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Human-provided waters for desert wildlife: what is the problem?

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Abstract Conflict persists in southwestern deserts of the United States over management of human-constructed devices to provide wildlife with water. We appraised decision processes in this case relative to the goal of human dignity and by the standards of civility and common interest outcomes. Our analysis suggested that conflict was scientized, rooted in worldviews, and aggravated by use of inflammatory symbols such as "wilderness" and "bighorn sheep." Contested problem definitions, framed as matters of science, advanced factional interests largely by allocating the burden of proof and failing to disclose private concerns about well-being, affection, respect, skill and power. Decision processes were shaped by precepts of scientific management, and thus largely failed to foster civility, common ground, and a focus on common interests, and instead tended to exacerbate deprivations of dignity and respect. If the status quo continues, we foresee further erosion of human dignity because there are likely to be increases in system stressors, such as climate change and human population growth. The prognosis would be more hopeful if alternatives were adopted that entailed authoritative, equitable, and collaborative public decision-making processes that took into consideration national-level common interests such as the U.S. Endangered Species Act.

Keywords Wildlife water developments · Southwest · Discourse · Problem orientation · Decision process

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Introduction

Wildlife water developments, or anthropogenic waters (AWs), are devices built to provide wildlife with water, typically in arid and semi-arid regions. Conflict among stakeholders over wildlife water developments has persisted for nearly 20 years in southwestern deserts of the United States, which is a problem for those who care about fostering civil societies and human dignity. Those involved in conflict over AWs define their problems in many ways, sometimes self-referential, sometimes self-transcendent, but rarely with a focus on process and common interest or human dignity outcomes. In this paper, we use the policy sciences framework to orient to the problem of AWs in the desert southwest, focusing on social process within the institutions of wildlife and wildland management.

Our over-arching concern, implicit to the policy sciences approach, is achieving a commonwealth of human dignity. Our goal here is to provide those who care about this and other similar cases with insights that might help them reconfigure dynamics to increase the likelihood of dignity-enhancing outcomes. In keeping with tenets of the policy sciences approach, we are not interested here in recapitulating, testing, or extending mid-level theories that purport to capture some underlying reality about how and why humans behave. We aspire to be problem-oriented and contextual—to analyze this case in enough detail and yet with enough scope to identify and explain the dynamics in social and decision processes that are key to dignity-related outcomes.

Human dignity, civility, and common interests are inexact but vitally important concepts. The notion of human dignity that we used for our analysis explicitly relates to values as defined by Lasswell (Lasswell and Kaplan 1950; Lasswell and Holmberg 1992): power, wealth, respect, skill, enlightenment, rectitude, well-being, and affection. According to this definition, dignity is a subjective experience shaped for each person by the values sought and obtained from the world, often through institutions, and typically as an outcome of social interactions and decision processes. A commonwealth of human dignity arises from the maximum possible number of people having sufficient access to all values through society's institutions (Lasswell and McDougal 1992). The widespread sharing of respect is closely identified with experiences of justice, whereas widespread disrespect often signifies corrosive behavioral norms and institutional arrangements (Lasswell 1948; McDougal et al. 1980; Miller 2001). Dispositions of power and the behaviors of people holding power have strong influences over whether respectful interactions and human dignity are fostered or destroyed (Lasswell and Kaplan 1950; McDougal et al. 1980). Of relevance to this case, we considered widespread experiences of disrespect to signify shortcomings in institutions.

We also considered civility and fulfillment of common interests to be key indicators of dignity-enhancing versus dignity-degrading decision-making processes. We employed Shils' (1997) conception of civility as socialized willingness to respect the interests and claims of others and to abide the self-losses that inevitably arise from democratic decision making. Ideal public decision-making processes foster civility. Public derogation of others and their claims and an unchecked willingness to employ coercive or subversive means to advance one's own interests are symptomatic of uncivil decision processes.

