SCIENTISTS AND STAKEHOLDERS: EVALUATING THE LEGITIMACY OF THE ILLINOIS RIVER BASIN MANAGEMENT PROTOCOL

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Introduction

In this paper, I discuss a persistent problem in the legitimation of environmental policy: the proper interaction between scientific expertise and stakeholder autonomy. I refer my discussion to an ongoing project by a team of researchers, of which I am a member, from the University of Oklahoma (OU) and Oklahoma State University (OSU), to develop a management protocol for the illinois River in northeastern Oklahoma. I first review briefly the circumstances of the Illinois River watershed and summarize the OU/OSU protocol. I then discuss the increasing use in recent years of stakeholder processes in the environmental policy arena. Next, I present a scheme that represents the ways that both scientific assessment and stakeholder processes factor into policy legitimation. Finally, I use this scheme to illuminate the roles assigned to scientific experts and stakeholders in the OU/OSU protocol and to explore the broader question of the complex relation between those roles in general.

The Illinois River and the OU/OSU Project

The Illinois is Oklahoma's most prized scenic and pristine river. It and its two major tributaries (Flint Creek and Barren (or Baron) Fork Creek) flow freely from their headwaters in northwestern Arkansas to a dam that forms Tenkiller Ferry Reservoir, south of the town of Tahlequah. Together the three streams comprise a corridor of 119 miles and drain a watershed of 900 square miles. The Illinois River provides multiple social benefits to the citizens of the state and region. It provides habitat to an abundance of wildlife, including several threatened and endangered species of plants and animals. The river is a center for rafting and canoeing, fishing, and other recreational activities, drawing users from Oklahoma, Arkansas, Missouri, Kansas, and Texas. Tourism is the major industry in the area; it is estimated that in 1997 there were more than 58,000 boat trips down the river, accounting for over $11 million in spending (Bality *et al.* 1998). However, the area has seen increasing agricultural development. In addition to limited cattle ranching and several plant nurseries, large-scale poultry operations have increased in the area.

Recent studies have indicated that the water quality in the Illinois has deteriorated. Although both point and non-point sources contribute to the total nutrient increase, non-point agricultural sources are responsible for most of the phosphorous loading. Recreational users have thus blamed agricultural users for the decline in water quality. In response, riverfront property owners have blamed boaters for trespassing on their land, for leaving litter along the banks, and for rowdy behavior. In addition, residents of Oklahoma have attributed water quality declines to a water treatment plant near the Arkansas city of Fayetteville for the problem – leading to lengthy litigation finally resolved by the U.S. Supreme Court.

This pattern of stakeholder groups trading blame for the river's problems has meant that management of the Illinois has been the center of political controversy for over twenty-five years. Since 1970, management has been in the hands of the Oklahoma Scenic River Commission (OSRC), which has attempted to balance stakeholder claims. However, the OSRC has been frustrated in its efforts to

implement a comprehensive management plan. The need for a plan was recognized in 1979, when a study showed that the Illinois was not ready for designation under the federal Wild and Scenic Rivers Act. In late 1998, after five years of difficult work, the OSRC released a draft plan that consists of goals and suggested implementation strategies.

The problem the Illinois has faced, therefore, is the inability of different stakeholders to reach agreement about how to protect their shared resource. In 1997, in an attempt to address this problem, a team of researchers from OU and OSU proposed a protocol for developing a management plan that is technically effective, economically efficient, administratively feasible, and sociopolitically acceptable. The OU/OSU project, supported by three years of funding from NSF and EPA, involves a rigorous scientific assessment of the physical and ecological characteristics of the region, as well as of the economic interests and social and political attitudes and values of resident and non-resident stakeholders. These data will be used to produce a model that predicts alternative impacts on the region under different management scenarios. The model, in turn, will drive interactive GIS-based visualizations, to be used first by policymakers and later by stakeholders as a decision-support tool for a policy dialogue about alternative land and water uses. The results of these stakeholder discussions will be presented again to policy makers to help refine their policy proposals, and then be evaluated by stakeholders. The acceptability of the final proposal that emerges will tested through a telephone survey of basin stakeholders.

The feature of the OU/OSU project I wish to examine here is the way it brings together two groups who represent distinct sources for the legitimacy of environmental policy: scientific experts and stakeholders. The project presumes that policies must be based on sound scientific assessment of the relevant environmental problems and their proposed solutions. At the same time, it is based on a firm commitment to the ideal that policies must be responsive to the values and attitudes of the persons who will live by them. Thus, the project raises the question, what is the relation between these two sources of policy legitimacy? This question is obviously present in virtually all policy contexts, and indeed is as old as political theory itself: Plato's dismissal of democracy in favor of government by the wise is one clear, if clearly controversial, answer. In my view, the relative weight of popular support and scientific validity for legitimating a given policy is a matter of ongoing inquiry, subject to the particularities of the specific case. I will therefore use the OU/OSU project as an arena for rehearsing this kind of examination, rather than as a basis for a definitive finding.

