introduction

Attempts to incorporate social and environmental objectives in water resources planning and management date from the very beginnings of these activities in American society. They did not originate within the last twenty years as we sometimes seem to assume. Yet, changes have occurred during the most recent two decades which make this appear to be a new process instead of the product of a long period of evolution.

Currently great changes are again occurring in the ways in which social and environmental objectives are incorporated in water resources planning and management. The pace of change will continue to be rapid in the years immediately before us. Yet these changes will be the products of evolutionary forces, as were those of the past. They can be anticipated and understood only if those evolutionary forces are kept in mind.

I believe that there are at least three different evolutionary processes which are involved in our consideration of the use of objectives in water resources planning and management. The first and least general of these is the evolution of water resources planning and management activities as such. The second, and more general, is the evolution of public decision making methods in the American system of government. The third, and most fundamental, is the evolution of rational analysis as a determinant of human behavior. In this paper I hope to explore each of these evolutionary processes briefly, to relate them to each other, to observe some aspects of the changing environment within which water resources planning and management are now occurring,

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and to draw some conclusions about the kinds of changes which we may anticipate, or even help to bring about.

Methodological Premises

Methodology was once said to be a subject unfit for discussion by gentlemen (and, presumably, gentlewomen). Accordingly, I will avoid my natural inclination to dwell upon such matters. However, this paper is an eclectic one, drawing from a number of disciplines and models. It may avert confusion, therefore, to mention at the outset of this paper certain of the conceptual models which provide the backbone of the analysis.

To begin, my epistemological model is essentially pragmatic. I assume that one of the worst, and yet one of the most common, intellectual sins is to confuse model with reality. As will become clear later on, I regard models as tools with which to cope with reality. Like physical tools, none is well-suited to every task, and most are suited to only a very few. A model "explains" the "real-world" only for certain purposes. It should be judged by its adequacy in doing so, and should not be rejected because it does not do some other task as well. Empirical testing of the propositions yielded by a model is an essential part of scientific investigation, but the failure to pass some such tests is not necessarily sufficient ground to discard a model. Newtonian physics remains universally accepted and widely used today, many years after Einstein theorized, and others later demonstrated empirically, that it yielded propositions which were invalid.

The German sociologist, Max Weber, coined the term "ideal type" (Weber, 1949). By this he meant a concept which never corresponds exactly with the world of our experience, but which is useful nonetheless in interpreting that world. The Newtonian model is such an ideal type. So are the psychological, sociological, political, and economic concepts which I will employ. To the objection that human behavior is neither purely rational nor purely non-rational, that conflict is never solely over facts nor solely over values, that political decisions are never made in a fully distributive nor a fully redistributive manner, or that benefit cost analyses are never exclusively economic nor exclusively financial, I respond only by agreeing and contending that it does not matter.

The second model which I will employ is that of social learning (Dunn, 1971). Very briefly, it suggests that the biological model of evolution can be extended usefully to account for how human societies perpetuate (and change) their learned behavior patterns and thus adapt successfully to their changing environments. Information, which is passed on from generation to generation, is the key to successful societal adaptation, even as DNA is the key to biological adaptation.

Abstract thought (is there another kind?) is a characteristic of our own species which sets us apart from other animals. This, more than our upright stance and our opposable thumb, explains the ability of an otherwise ridiculously weak and ill-equipped ape to dominate the planet.

But it is not enough to be able to think abstractly, to make models if you will. It is also necessary to develop the behavior patterns which ensure that models can be transmitted from one individual or group or generation to another, thus eliminating the need to reinvent the wheel billions of times over. Equally important is the ability to test our models, and to modify them to make them more and more useful. The aggregate of these enormously effective behavior patterns is called social learning. To go one step further, we now confront the challenge of understanding and shaping the social learning process in order to create our own future as a species, and that of the rest of the world with it.

My third model is the Platonic distinction between fact and value. Facts are propositions which can be determined to be true or false by empirical test. Values are statements about good or bad, propositions which cannot be directly tested empirically. This distinction is an intellectual construct, a creation of the human mind and not an inherent property of the real world. As such, it is neither true nor false, but it has been enormously useful. From it stems the distinction between ends and means, between objectives and alternatives for attaining them. What I will call the rational-analytic decision making paradigm, of which multiobjective planning, as exemplified in much of our water resources literature and as embodied, however imperfectly, in current Federal principles and guidelines, constitutes but a small subset, is the scion of this line of thought.