We used definitions of common interests given by Brunner (2002) and Ascher (2004) for our analysis. As a policy-related concept, common interests are collectively discovered and continually re-specified, the outcome of decision processes that meaningfully involve all who have a valid interest, consistent with relevant facts believed by those involved, feasible to apply given reasonably available resources, and, as applied policy, capable of producing desired outcomes. By contrast, special interest policy processes exclude those

with valid interests, are not factually well supported, are logistically infeasible, or fail to produce collectively desired values in application.

Methods

We used the policy sciences as a meta-framework for our analysis (as described by Lasswell (1971) and Clark (2002). This paper is organized around problem orientation, which consists of clarifying goals and related standards; summarizing historic trends in social process, decision-making, and the biophysical environment; clarifying current conditions germane to understanding defined problems; projecting foreseeable developments in relevant conditions; and developing and judging alternatives to resolve problems. Goal clarification is central to problem definition if problems are understood to be perceived discrepancies between ones' desires (e.g., goals) and ones' perceptions of the world (Dery 1984). We map perspectives (e.g., value orientations, identifications, expectations, and demands) and strategies (e.g., persuasive or coercive) of participants to understand the outcomes and effects of social process; and use the seven-part scheme of the policy sciences to locate events within the decision-making process (intelligence, promotion, prescription, invocation, application, appraisal, and termination).

We obtained information about the policy process governing AWs from multiple sources with bearing on our geographic focus of the Mojave and Sonoran Deserts of Arizona, California, and Nevada. Our sources included all relevant documents available from scientific journals and the World Wide Web able to be obtained through Google and LexisNexis searches using multiple key words, as well as additional documents from other sources over the last four years, including peer-reviewed scientific papers, government agency technical reports, environmental assessments and impact statements, administrative appeals, judgments by courts, federal legislation, minutes of state game and fish commission meetings, newsletters, and promotional material by participants. We also secured all articles referencing AWs (including "catchments," "guzzlers," and "wells" as key words), going back as far as online records allowed (typically 1995–2000), from the Los Angeles Times, The Sun of San Bernardino, the Las Vegas Review-Journal, the Yuma Sun, the Phoenix Arizona Republic, and the Tucson Arizona Daily Star.

We obtained additional information from a workshop entitled "Wildlife water development workshop: A review of the science, policy, and human dimensions," held 3–4 November 2004 at the Arizona State University College of Law in Tempe. The workshop was sponsored by seven organizations, including our own, to create a venue to foster common ground. We took detailed notes on public statements of speakers and other participants, and also recorded a list of prioritized research interests or needs that was produced by workshop participants.

All of this material pertained to the public discourse about AWs, which was often promotional or highly ritualized and thus opaque regarding some aspects of people's perspectives, interests, or relations. To remedy this potential distortion, we also drew on our collective seven years of private conversations with involved individuals for insight into perspectives that might have been undisclosed in writing or public statements. We drew on these more subjective verbalized "data" invoking the precept that difficult to measure is not the same as unimportant, and realizing that people's private concerns and motivations are often not the same as their public statements.

We employed multiple methods for our analysis of discourse content. For specifics we relied primarily on written public statements. We read all materials and, for each statement that we encountered, recorded the name and organizational affiliation of the person who was explicitly attributed. We tallied the number of articles or publications in which each participant or organization appeared. We differentiated peer-reviewed scientific articles from all other sources except when the article was overtly an opinion piece. This information provided us with an estimate not only of the numbers of people and organizations participating in discourses about AWs, but also a sense of the extent to which different groups or individuals dominated public exchanges.

For analysis purposes we differentiated seven groups of participants that were defined on the basis of patterns evident in claims or other promotional statements. These groups were: (1) hunters; (2) game and fish agency personnel and commissioners from Arizona Game and Fish Department (AGFD), California Department of Fish and Game (CDFG), and Nevada Division of Wildlife (NDOW); (3) utilitarian federal land managers, including the Bureau of Land Management (BLM), U.S. Forest Service (USFS), and U.S. Fish and Wildlife Service (USFWS); (4) preservationist land managers from the National Park Service (NPS); (5) political elites (sensu Lasswell and McDougal 1992), whether elected or holding high-level appointments; (6) environmental activists in the Sonoran Desert of Arizona; and (7) environmental activists in the Mojave Desert of California. Although academics were involved in public and private discourses about AWs, they were rarely featured in the journalistic media.