The Increasing Use of Stakeholder Processes

The OU/OSU project's use of stakeholder deliberation is, of course, hardly unique; the current movement to include affected parties in both private- and public- sector decision-making is indeed international in scope. In a recent survey of stakeholder processes in the environmental policy arena, Terry F. Yosie and Timothy D. Herbst (1998:10) argue that such processes "represent an evolution from previous methods of soliciting public input." They cite several sources of the present presumption that stakeholders ought to play some role in environmental decision-making (p. 11).

- In the 1960s, the War on Poverty sought to organize low-income people at the community level, in order to foster "maximum feasible participation" in the programs that served them.[1]
- Within the private sector, dating from the 1970's, there has been an increasing recognition that companies are responsible to other parties than shareholders, e.g., customers, suppliers, and communities in which they operate.
- In the 1970s and 1980s, stakeholder groups became involved in environmental dispute resolution, which grew out of more general efforts to head off litigation by negotiated settlements, mediation, and also by public involvement in city planning.
- The "good government" movement has called for greater public participation in administrative rule making. For example, as Mark Sagoff (1999) notes, in 1972 the U.S. Forest Service instituted a program for engaging stakeholders in policy debate that became a model for other federal agencies.

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[1] These efforts, in turn, hearken back to the "Social Unit" experiments of Wilbur and Elsie Phillips in the 1910s (see Wayne A. R. Leys (1952), pp. 224 ff).

- A further impetus, according to Sagoff (1997), has been grassroots frustration with the inability of the formal policy-making apparatus to respond to local concerns and to resolve conflicts over resource uses due to "unclear and conflicting goals, and a maze of competing agencies and programs." This has led to a movement dubbed "civic environmentalism," in which local stakeholder groups have stepped forward to propose solutions themselves. Thus, John (1994) notes, "hundreds of citizen associations now exercise responsibility in managing forests, wetlands, rivers, lakes, wildlife, and other natural assets."

The past three decades, therefore, have established stakeholder participation as a norm in environmental policymaking as a way of providing democratic legitimacy to policy decisions. However, Yosie and Herbst (1998) observe that this mode of legitimation stands as a rival to another mode that grew in importance over the same period: the reliance by policymakers on scientific assessments of environmental issues. The invocation of scientific authority is an expected and powerful way to justify environmental policy.[2] Thus, Yosie and Herbst (1998:40) note, "At present, science-based and stakeholder-based processes represent competing approaches for influencing policymakers' choices." Indeed, Yosie and Herbst pose as one of the most significant challenges to stakeholder participation the need to integrate these two processes' contributions more successfully.

Yosie and Herbst propose an integration that is based on two distinctive roles that scientists and (lay) stakeholders are best suited to play. Their survey of over three dozen participants in stakeholder processes, from a range of backgrounds, yielded the intuitively plausible conclusion that while scientists should be the "finders of fact" about environmental problems, lay stakeholders should be the interpreters of social values. Insofar as environmental conflicts stem from competing values, scientific assessments are insufficient guides to the right public policy. However, at the same time, the application of values to the formation of policy must be informed by the best available understanding of the physical processes at work. Thus, on this view, the best prospect for stakeholder processes is that scientists have some structured role by which they may contribute their assessments so that stakeholders may then shape policies in light of the best scientific information and their own authoritative conception of societal values.

Policy Legitimation

Yosie and Herbst are right to highlight the relation between scientists and lay stakeholders as a crucial issue for stakeholder processes. However, I believe that while their scheme (whereby scientists confer legitimacy to policy at the level of facts and stakeholders confer legitimacy at the level of values) is intuitive, it is also too simple. In particular, it does not make clear how the information to be provided by scientists and stakeholders functions to make policy legitimate, and, importantly, it ignores the different contributions that can be made by natural and social scientists. I thus propose an alternative scheme that better captures the complexity of policy legitimation. I will begin with an overview of the main concepts to which I will appeal.

Theoretical Background

The western tradition of political theory offers two broad accounts of legitimacy – one distinctively modern, one a legacy from antiquity.[3] The modern account, which lies at the root of the social contract metaphor that remains the dominant explanation of democratic legitimacy, is voluntarism. Human beings are seen as inherently free, hence any political obligations to which they are subject must be voluntarily self-imposed to be legitimate. The social contract, from its classic to its contemporary versions, involves independent agents consenting to be ruled in this or that manner. We can isolate two distinct strands within voluntarism. One strand emphasizes the activity of choice itself; it is in this activity that human beings exercise their distinctively human capacity for autonomy.[4] A policy that is freely chosen by the

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[2] Though, as Sagoff observes, opposing parties frequently cite their own scientific experts to support their views, leading to policy deadlock and the danger that the public will become skeptical regarding appeals to scientific authority.

[3] The discussion here follows Riley (1982).