The discussion will be clearer if we begin with a definitional distinction between social values, societal goals, and program objectives. I use the term social values to mean those widely shared yet vaguely articulated notions of what is good and desirable which, in combination with its technology and social institutions (themselves the means available for achieving the good and desirable), characterize a culture. They are commonly, but not necessarily, evoked in religion and in politics, and in the family. Socialization of new generations includes inculcation of social values, as well as training in the arts and technologies of dealing with the physical and social worlds.

Societal goals are more clearly expressed statements of what a society is trying to accomplish through collective action, and they convey a sense of purposive action which is usually lacking in social values. They are more explicit than social values (to which they are clearly related), yet are also quite broad and general. Examples might include developing the West, limiting unemployment, and preserving endangered species.

Program objectives are not only clearly expressed but also operationally defined statements of what particular government programs are intended to accomplish. They are more specific, less general, and often more controversial than societal goals, to say nothing of social values. Examples might be to achieve a stipulated level of timber harvest from the National Forests, to reduce or limit flood losses to a given level in the long term, or to limit the rate of inflation to a specified annual percentage.

I also want to employ a model from political science attributable

to Theodore Lowi (1964). This model characterizes political decision making by four modes. Redistributive decision making is characterized by the identification of one or more ends for collective action and subsequent selection of an appropriate policy for pursuing that end. Agreement on the end(s) to be pursued is achieved by ideological consensus, not by vote trading. Distributive politics is a process of creating group consensus over a set of actions, each of which responds to the ends considered appropriate by one or more members of the group. Agreement on the means to be employed is achieved by mutual non-interference (Ingram, 1972) and shifting costs to other interests which are not represented in the group. Agreement on ends is neither sought nor achieved. The Lowi paradigm also contains models of regulatory and constituent politics, but neither is essential for my purposes in this paper.

It will be obvious that redistributive politics shares many of the features of another political science model, that of synoptic decision making (Braybrooke and Lindblom, 1963). Both follow the model of rational-analytic decision making which has been alluded to earlier. Explicit identification of objectives, definition of alternative means for attaining those objectives, and comparative evaluation of the means characterizes both models. Distributive politics, however, resembles the model of disjointed incrementalism, earlier called "muddling through," which Braybrooke and Lindblom contrast with the synoptic ideal. Both describe behavior patterns which have evolved to make collective decisions in a way which relies upon intuition and experiment rather than upon explicit intellectual model-building.

The last model which I want to mention is that of welfare economics. It seeks (in vain, as it turns out) to define the necessary conditions for identifying a socially optimal pattern of resource allocation. The benefit-cost analysis so familiar to water resource planners, and the NED analysis which is almost all that now remains of the multiobjective planning of the 1970's, is an attempt to apply welfare economics to public decision making. It is clearly in the rational-analytic tradition. But from a public decision making perspective, there is one major deficiency in the welfare economics model and, consequently, in benefit-cost analysis. Distributional implications are at worst neglected entirely and at best handled imperfectly, in the sense that there is no mechanism for making interpersonal or intergroup tradeoffs. But, making such tradeoffs lies at the heart of collective decision making, something which the practitioners of distributive politics and muddling through fully appreciate.

A distinction has traditionally been drawn in water resources planning between economic and financial analyses. The former are the benefit-cost analyses just discussed. Financial analyses are taken to be more practical investigations of the monetary feasibility of implementing a plan, given the limited perspective of the entities who must raise the money and the peculiar institutional constraints which bear upon their ability to do so. There is too little recognition that these two types of analysis are intimately related, and each is an incomplete subset of the information ideally needed for synoptic planning, and possibly even to begin to combine the best features of

synoptic planning and muddling through. Benefit-cost analysis portrays the aggregate economic effects of a plan from the viewpoint of society as a whole. Financial feasibility analysis portrays the disaggregated economic effects of a plan from the viewpoint on only the sponsoring entity. An ideal form of economic analysis would portray the disaggregated effects from the viewpoints of all affected entities (Lord and Warner, 1973). If project impacts are presented in a matrix or table, with type of impact as the row heading and incidence of impact as the column heading, then the row sums constitute a multiobjective analysis and the column sums constitute a financial feasibility analysis. The vector sum of each is then the net benefit.