We examined each written statement in promotional or journalistic materials for information germane to our analysis, including: relations among participants, including voluntary or formal associations; claims regarding other participants and their motivations; claims regarding the nature of reality and related factual assertions; overt or implicit allocations of the burden of proof or risk attached to claims; and justifications for expressed perspectives. We also analyzed conclusions in scientific articles for how the burden of proof was explicitly or implicitly allocated. This information was important to understanding key facets of social process, including publicly expressed identifications, expectations, and demands. "Factual" assertions and the placement of burden of proof provided especially important insight into whether and how participants were using "science" and "scientific information" to tacitly advance their interests—which is a key facet of scientized policy processes (Habermas 1970; Sarewitz 2004).

We made a comprehensive list of 51 basic claims or other self-statements, which we consolidated on the basis of similar foci into 20 synoptic statements (Table 1). In defining these synoptic statements we strove for parsimony; to minimize instances where only one participant group had made a particular kind of statement; and for a number of statements that was suitable for statistical clustering. We tallied the frequency with which each of the 20 statements was made by individuals from each participant group, yielding a matrix of participant groups by statements with relative frequencies of statements in the body. We used this matrix to statistically cluster participant groups based on similarity of statement frequencies, and then to differentiate the expressed perspectives of participant group clusters ("factions") on the basis of proportions of specific claims or statements. We used unweighted pair-group averages of squared Euclidean distances for clustering participant groups (SAS Institute 2002–2003), after first converting proportions to normalized ranks to stabilize variances (Blom 1958).

Table 1 Proportional frequency of claims and other statements made by Anthropogenic Water (AW) Foes and AW Advocates in journalistic media

Synoptic statements	Factions	
	AW Foes	AW Advocates
There is evidence or likelihood that AWs harm desert wildlife	**0.289**	0.000
AWs have harmed, or could harm, desert ecosystems	**0.221**	0.000
AWs are undesirable because they conflict with wilderness or park "values"	**0.125**	0.000
There is no evidence that AWs benefit desert wildlife or are otherwise needed	**0.115**	0.000
AWs are used to "farm" game for hunters	**0.067**	0.000
More information about the effects of AWs is needed	**0.048**	0.007
Habitat management should emphasize ecosystem restoration/maintenance	**0.048**	0.000
AWs should not be allowed	0.019	0.000
AWs offer social–psychological benefits to people who build/maintain them	0.010	0.000
AWs are needed	0.000	0.013
Environmentalists don't contribute to or support conservation	0.000	0.007
AWs are compatible with wilderness and park "values"	0.000	0.027
Maintaining and provisioning AWs is a logistical problem and dependent on roads	0.029	**0.047**
AWs are important hunting sites	0.000	**0.040**
Wilderness and park designations are undesirable because they conflict with AWs	0.000	**0.047**
AWs are for conservation, not for farming game animals to hunt	0.000	**0.074**
AWs are not harmful, or there is no evidence that they are harmful	0.000	**0.094**
Hunting groups and state wildlife management agencies are partners in AWs	0.000	**0.148**
AWs are necessary to mitigate human impacts on desert wildlife	0.019	**0.154**
AWs are important to maintaining/restoring desert wildlife populations	0.010	**0.342**
n	104	149

Statements in the table body summarize thematically similar quotes or other written statements and attributions

Bold entries denote proportional frequencies differentiating AW Foes from AW Advocates

