DESIGNING MANAGEMENT STRATEGIES THAT INTEGRATE STAKEHOLDER BELIEFS AND SCIENTIFIC MODELS: A CASE STUDY OF LAKE LANIER

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REFERENCE: Proceedings of the 1999 Georgia Water Resources Conference, held March 30-31, 1999, at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, the University of Georgia, Athens, Georgia.

Abstract. This work focuses on the role of stakeholder involvement in water resources decision-making. It builds upon a methodology developed for integrating stakeholder beliefs and preferences with scientific modeling of lake ecosystem processes, and is part of a larger study involving the application of integrated assessment models to water resource management. We identify four different management practices -- means, ends, scenarios, and targeted scenarios -- and examine their strengths and weaknesses. This element of the project studies types of lake management at Lake Sidney Lanier. It also explores the benefits of stakeholder involvement in management of an impounded water source facing rapid development pressures. Inclusion of local community values into this modeling framework allows for a more place-based approach in the decision-making process.

INTRODUCTION

Water resource issues continue to confront decision-makers. The management of scarce water supplies is a hotly debated issue. Whether in Phoenix or Chicago, managing the wise use of water resources remains a primary concern for most communities. Lake Sidney Lanier, in Northern Georgia, is no exception. The lake was created in 1956 as one of the US Army Corps of Engineers projects designed to manage water flow and supply, river navigation, and to provide additional power supply to the rural regions in North Georgia. The project involved construction of the Buford Dam, which impounded stream flow from the Chattahoochee River, just south of where the river is joined by the Chestatee River. Originally intended to serve rural communities, Lake Lanier is now considered part of the rapidly growing Metro Atlanta Region, providing additional important economic development opportunities such as recreation and tourism. In 1991, Lake Lanier was the most frequently visited of the Army Corps lakes in the US. Given its current status, the watershed is facing increasing pressure to make wise land-use decisions, thus bringing more focused attention to the area (Hatcher, et. al., 1994; Beck, et. al., 1998; Kundell, et. al, 1998; Limno-Tech, inc., 1998).

The future state of the community and surrounding environment depends on the land use practices in the area. Local land use and environmental decisions are made for any number of reasons, often forced by the most expedient or influential needs. Effective decision-making, however, needs to rely on place-based citizen participation regarding a community vision of the future. This sort of forward thinking, when coupled with a sound scientific understanding of the performance of ecosystem processes, is akin to the adaptive ecosystem management practices described by Lee (1993) and Gunderson, et. al. (1995). We refer to this process as adaptive community learning and which we argue helps a community to sustain a healthy ecosystem state under future growth and development pressures. In this framework, both stakeholders and science play an important yet distinct role in decision-making (Fath, et. al, 1999). There is timely and important scientific information that is necessary for this sort of development in accordance with environmental guidelines, but the future opportunities and constraints offered from this landscape are largely the result of present social, not scientific decisions. Understanding the relationship between social and scientific decision support networks is critical to the water resources decision-making process, since these networks cannot be sharply separated.

In this research, we identify four types of management/planning strategies for the interaction between society's value-based vision and scientific information. The four strategies are means, ends, scenarios, and targeted scenarios. Each of these practices involves varying degrees of science and/or citizen involvement and we explore the strengths and weaknesses

of each approach relative to examples found in Lake Lanier. We will argue that the targeted scenario-based approach provides a promising framework for developing a successful interaction among the science community and the stakeholders and decision-makers they seek to inform.

BACKGROUND

This project is just one element of a larger body of ongoing research that focuses on the interactions between community values and rapidly urbanizing watersheds. The objective of this larger research project is to develop a prototype approach to engaging both community interests and a complex (mathematical) map of the science base of Lake Lanier's ecosystem. Thus, we are exploring how shorter-term individual preferences can be reconciled with longer-term community values in regard to maintaining the integrity of an environmental system (Norton, 1995; Norton, 1998; Norton et. al., 1998). The larger project has two distinct programs of research: 1. Eliciting community values and encoding stakeholder-derived futures and 2. Developing a foodweb, sediment, and hydrological model of lake systems. The unique aspect of the larger project is that these two elements will be integrated such that the stakeholder-derived futures will be reconciled with the lake systems model yielding a model of water quality that integrates community hopes and fears with sound science and decision-making.

One of the stated goals of this larger research project is to move beyond stated preference models common in environmental valuation studies today. Hence, one of the innovations we are undertaking is to articulate values that can be understood and valued over multiple scales of time and management horizons and linking these stated preferences to the scientific modeling efforts planned for the lake. Through evaluating values on more than one level, simultaneously, we argue that a more accurately stated preference toward environmental values can be developed that moves well beyond the traditional economic valuation framework and into a more sustaining model of growth and development for rapidly urbanizing watersheds (Norton and Steinemann, forthcoming).