Evolution of Rational-Analytic Thinking

When seen in the context of the social learning model, rational-analytic decision making is a form of human behavior which has evolved in response to environmental stimuli and the value of which is subject to the pragmatic test of survival value in the long run. In its two thousand or so years of existence, this form of behavior has been refined and has become increasingly common. However, it is still far from dominant. In fact, I think that most modern psychologists would agree that most behavior is still shaped by primarily non-rational considerations.

My thesis is that we have become quite adept at evaluating alternative means for attaining postulated ends, that we have not yet become very adept at identifying those alternatives, and that we are least adept at determining the ends which should guide the rational-analytic process. The extensive development of sophisticated evaluation techniques within systems analysis, economics, and other disciplines, our limited understanding of the heuristics necessary for creative and imaginative identification of means, and our groping beginnings to understand something about how objectives are created, used, tested, and transmitted lead me to this conclusion.

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. Values, in turn, are inculcated in us by the socialization to which we are subjected from birth onward. But we also test those values experientially, whether explicitly or implicitly, as individuals and as groups. The value shifts which thus occur are analogous to the genetic variation which makes natural selection possible at the biological level.

Rational-analytic behavior has been and is still evolving. It has found its most successful applications in business and military applications where objective formulation is comparatively easy because institutional considerations have effectively bounded the realm of analysis. It has been less successful in guiding individual behavior, although we have found that we can rather easily bully people into thinking rationally in a classroom, laboratory, or similar institutionally structured situation (this includes, to a varied extent, scoping sessions and other structured decision making situations often found in water resources planning). It is difficult

(maybe impossible) to evaluate how successful rational-analytic thinking has been and could be used as a guide to the behavior of individual humans.

I will subsequently argue that we know even less about how useful this paradigm will turn out to be for improving collective decision making, or how it can be blended with another decision making behavior pattern which has a similarly strong claim on evolutionary grounds.

For now, the point to be made is that what we have called social values, particularly as they are refined and defined into societal goals, and even program objectives, are also intellectual constructs, tools which we have forged to help us deal with our environment. In other words, as John Dewey might have said (Dewey, 1938), they are instrumental, and possess no ultimate validity in their own right. We learn to value even as we learn to make, use, and improve physical tools. Our values are not sacrosanct, but are fluid and subject to reevaluation and modification. 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.

Evolution of Public Decision Making

The ways in which we make collective decisions have been evolving for even longer than have the ways in which we think rationally, since we have always been a social animal. Consequently, the earliest forms of collective or social behavior must not have been at all self-conscious. But, with the evolving ability to create and use abstract concepts, and the later ability to think rationally, came the probably quite recent ability to be self-conscious. This ability to envision ourselves objectively, as if from the "outside," permits us to review, evaluate, and deliberately change our ways of behaving.

Most of our political behavior is still not deliberately chosen; we act as we have learned to act through observation of others and in response to the sanctions (positive and negative reinforcers, to the psychologist) which abound in political institutions. But we are becoming increasingly self-conscious even about political behavior. Lowi's four political modes, as well as the models proposed by other political scientists, describe behavior patterns which have succeeded and evolved in ways which are largely not self-conscious. However, rational-analytic techniques, such as PPBS, benefit-cost analysis, and multiobjective planning, are increasingly common in political life. It should come as no surprise that such techniques do not dominate collective decision making, and they are often used in the context of an apparently less than fully rational process. Often, in fact, they seem to be bent to the use of those less rational processes, much to the dismay of the analysts who have developed and promoted them.

There are at least three good reasons why rational-analytic approaches have achieved such a tenuous foothold in public decision making. The first is that they have been used for such a short period of time that they have not been fairly tested yet. The second is that

they are guided by explicitly defined goals or objectives, and we have not yet become very successful in defining objective functions. The third reason is that we have made almost no progress on the problem of including interpersonal tradeoffs, as we call them, in the analytical framework. It is for this third reason that rational-analytic techniques have been such limited aids to those whose principle business is to forge agreements among divergent interests. Politicians, along with mediators, belong squarely in that group.