Trends: setting the stage for conflict

Managers began widespread building of AWs during the 1940s (Broyles 1995; Rosenstock et al. 1999). These structures complemented water available from wells, troughs, and earthen catchments built for livestock beginning in the 1880s, although AWs are more efficient and designed to favor targeted species of wildlife (Rosenstock et al. 1999). As many as 6,000 AWs exist in the West currently (Rosenstock et al. 1999), maintained largely by state wildlife management agencies and civic hunting organizations, supported by multi-million dollar annual budgets (Broyles 1997; Tobin 2004). Road access has traditionally been important to managers for maintaining AWs and, during extreme drought, for hauling supplemental water (Bleich 2005). In recent decades much of the labor and funding for building and maintaining AWs has come from civic organizations working formally or informally with state agencies (Broyles 1997; Foust 1998). Most AWs built before the 1990s were smaller, less efficient, and visually more prominent compared to

more recent designs. Many older AWs are also in disrepair, some to the point of dysfunction (Arizona Game & Fish Department 2003). In recent years both hunters and wildlife managers have urgently promoted either repairing or replacing AWs to enhance function and reduce long-term costs (Arizona Game & Fish Department 8–9 August 2003).

Most AWs in the West have been built on federal lands administered primarily by the BLM, USFS, and USFWS (e.g., Burch and Grossi 1997). AWs are thus one of the more tangible expressions of the long-standing division of authority over wildlife on federal lands between state management of the animals and federal management of the habitat (Bleich 2005). Federal land managers have a stake in AWs as an expression of policy directives to enhance habitat, often at the behest and direction of state wildlife management agencies, although federal land managers with a more overt wildlife mission, such as on USFWS wildlife refuges, have taken the lead in constructing and maintaining AWs.

Whatever the aegis, hunters, and state wildlife and federal land managers have built and maintained AWs believing that water in dry regions limits populations of game species (Brown 1997; Broyles 1997; Cart 2005). Although desert bighorn sheep (*Ovis canadensis*) and Gambel's quail (*Callipepla gambelii*) have been the primary intended beneficiaries of AWs, species such as wapiti (*Cervus elaphus*), mule and whitetailed deer (*Odocoileus hemionus* and *O. virginianus*), chukars (*Alectoris chukar*), and Merriam's turkeys (*Meleagris galloparo merriami*) have also been targeted for benefits (Ballard et al. 1997; Rosenstock et al. 1999; Bleich 2005). Faced with declining or severely reduced populations of many game species, managers' goals have ranged from restoring to increasing populations of desert natives (e.g., bighorn sheep, mule deer, and quail), to expanding ranges of water-limited natives (e.g., elk and whitetailed deer), to establishing water-limited non-natives (e.g., chukar). All of these species provide hunting opportunities and generate revenue for wildlife management agencies through the sale of hunting licenses. Federal land management agencies typically receive no direct economic benefits.

Environmentalists emerged as important stakeholders in management of AWs beginning in the mid-1980s. The environmental movement as a potent civic and political phenomenon began in the 1960s and has persisted since with varying degrees of intensity and effectiveness (Brulle 2000). This movement gave birth to the scientific discipline of conservation biology, new policies such as the U.S. Wilderness Act of 1964 (P.L. 88–577) and the Endangered Species Act of 1972 (16 U.S.C. §§ 1531–1544), and new interpretation to long-standing policies such as the U.S. NPS Organic Act (16 U.S.C. §§ 1–4), all of which had bearing on discourses surrounding management of AWs. Environmentalists have commonly promoted healthy ecosystems, emphasizing pristine and "untrammeled" conditions in wilderness.

The environmental movement gained influence during recent decades in the Mojave and Sonoran Deserts through the creation or expansion of NPS, USFWS, and BLM wilderness areas and national parks and monuments. BLM and USFWS wilderness areas were designated in Arizona and California during 1990 and 1994, respectively; NPS jurisdictions were expanded in California, also in 1994, principally in the form of Mojave National Preserve and additions to Death Valley National Park; and Ironwood Forest and Sonoran Desert National Monuments were created by administrative fiat on BLM lands in Arizona during 2000 and 2001, respectively. Through the offices of sympathetic national-level politicians, these prescriptions shifted management priorities on large areas of federal lands from traditional anthropocentric goals to newer ecocentric ones, although a focus on "science-based" management remained (Hamin 2003; Dilsaver and Wyckoff 2005).