METHODS

To further understand the approaches to decision-making, we chose the case study method to examine the roles of various stakeholder groups affiliated with Lake Lanier. The groups we studied have been operating both collectively and individually in addressing growth and development pressures affecting the water quality of Lake Lanier. Interestingly, two groups in particular are actively seeking scientific understanding of lake ecosystem processes yet seem to be doing so for different purposes, thus we feel that they will make for an excellent case study.

For the purposes of this immediate research exploring the role that citizen involvement plays in environmental decision-making, we are opting for a combination of open and close ended questions distributed via a mail survey to a representative sample of stakeholders within the Lake Lanier watershed. Through our work, thus far, we have established some initial understanding of how groups approach management of the watershed and view the relationship between citizens and decision-makers. The following discussion section outlines our findings to date and explains how we expect to proceed in this vein of the larger research project

DISCUSSION

The role of the decision-maker depends on the levels or absence of interaction between the science, the decision-maker, and the stakeholder. We believe that the process of interaction is iterative yielding a triangular relationship among the three entities. The following diagram illustrates these interactions.

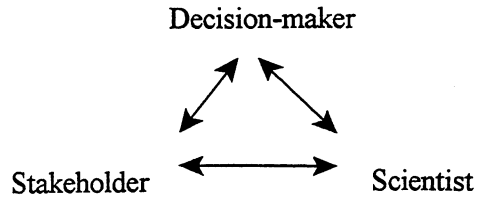

Figure 1. Interaction among decision-makers, stakeholders and scientists.

Each of the approaches referenced earlier focuses on the interaction described in Figure 1 in a slightly different way.

The means-based approach emphasizes method over results and has a low input of social vision or scientific information. This style of management is rational but

bounded by perceived limits to capabilities. The decision-maker reacts to immediate problems with short-term solutions. It is akin to the bounded rationality model of policy development described by Charles Lindblom (1959) as 'the science of muddling through.' This approach rarely results in a future collective vision and is reactionary to citizen complaints and political pressures. Typical examples associated with Lake Lanier seem to involve the planning practices of individual local governments. Their obvious objective is to secure a strong local planning strategy that benefits their immediate community.

The ends-based approach requires strong social organization to agree upon a common vision and a moderate amount of scientific information. As stated by advocacy planner, Norman Krumholz, there is not one, but a multiplicity of public interests, and we need to plan for this collective of individuals as we would for ourselves. Thus, this illustrates the nature of an ends-based approach as uniquely activists focused (Krumholz, 1982). Other planners argue from this perspective that if those in opposition to decided management plans prepare one of their own (Davidoff, 1965). This approach is citizen-based but often divisive, lacking integration with science and decision-makers.

The scenario-based approach has minimal social consensus building and high dependence on scientific information. It is also rationalist in nature, utilizing a top-down planning process, with the planner serving as technocrat, providing decision-makers with a high degree of control. Followers of this approach argue that there are no alternatives to rationalism, stating that it is fundamental to all other decision-making processes (Faludi, 1987). This approach is typical in most local government agencies. Data is collected that is typically absent citizen involvement and analyzed in isolation of the problem, water quality in this case. This sort of approach is what creates controversy among citizens as they feel left out of the planning process.

The targeted scenario-based approach appears to have the most potential for sound watershed management because it integrates social and scientific knowledge. It utilizes the concept of social learning whereby the scientific community and the stakeholders inform each other yielding outcomes that are community-based, and perhaps more readily accepted and successfully implemented. The process involves change agents that provide a learning loop integrating knowledge from both the citizens and the scientific community such that decision-makers and citizens arrive at mutually agreed upon outcomes (Schon, 1983; Friedmann, 1987). We feel that this multidisciplinary approach is beneficial because it promotes collaboration among scientists and stakeholders.

CONCLUSION

Our preliminary investigations have revealed evidence of each of the four approaches to watershed management associated with Lake Lanier. Based on initial feedback relative to the outcomes of the examples we have observed, we feel that the targeted scenarios approach offers the best prospect for a sustainable future in the Lake Lanier watershed. Targeted scenarios offer an integrated look at the present and yield a more sound watershed management strategy that is inclusive of both long and short term goals that are shared by the citizens and the decision-makers. Our contribution to the process comes in through combining citizen hopes and concerns with current science of the Lake Lanier ecosystem. The interface between science and society comes about because the users (society) are choosing future targets to which we (the scientists) project.

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