From an evolutionary perspective, then, it must be said that rational-analytic techniques have yet to insinuate themselves importantly and irrevocably into our group decision making processes, which continue to be shaped in largely non-selfconscious ways by our collective experience in dealing with each other. There are at least two reasons in principle why this should be so, and thus one should not expect an early or easy flowering of the plant which this conference seeks to nurture.

Evolution of Federal Water Resources Planning Procedures

Water resources planning and management have been undertaken from the very earliest days of our nation. At the outset, such activities were conducted only by private parties, but governments became involved before long. Eastern states participated in the canal building era, and the Corps of Army Engineers, because it had the largest concentration of engineering expertise in the new nation, soon became involved in navigational improvements as well. Planning (as contrasted with engineering design) procedures were not made explicit and formalized, however, until this century. They were made explicit and increasingly formal because there was conflict over the societal goals to which water resources programs were said to promote and because there was also conflict over whether water programs, as implemented in practice, were the best means of pursuing those goals.

Various societal goals have been enunciated from time to time to stimulate new directions in public policy. For example, John Wesley Powell envisioned the development of an irrigation-based economy for the arid and semi-arid western territories. He correctly foresaw that private investment alone was unlikely to achieve this end very quickly, and proposed that the federal government take active steps to promote land settlement and reclamation. Thus the federal reclamation program, when it was instituted at the beginning of this century, had as its explicit goal the settlement of the public domain and the development of the irrigation economy foreseen by Powell.

Goals are often in conflict when collective decisions are made. Westerners who stood to gain from reclamation projects believed the goal of the program to be clearly in the national interest. But as the subsidies included in the program became more numerous, more generous, and more costly to taxpayers (for a discussion of those subsidies, see Cuzan, 1983 and Rucker and Fishback, 1983), some eastern interests came to question just how much subsidized western development was in the national interest. No doubt the criticism was somewhat muted by the navigation and flood control subsidies which Corps programs brought to eastern states.

The politics of water resource development has always followed the distributive pattern of seeking to provide rewards for enough players to build a strong consensus based upon mutual non-interference and support (Ingram, 1972). Yet the dilemma is that the attempt to do so leads to the inclusion of less and less efficient projects, so that external opposition builds as well. In this case, both water resource development proponents and opponents turned to rational-analytic methods to attempt to justify or discredit such development. The language in the 1936 Flood Control Act which set the stage for benefit-cost analysis by declaring that benefits should exceed costs is the clearest example. First government economists and then academics became major players in what had theretofore been a politician's game. However, the result was the politicization of analysis and a half century of tension between methodological purity and political necessity. The outcome, at this point in time, appears to be abandonment of the multiobjective paradigm in favor of the more restrictive (and politically less adaptable) benefit-cost analysis, which is now methodologically purer than it has ever been but also less binding. Analysis seems to have taken a back seat to institutional change, especially changes in cost sharing rules to reduce subsidies and more nearly approach co-occurrence of benefits and costs. If achieved, this goal will spell the end of distributive politics in federal water programs, and quite likely of the programs themselves.

When environmental quality was made an explicit planning objective in water resources planning nearly two decades ago, it was an example of the derivation of such an objective from a social value which had long existed, but which was becoming more influential in our culture as our collective experience revealed problems associated with what had been a fairly single-minded rush towards economic development and a homocentric view of the world. Progress towards developing a rational-analytic method for integrating environmental concerns into water planning procedures has been spotty at best. This is not just because the environmental objective remains poorly defined, but also because commensuration remains an unsolved problem. Environmental quality is an ambiguous term which points to an increasingly emphasized social value, but which has only partially been translated into societal goals, and scarcely at all into operationally defined objectives.

Perhaps the best defined societal environmental goal is the preservation of rare and endangered species. It is not yet clear whether the objectives sought will be the prevention of the extinction of all or only some species, or whether the objective is merely to constrain human activities so as not to hasten extinction or to take whatever action is necessary to reverse a naturally occurring process. Nonetheless, much definition has been achieved in a relatively short period of time. Compare this with the shambles which existed in the Principles and Standards EQ objective and account prior to its virtual abandonment by the present administration. The heroic efforts undertaken to catalog, measure, and commensurate environmental variables came to no useful conclusion, in no small part because they were not illumined by any clear notion of what societal goal was to be pursued. I contend that certain national environmental goals, such as the preservation of endangered species, the protection of migratory waterfowl, and the designation and management of wild rivers had been

identified and programs to attain them had been put in place apart from, although not necessarily independent of, the water resource planning process. What remained was a sense that locally important environmental goals should also enter the planning process, but by that time planning was off in pursuit of national objectives and was hopelessly ensnared in the confusion between local planning objectives and national constraints (Lord, 1981).