The authoritative overlay of ecocentric policies on traditional practices of hunters and wildlife managers set the stage for conflict over AWs (Bleich 2005). During the 1980s environmentalists began objecting to AWs and the roads accessing them as incompatible with the aesthetics and health of desert ecosystems (deVos et al. 1997). These objections were given legal potency by the enlargement and designation of NPS, BLM, and USFWS protected areas. Environmentalists invoked these new designations to demand the termination of certain practices and plans that perpetuated or even promised to expand AWs (Czech and Krausman 1999; Krausman and Czech 2000). Their objections most recently culminated in legal appeals (e.g., Center for Biological Diversity and Public Employees for Environmental Responsibility vs. Jonathan Jarvis 2005).

These policy invocations were accompanied by heightened promotional activity reported by regional and even national news media (e.g., *The Los Angeles Times*). Environmentalists publicly questioned the aesthetics of AWs, the legalities of maintenance and construction, and whether AWs achieved stated goals for wildlife (e.g., Broyles 1995). Further complicating matters, the issue of AWs became publicly entangled with the plight of federally listed endangered species—desert tortoises (*Gopherus agassizii*) and peninsular desert bighorn sheep (*O. c. cremnobates*)—with claims of harm to the former and both benefit and harm to the latter (Hughes 2002, 2005).

A decade of sometimes acrimonious dispute among environmentalists, hunters, and wildlife and wildland managers precipitated two workshops designed to help disputants find common ground, one in 1997 and the other in 2004. Both were hosted by Arizona State University (ASU) College of Law. Despite these efforts, conflict has persisted, as described in the following sections, where we also examine factors that explain this conflict, make projections, and formulate alternatives that might foster civility and common interest outcomes.

Conditions: the nature and sources of conflict

Evidence from the written discourse

Written claims made by participants about AWs helped us construct disputants' problem definitions, gave us insights into coalitions, and clarified participants' focus of attention. Fully two-thirds (66%) of the 253 claims we recorded in non-science venues pertained to the state of the biophysical world (Table 1). Most prominent among these were claims, on the one hand, asserting the importance of AWs to sustaining desert wildlife populations (21%), or the lack of evidence of any harm (10%), and, on the other hand, asserting lack of evidence for the benefits of AWs (5%) and the possibility or even likelihood of harm (21%). Of the remaining claims not expressly focused on the nature of biophysical "reality," 19% pertained to motivations of self or others, as well as perceived relations among participants (i.e., facets of social process); and 15% pertained to decision processes, including the desired biophysical focus for prescriptions, the need for more biophysical information (i.e., intelligence activity), and desires for biophysical outcomes from invoking and applying existing policies.

Most participants clearly thought or felt that claims about the biophysical efficacy or inefficacy of AWs were central, not only to "the problem" of AWs, but also, perhaps, to advancing their interests. In other words, for virtually everyone, the problem appeared to be "out there" in the biophysical world, rather than being a matter of constitutive