[4] This notion was articulated Rousseau, and then rigorously developed by Kant.

people it covers is *prima facie* legitimate; its rightness is established directly by being the object of autonomous choice. The other strand in voluntarism emphasizes the fact that consent reveals what people want; this strand is associated with utilitarianism, for which (in its standard contemporary version) the good is the fulfillment of preferences. On this view a freely chosen policy is *prima facie* legitimate because choice is authoritative evidence that the policy is good, and it is right to implement good policies.

The ancient account of legitimacy, which survives in contemporary talk of government acting (or not acting) in the public interest, can be called fiduciarism: the view that a state is legitimated by the fact that it serves the interests of the public that it governs (Wolin 1960:56).[5] Two further distinctions are important here. First, the term "interest" is typically used in distinction from "want"; thus, someone may want something that is not in his or her interest or not want something that is. However, this stark distinction between want and interest is too strong. There are certainly cases where a person might want something for a good reason in spite of the harm it will bring. Thus, it is not obviously outside of one's interest to risk injury to save a child in danger. Further, it is paternalistic to deny that there is a certain benefit to having one's wants satisfied, even if those wants lead to some degree of harm. Finally, it may not be clear which of several outcomes is in fact more beneficial, in which case the one that is desired has a stronger claim to the status of interest. Therefore, it is reasonable to speak of locating interests within a spectrum between subjective wants and objective benefits. The case is strictly analogous when we speak of the public rather than individual interest. Thus, we must recognize that, in particular cases, the debate over what is in the public interest will include arguments that appeal both to what the public wants as well as to what is good for the public, objectively.

Second, speaking of the public interest raises the question of precisely how it aggregates the interests of the individuals who constitute the public. We can distinguish between two conceptions of aggregation. On one hand, the public interest is that which is in the interest of everyone. To the extent that different individuals have different sets of interests, the public interest is the intersection of those sets. On this view, clean air is in the public interest because everyone benefits from it. However, on the other hand, the interests of different groups frequently conflict, so that there are few interests shared in common. Such cases call for some sort of equilibrium or balancing of interests, whereby competing groups trade off some of their claims in order to satisfy others. On this view, the public interest is the best reconciliation possible given the particular constellation of interests at hand.

These two accounts of legitimacy, voluntarism and fiduciarism, identify conditions that make a policy legitimate. On the first account, a policy is legitimate to the extent that it is willed by the public; on the second, a policy is legitimate to the extent that it furthers the public interest. How are we to know if these conditions are fulfilled? It is, I take it, obvious that democratic decision-making procedures such as deliberation and voting establish *prima facie* that a policy has been chosen by the public. Thus, stakeholder processes base their claim to be sources of legitimacy largely on voluntarist considerations. It is equally obvious that establishing that a policy serves the public interest is a *prima facie* goal of scientific assessment. Fiduciarist considerations are thus the basis for scientists' claims to legitimate policy (Hays 1959).[6] However, as we shall see, stakeholder processes and scientific assessment in fact contribute in complicated ways to *both* sorts of considerations. The respective "turf" of experts and lay people is not clearly demarcated, but is shared – and contested – simultaneously.

Likewise, I must stress that no robust political theory ignores one or the other account of legitimacy, but weaves together elements of both. Voluntarism has been the central theme of modern political thought,

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[5] Sheldon Wolin argues that Plato defends rule by the philosopher kings on the grounds that philosophers' pursuit of wisdom makes them discount the ordinary personal benefits of political power, e.g. wealth and prestige, freeing them to direct their energies toward pursuing the common interest.

[6] This is Plato's ideal of rule by experts, which was shared by the conservationist movement's promise of "scientific management." As Hays explains, "Each resource problem involved conflicts. Should they be resolved through partisan politics, through compromise among competing groups, or through judicial decision? To conservationists, such methods would defeat the inner spirit of the gospel of efficiency. Instead, experts, using technical and scientific methods, should decide all matters of development and utilization of resources, all problems of allocations of funds" (p. 271).

but appeals to the public interest are a recurring theme in many social contract theories. As Patrick Riley (1982) argues, Rousseau in particular is notable for his attempt to blend an ancient commitment to a common good morality into a theory built on voluntarist foundations. But, as Riley shows within the context of Rousseau's theory, these two elements are in significant tension: there is no guarantee that a people will freely choose what is actually good for itself – and *making* it choose the good violates its freedom.[7] Rousseau's theory thus vividly illustrates a persistent problem for democratic legitimation: voluntarism and fiduciarism both identify essential elements of legitimacy, but they pull in opposite directions. This problem is particularly acute in the environmental arena, where achieving goals that seem straightforwardly good (e.g., cleaner air) can involve actions that much of the public does not want (e.g. regulations on automobiles). The lesson to be drawn from this conceptual tension is that, in any given instance, legitimation involves a complex negotiation between competing normative concepts. The scheme I shall now offer is meant to identify the main sites of that competition, in order to clarify the kinds of issues that must be negotiated to frame legitimate policy.