The Current Environment

Evolution is the process through which organisms and societies adapt to their environments. Water resource planning and management in the United States is occurring within a rapidly changing environment. We can expect to see similarly rapid changes in planning procedures in response to these changes in the environment. If we are wise, we will actively direct and accelerate those changes. In order to do so, we must correctly perceive how the environment is changing. My own perceptions are as follows:

- 1) Resource development is giving way to resource management. In water quantity management especially, we are nearing the limits of exploiting a familiar technology. We have already built most of the feasible and economic storage sites. Those that remain are the more difficult, less efficient, more costly, and more controversial. In water quality management this is not the case, but management presently appears to be more attractive than technology as an approach to these problems.

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 success may be expected from the use of conflict resolution techniques of the kind to be explored at this conference. Greater emphasis will be placed upon the establishment of societal goals and objectives. Rational-analytic approaches will become more important, provided that major conceptual problems in their application to group decision making can be solved.

- 2) State, regional, and local programs will displace federal ones. The current administration has made rapid strides in reducing non-military federal programs, with water resource development high on its list of expendables. Development, to the extent that it continues, will have to be accomplished with a lesser federal role. Management and regulation are probably best accomplished at non-federal levels, with some federal assistance. Again, distributive politics will be less predominant at lower levels of government, where it will be more difficult to shift costs to third parties (attempts in western states to dedicate general and property tax receipts to water resource development are encountering stiff opposition). Rational-analytic methods are much less securely established in non-federal decision making than in federal procedures and regulations, but when they are used they may be used with greater fidelity.

- 3) Financial analyses will loom larger than economic ones. The fiscal resources of state and local governments are more limited than those at the federal level. Careful determination of possibilities for debt retirement will become mandatory as bonding is looked to for raising investment capital. Externalities incident beyond the boundaries of sponsoring entities will be given less attention. One of the major justifications for a continuing federal role is to ensure that such externalities are considered. In this respect, there may at last be a move to combine economic and financial (efficiency and equity) analyses in a single comprehensive framework.

It seems likely that the great effort to create a federal EQ objective and account has come to a close. Existing federal environmental goals and programs will constrain state and local activities which might otherwise damage essential national interests. Locally defined environmental goals will be translated into quite specific environmental objectives and constraints. Planners need no longer go through exhaustive and exhausting attempts to describe, measure, and commensurate every conceivable environmental change which an alternative might produce.

State and local concerns for financial feasibility and disinterest in externalities beyond their borders will have mixed effects upon environmental objectives. Far fewer water development projects will be forthcoming, so that potential adverse environmental impacts of such projects will be avoided, although not deliberately. However, the emphasis upon financial considerations will make it more difficult to fully consider non-monetary environmental implications of those projects which are constructed.

- 4) Incentives will assume a larger role than analysis. This tendency is already evident in the administration's tightening of cost-sharing rules and de-emphasis on analytical procedures, such as those embodied in the Principles and Standards. Rational-analytic procedures are currently less securely ensconced at non-federal levels, and resources do not exist there to raise them to prominence. Financial limitations will dictate a strong emphasis on properly structuring incentives in any case. It will be a challenge to the intellectual community to provide leadership in this area equivalent to that which it has provided in the development of analytical techniques. Institutional analyses far more penetrating and theoretically based than those now conducted will be needed.

In conclusion, I believe that the incorporation of social and environmental objectives in water resources planning and management will take quite different forms in the future than it has in the past. However, these developments will continue to be the results of evolutionary processes which we can understand and even influence if we try. We have passed through the Principles and Standards era and must now learn from it but not try to reinstate it. Multiobjective planning techniques, in the sense of the evaluation algorithms which have occupied so much of our attention in the past, must give way to value

elicitation, values revision, and all of the related concerns which are raised by the social learning paradigm. Institutional analysis must be elevated to a prominence equal to or greater than that of mathematical systems analysis. But I believe that all of these things will happen, and that an exciting intellectual future awaits us in water resources planning and management.

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Key Words

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