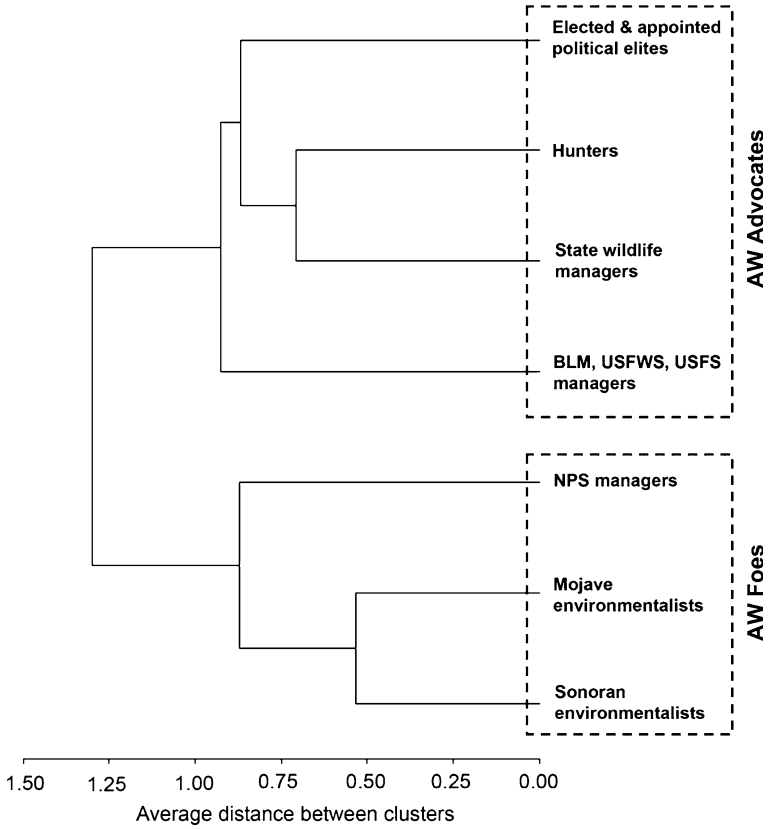

Fig. 1 Clustering of participant groups in the AW policy process based on proportional frequencies of claims or other statements related to AWs by each group in journalistic media, using average Euclidean distance for linkages

arrangements, authoritative decision-making processes, or facets of social process other than motives.

Not surprisingly, the seven participant groups made written claims with different frequencies, and, based on these statements, some clearly had shared interests. Environmentalists in the Sonoran and Mojave Deserts made statements that were most similar of all the groups and also similar to claims by NPS personnel (Fig. 1), suggesting that these three groups shared a similar perspective on AWs and related matters. For convenience of reference, we called this faction AW Foes (our use of "faction" follows [Madison 1961]). The remaining four participant groups—hunters, state wildlife managers, managers from federal agencies with a "use" culture (BLM, USFS, and USFWS; Clarke and McCool 1996), and involved political elites—clustered in a separate group, with statements by hunters and state wildlife managers being most similar. We called this faction AW Advocates.

These labels followed from the fact that, in instances where the efficacy of AWs was publicly addressed, AW Foes made claims doubting benefit or asserting harm 94% of the time ($n = 90$), whereas AW Advocates made claims asserting benefits and denying harm 93% of the time ($n = 107$). These two broad factions were further differentiated by Foes

claiming that AWs were incompatible with wilderness or national park "values" or designations [13% of their total statements ($n = 104$) versus 0% for Advocates (of $n = 149$)], and by Advocates stating that wildlife management agencies and civic hunting groups were "partners" in matters related to AWs (15% of their statements versus 0% for Foes).

Aside from the patterns of claims, alliances among AW Advocates were abundantly evident in other written public records. We tallied 49 descriptions of civic hunting groups collaborating with either state wildlife management agencies or utilitarian federal agencies in funding, building or maintaining AWs. Several articles reported state agencies honoring individuals with awards for a history of collaboration on AW projects (e.g., Las Vegas Review-Journal 2002, 2005). Frequent reference was made by state agencies in these and other articles to hunters and hunter groups as "partners" (e.g., Burch and Grossi 1997).

The iconic status of desert bighorn sheep, and the believed importance of AWs to them, clearly knit together not only hunters and state wildlife management agencies, but also allied political elites. Of the 13 hunting groups involved with AWs, five overtly focused on desert bighorn sheep; 57% of all collaborative projects were expressly to benefit sheep. Minutes from meetings of one state's game and fish commission suggested a pattern of deference to civic hunting groups involved with bighorn sheep and AWs (e.g., Arizona Game & Fish Department 17 January 2003, 8–9 August 2003, 13 February 2004, 13 March 2004). Exemptions from compliance with the Wilderness Act for AWs and related motorized activities, explicitly tied to bighorn sheep, were included in two recent federal designations of wilderness areas in southern Nevada. Statements by sponsoring congressmen not only singled out bighorn sheep, but also lauded hunters' efforts building and maintaining AWs (Congressional Record 16 October 2002, 16 June 2004, 9 February 2005).

Much of the written public discourse about AWs featured science or scientific information, including implicit or explicit allocations of the burden of proof, calls for more scientific investigations, and critiques of design and method (e.g., Broyles and Cutler 1999, 2001; Rosenstock et al. 2001). Academics were especially wont to call for definitive scientific studies entailing long duration, experimental design, and manipulative treatments (27% of conclusions we found in scientific papers), although demands for more and better studies were relatively rare in non-scientific media (2% of total statements or claims).