A Scheme for Representing Policy Legitimation

The scheme I propose has three layers: the abstract structure of public policy, the conditions that legitimate policy, and how it is determined whether those conditions obtain.

Layer 1: Public Policy

The foundation of the scheme is a simple representation of policy in terms of ends and means (Figure 1a). A policy has a goal and implements measures to attain it. In line with the fiduciarist account of legitimacy, let us stipulate that the goal is in line with the public interest, as will be elaborated later.

Layer 2: Legitimation

Overlaying this foundation is a representation of the voluntarist and fiduciarist conditions that legitimate policy (Figure 1b). Note that these operate at the levels of both ends and means: a policy with acceptable ends might be pursued in an unacceptable way (the converse case seems less likely). Let us see how the two accounts of legitimacy operate at each level. At the level of means, each account supplies a distinct consideration. Policy instruments that were not efficacious, e.g., due to an inadequate understanding of the natural systems involved, would clearly fail the fiduciarist criterion of legitimacy since they would fail to act in the public interest. On the other hand, policies that lacked public support would fail the voluntarist criterion since they would be rejected rather than chosen by the people they regulate.

At the level of ends, the voluntarist and fiduciarist considerations are not so distinct. I list two legitimating factors for policy ends, which together shape our understanding of the public interest: "what the public wants" and "what is good for the public." The former has an obvious *prima facie* association with voluntarism: it seems right for the public to choose the ends its government should pursue based on its own conception of its good, i.e., what it wants. Note that this association points to the utilitarian strand in voluntarism – the idea that what is important about choice is that it reveals preferences, and what legitimates government is that it acts in accordance with people's preferences.

Nonetheless, at least for the version of fiduciarism that stresses the objectivity of benefits, the legitimacy of a goal whose main claim is that the public wanted it would still be very much in question. This version has an obvious *prima facie* association with the second factor of legitimacy, "what is good for the public:" it seems right that the government should pursue ends based on what will actually do the public good. However, what exactly makes something count as a public good?[8] Can a policy be determined to be good for people, whether they themselves acknowledge it or not? Or, as the strand of voluntarism that stresses autonomy would insist, is it the case that the good for human beings is not given externally, but has to be chosen to count as a good for the public involved? These questions demonstrate the complexity of the notion of the public good, which must keep in balance voluntarist and fiduciarist considerations that are in conceptual tension.

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[7] *The Social Contract*, Book II, chapters vi-vii.

[8] I am *not* using the term public good in its technical economic sense, i.e., to refer to a good that if it is available to anyone it is available to everyone, but rather in a more informal sense of something that is good for the public.

Figure 1a

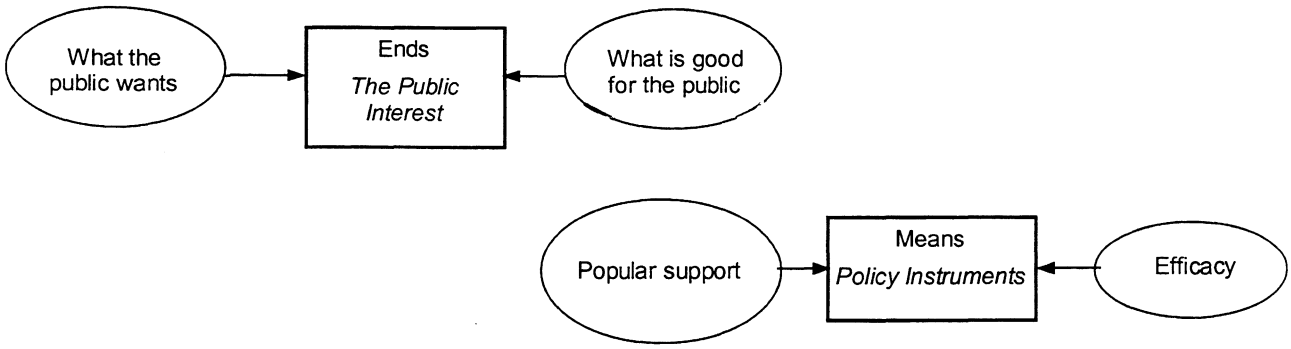

Figure 1b

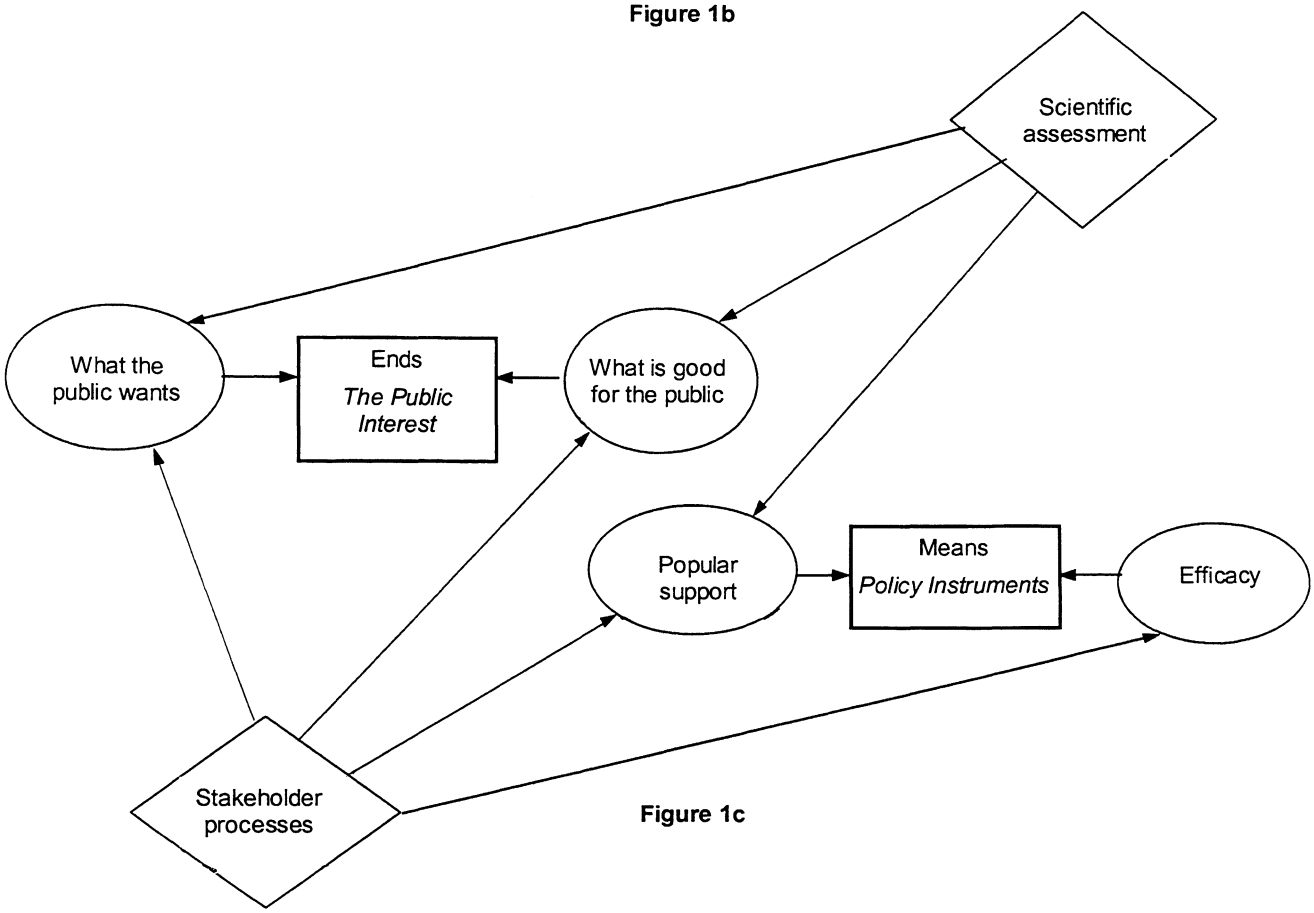

Figure 1c

Layer 3: Determination

The top layer of the scheme represents the methods used to determine whether the conditions of legitimacy in fact obtain (Figure 1c). The methods are, of course, scientific assessment and stakeholder processes; the scheme illustrates the different ways stakeholders and scientists contribute to the process of policy legitimation. I will present this layer by taking up the contributions scientists and stakeholders make with respect to the four legitimating factors represented in layer 2 (the ovals in the figure). At first glance, it might seem most natural to associate stakeholder processes with the voluntarist conditions of legitimacy and scientific assessment with the fiduciarist conditions. However, as the figure indicates, in fact the situation is more complex: both sorts of methods provide evidence pertinent to both sorts of conditions.

Efficacy. Determining the efficacy of policy instruments may seem like the simplest case, since it seems that scientists have a privileged role to play in determining whether a policy will meet the fiduciarist criterion of actually serving the public interest. Indeed, the expertise of physical scientists is clearly crucial in predicting the impacts of policy on the natural world, and social scientists, such as economists, can predict the impacts of policy on society. However, stakeholder groups can also have a role in assessing the efficacy of policy. Thus, for example, citizen juries have been used to evaluate the sometimes conflicting contributions of scientific experts in a range of policy domains (Smith and Wales 1999).

Popular support. Insofar as popular support is a voluntarist criterion, it would be natural to suggest that it be determined democratically, say by a vote. However, the approval of a representative stakeholder group is in most cases more practical, and, given the opportunities for increased understanding by participants in small groups, perhaps is even more authoritative. However, the utilitarian strand in voluntarism suggests that social scientific methods can be used to determine if this condition is met. These methods are meant to determine the public's preferences directly, without any formal choice procedure. Thus, polls, focus groups, or other methods of opinion research can gauge whether a policy enjoys popular support.

What the public wants. As we noted above, this factor is linked to the voluntarist account of legitimacy – specifically, the utilitarian idea that identifies the good with preference satisfaction. How, then, do we determine the public's preferences? Clearly, both scientific methods and stakeholder processes can be used in this inquiry. Sophisticated social science techniques can identify subtle structures of knowledge and opinion within a population by using random polling or detailed interviews with targeted individuals. On the other hand, discussions among representative stakeholders can also reveal the preferences of members of the public. How are we to compare the evidence provided in each way?

As advocates of deliberative democracy argue, the "discourse conditions" of stakeholder discussions can lend them greater weight than scientific methods in the process of legitimation.[9] For, as noted above, in small groups individuals are able to gain greater knowledge of a situation, hence to inform their preferences with facts. Ideally, in such situations, individuals must respond to the stated preferences of others and hence must provide reasons that might appeal to others' points of view as well as acknowledge and respond to others' like explanations. Thus, the results of deliberation can claim to represent not merely a static "snapshot" of the public's preferences at a given moment, but the expression of a considered preference that is revised in light of existing disagreements.

On the other hand, however, the legitimacy of a stakeholder process is highly dependent on the range of factors that determine whether the broader public accepts a particular set of individuals as their spokespersons, in a formal or informal sense. The results of a stakeholder discussion might be deliberatively robust but democratically unrepresentative. Thus, scientific techniques might claim to produce results that, while perhaps less robust in the deliberative sense, are more truly representative of the range and distribution of preferences in the given population.

What is good for the public. As we saw above, the concept of the public good is complex; it embodies some conceptual tension between voluntarist and fiduciarist considerations. Correspondingly, the

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[9] See James Fishkin's (1995) work on deliberative polling.

methods used for determining what is, in fact, good for the public are addressed to different and competing legitimating conditions.

From the fiduciarist perspective, the public good is an objective matter, discoverable (in different ways) by natural and social scientists. Natural scientists might claim to speak with authority on what state of the ecosystem is objectively good for the public, and, in light of observed or predicted changes in the environment, what policy ends are required to maintain that optimum state. This claim would be made in light of the conception that defines the public good as what is good for everyone in society, i.e., the interests that all share in common.

However, from the perspective of the autonomy strand in voluntarism, the public good is good in virtue of its having been chosen as a good by the public. How is such a choice identified? Here, social scientific techniques for measuring opinion seem to miss the mark. What is called for is an actual process of public deliberation emanating in a decision that, in a performative sense, makes the chosen policy end good. With the important caveat that they be appropriately representative, stakeholder processes seem to be necessary to fulfill this role. Note that the notion that the public must choose a good for it to count as the public good addresses the idea that stakeholders speak on behalf of public values. It is here, therefore, that we can locate the partition of roles for scientists and stakeholders articulated by Yosie and Herbst, i.e., that scientists discover facts but these facts must be evaluated by stakeholders.

What is the role of social scientists in discovering the public good? Recall the conception of the public interest as the best tradeoff between competing interests. As Sagoff (1997) argues, economists have claimed to be able to determine the equilibrium of interests that defines the public interest: the economic technique of benefit-cost analysis aims to identify the optimal blend of resource uses, offering the prospect that competing interests can be reconciled. Moreover, apart from economics, there is an arsenal of research techniques to identify the range of values in a population and their relative salience. Policy makers can make use of this evidence in combination with the evidence regarding the ecosystem itself to frame policy ends that blend objective assessments of benefits with the values that would make such benefits count as public goods.

Legitimation and the OU/OSU Project

The scheme just presented lays out the kinds of appeals that might be expected in arguments about the legitimacy of a given public policy and the kinds of evidence that might be used to support these appeals. As noted, the scheme is complex, allowing for overlapping and conflicting appeals based on different sorts of evidence. The value of the scheme is, I believe, that it aids the analysis of the claim of a given policy-making process to produce legitimate outcomes. The scheme provides categories for identifying the legitimating features of such a process as well as for pointing out sites of conflict over the legitimacy of a given policy. To test the scheme, I analyze the policy-making protocol proposed by the OU/OSU team for the Illinois River.

First, I must stress that this analysis is preliminary. The OU/OSU project is ongoing, and as of this writing has not yet reached the stage of initiating the policy dialogue involving first policymakers and then stakeholders. The visualization tools intended to support these discussions are still being created. Thus, my comments are informed less by concrete results than by speculations based on the procedures the project plans to implement. The situation is complicated further by the fact that the OU/OSU project is being conducted at a time when the OSRC has released its own plan for the river and is enmeshed in substantial controversy regarding its implementation. With these caveats in mind, what is of particular interest in the OU/OSU project is the degree to which it integrates scientific assessment and stakeholder processes. I will comment in particular on how both natural and social scientific techniques will be used to help frame and conduct stakeholder discussions.

Natural Science Techniques

A wealth of data on physical and ecological impacts on the Illinois River will be used to develop a database and hydrologic model of the river basin. These, in turn, will be the basis of visual simulations that represent predicted changes in the basin due to alternative management scenarios. The simulations, which will include photo-realistic animations designed to make scientific data understood by non-specialists, will be presented to groups of policy makers and stakeholders to aid them in ranking and revising alternative plans for managing the Illinois.

How will the scientific techniques embodied in the visualizations contribute to the legitimacy of the policy that (hopefully) will emerge from the OU/OSU protocol? Most obviously, the models supporting the visualizations can produce assessments of the efficacy of various policies. This is a fiduciarist criterion, which speaks to the ability of the given policy means to attain its end. Nonetheless, it seems likely that, if seen by a large number of residents, the visualizations can also aid with the voluntarist criterion of generating popular support.

More interestingly, however, the visualizations will help their viewers decide on the precise ends management policy should aim to achieve. They will be first presented to a group of policymakers who will use them to frame initial versions of policy alternatives. At this level, the information about the hydrology and ecology of the Illinois that the visualizations incorporate can be used to inform fiduciarist claims by policymakers about what is in the public interest. However, the visualizations will also be used, at another level, in discussions among representative stakeholders aimed at evaluating and revising the initial proposals drafted by policymakers. Here they provide a more robust voluntarist service. For example, by showing one stakeholder group how policies that are aimed to satisfy their specific preferences might adversely affect other groups, the visualizations might lead the members of the first group to reconsider and revise their preferences, leading to a deliberative expression of what the public wants. Thus, by showing vividly how a management plan affects a variety of stakeholder interests, the visualizations will support stakeholder deliberations about how to balance competing interests, allowing them to reach a considered judgment of what, in their view, is good for the public. The results of these stakeholder discussions will in turn be fed back to policy makers as data about the public's views, thereby initiating another round of policymaking and evaluation. In sum, then, the visualizations contribute to policy legitimation by aiding policymakers in fulfilling their fiduciarist responsibilities in a way that fully respects the voluntarist requirement that stakeholders have a say in framing the policies under which they will live.

However, we should take note of a concern that the scientific methodology embodied in the visualizations can work to undermine the legitimating force of their use by stakeholder groups. The models that drive the visualizations incorporate assumptions about highly complex and uncertain ecological processes. Thus, on the one hand, technical decisions on the construction of the models might lead them to under- or over- emphasize impacts on the river basin. This kind of distortion in the representation of reality might unduly dispose stakeholders to choose associated policy goals. The science, that is, might "wire" the outcome of democratic deliberations. On the other hand, there is a conflict between the uncertainties associated with the models' predictions, and the fact that vivid visual images can give an impression of predictive certainty. The visualizations are useful as decision support tools precisely because they have a high degree of credibility. However, to the extent that they represent the future in unambiguous terms, they misstate the ambiguities implicit in the exercise of modeling complex natural systems. This is, of course, not to suggest that models or visualizations based on them have no place in stakeholder processes. Rather it is to observe that they acutely raise well-recognized difficulties in communicating scientific information to the lay public. With respect to the question of policy legitimacy, scientific information *must* be communicated to meet the voluntarist condition of public engagement in policymaking. However, if it is presented in a way that conceals uncertainties and indeed keeps invisible the techniques by which it has been produced, then it actually compromises the very stakeholder autonomy it is intended to serve. Under these circumstances, the mode of presenting the scientific information gives stakeholders the misleading impression that the information on which they base their decisions is more certain and unequivocal than is in fact the case.

Social Science Techniques

Two sets of social science techniques are used in the OU/OSU project. First, economists are assessing the regional economy to develop a model that can generate benefit-cost analyses of alternative management plans for the basin. The model will focus on tourism and recreational activity, and agricultural activity, with a particular focus on poultry production. The economic model will be linked with the model of physical and ecological aspects of the basin discussed above so that visualizations can also represent the economic impacts of different basin policies. Second, political scientists have used a battery of techniques to ascertain knowledge and opinions about the basin among a range of stakeholders including policy makers, local residents, and tourists, among others. This sociopolitical assessment includes a comprehensive description of various participants' perspectives, beliefs, views, and values concerning the river, perceived threats to its uses, and options for policymaking. The assessment will in turn be used to help policymakers first to frame alternative management plans and then to select participants for stakeholder discussion groups. It will also be used by the groups' facilitators to guide their discussions.

The economic techniques contribute to policy legitimation in ways that parallel the contributions of natural science, as discussed above. To the extent that the visualizations mesh economic analysis with hydrological and ecological predictions, they will allow their viewers to consider a fuller range of impacts of proposed management plans. In particular, the visualization of economic aspects might aid both policymakers and stakeholders in identifying acceptable balance-points between competing stakeholder interests. However, paired with this opportunity for legitimation that is enhanced by the economic information are the possibilities, just discussed, of compromising the full requirements of voluntarism by understating the degree of uncertainty associated with the economic model.

The sociopolitical assessment enters into the legitimation process in three especially interesting ways. At the level of the drafting the initial alternatives, the data will be used by policymakers to frame proposals that have greater prospects for success. That is, the opinion research techniques give strong evidence of what the public wants and values. Thus, their results can guide policymakers in their efforts both to determine what environmental conditions count as benefits and harms for the public, as well as to reconcile groups when their interests are inconsistent.

At the level of stakeholder evaluation of proposed policies, the data will help determine which individuals will be invited to participate in the stakeholder discussions. Here, the assessment will incorporate the technique of Q-factor analysis (Brown 1994), which identifies typical structures of opinion present among members of a population (though not how widespread each structure might be). This analysis enables researchers to select previously interviewed stakeholders for discussion groups in a way that ensures that all commonly held perspectives are represented. This will improve the likelihood that the full range of viewpoints that exist in the region will be articulated and defended in-group discussions. To help reach this goal the discussions will be run by trained facilitators who will use the assessment data to estimate the likelihood of the development of a consensus policy outcome based on the existence, nature, and intensity of conflicts among stakeholder viewpoints.

Finally, the sociopolitical assessment will consider the validity of different groups of stakeholders' beliefs about the various physical and social processes that produce impacts on the Illinois by having individuals produce "mental models" that represent their understanding of the relevant causal relationships between impacts and their sources. These will be compared to an authoritative model, produced by interviewing a set of experts on various aspects of river basin management, with particular preference for those familiar with the Illinois River and the studies conducted on it. The comparison will reveal deficiencies in stakeholders' understanding of how the watershed "works." Identifying these gaps in understanding can serve the goal of fostering popular support for the final management plan since policymakers will see in advance, and be able to address, ways in which stakeholders' opposition is due to their misconceptions.

The contribution of opinion research techniques to policy legitimation addresses the strand of fiduciarism that stresses the subjective quality of the public interest: in general, it helps policymakers identify policy ends that are in the public interest by showing what the public wants and values. However, from the perspective of the autonomy strand of voluntarism, these techniques raise certain concerns. Consider the difference between giving one's opinions in a private interview and participating in a public discussion. The latter forum, unlike the former, carries with it the connotation of collective decision-making. It is thus

distinctively political and invokes the voluntarist notion of legitimation through public choosing. However, in fact, the stakeholder discussions that evaluate the policymakers' proposals are not designed for stakeholders to make a politically effective choice but rather to serve the fiduciarist purpose of providing policymakers with very accurate information about what stakeholders think. It is thus entirely possible for stakeholder participants to misconstrue their own role in the legitimation process by thinking of themselves as decision-makers rather than as informants.

The present concern is highlighted by the way participants for the stakeholder discussions are chosen. From the fiduciarist perspective, it is crucial that all points of view be recognized and incorporated in the policy dialogue. In that sense, the stakeholder groups can be thought of as genuinely representative. However, this notion of representativeness is in tension with the more manifestly voluntarist notion in which representatives are chosen by those they represent. Thus, even if the participants in the discussions are made completely aware of their role, there is the prospect of misunderstanding among the wider public. It is plausible that, in the absence of a personal connection with the process even as attenuated as voting, members of the public might not regard the policy outcome as legitimate precisely because they take it to be unrepresentative. Public suspicion of the process might well be exacerbated by the fact that it consists of complex scientific techniques, administered by outside academic experts, instead of conventional and familiar democratic forms of participation.

The use of opinion research techniques thus raises the prospect of the paradox that the OU/OSU protocol could produce a policy that, in fiduciarist terms, serves the public interest perfectly, but which, for voluntarist reasons, the public does not accept. This is, of course, the essential problem regarding the role of expert knowledge in democratic politics recognized since Plato. Science might identify the right policy – right even in the sense of being the policy in accord with what the public wants. However, if it is not legitimated by a procedure that makes room for the public's active and effective choice, it may not be accepted even by those whom it would benefit. Legitimacy is most enhanced by policy-making processes in which there is an explicit and active partnership between scientists and stakeholders. As suggested by an influential National Research Council report, within such a partnership scientific analysis would work to inform stakeholder deliberations, which in turn would frame scientists' research efforts.[10] In this recursive interaction, scientists' and stakeholders' distinct but mutually dependent contributions to legitimacy can be most productively combined.[11]

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[10] The research design for the OU/OSU project was strongly influenced by this report. However, the policymaking protocol it proposes is importantly different, in that it places greater emphasis on policy-making officials, and uses survey data rather than direct stakeholder deliberations to frame the questions the project scientists studied.

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