Burden of proof was the most common science issue and its resolution divided AW Foes from AW Advocates. Burden of proof was addressed, most often tacitly, in 78% of all public claims, but with AW Foes placing the burden 94% of the time on proving the benefit and disproving the harm of AWs, and AW Advocates placing the burden 93% of the time exactly opposite. Despite this emphasis on burden of proof, we found only one instance (Collins 1997) where participants overtly addressed the importance of this issue, its intrinsically normative basis, or principles for allocating the burden.

AW Advocates responded to public claims against the efficacy of AWs by launching research programs in the late 1990s that culminated in several scientific articles, most notably published in a 2006 special section of the *Wildlife Society Bulletin*. These studies reduced uncertainty regarding the benefits of AWs, but not definitively, primarily because of short durations, small sample sizes, and lack of experimental designs (deVos et al. 1997; Krausman et al. 2006). The studies also did not address cost effectiveness and population-level benefits for targeted species, which were issues featured by some AW Foes (Brown 1997; Broyles 1997).

With uncertainty persisting, the burden of proof continued to be allocated along factional lines, even in scientific papers, and without accompanying discussion of normative implications. Individuals from groups identified as AW Advocates were co-authors on

most (ca. 70%) journal papers and, in these papers, the burden of proof was implicitly placed on AW Foes 79% of the 28 times that a proof-related conclusion was stated. By contrast, we observed this same pattern in only 54% of 24 conclusions in papers authored or co-authored by nominally neutral academics. Regardless of current uncertainties, a large body of scientific literature casting doubt on the claims made by AW Foes was politically expedient for AW Advocates because adjudicating courts and boards deferred to federal agencies in matters of scientific dispute and explicitly placed the burden of proof on those appealing agency decisions (McSpadden 1997; Interior Board of Land Appeals 2006).

Evidence from the verbal discourse

Some of what participants verbalized in the 2004 public AW workshop and in related conversations was consistent with what appeared in the written record, but much was not. The verbal discourse also differed from writings by more transparently conveying affect, which constituted an important diagnostic of felt value deprivations or affordances (Epstein 1994). Demands for more enlightenment from scientific inquiry was a theme common to both writings and verbalizations, expressed by both Foes and Advocates in statements such as: "I'm glad we're moving towards more and more research." Verbalized interest in more science was most prominent and consistent among academics, focused on concerns that current research did not adequately address whether animals needed additional water or landscape- and population-level effects of AWs. Emotion was not often evident in verbal communications about science except for hints of indignation concerning the burden of proof and occasional assertiveness by researchers couched in the authority of their expertise.

Among AW Foes, verbal arguments differed from written ones by centering more on the importance of aesthetics and the naturalness and health of desert ecosystems, with scientific issues peripheral, expressed in quotes such as: "we shouldn't manage the heck out of the desert." These verbalizations about beauty and solitude were almost always imbued with considerable positive emotion—a presumed reflection of past experiences of profound well-being. AW Foes also verbally highlighted perceived transgressions of ecocentric policies by management agencies, in private often accompanied by frustration and indignation, most likely signaling felt deprivations of rectitude.

Among AW Advocates verbalizations differed from writings by more prominently featuring matters touching on power and skill. One of their major themes was frustration over Foes interfering with their exercise of private or professional skills, whether hunting, maintaining roads, building and restoring AWs, or more directly managing wildlife. Another closely related theme was frustration over Foes interfering with the prerogative of management agencies to manage wildlife, wildlands, and AWs without hindrance—a prerogative derived from the assumption that agencies were legitimately invested with power. A variation on this theme invoked the justifying doctrine of Total Quality Management (TQM) (see below) to feature "customers" as the beneficiaries of agency management and the indirect victims of AW Foe interference. Although expressed by some in federal agencies, these narratives of denied power and skill opportunities were especially prominent among hunters and others directly identified with state wildlife management agencies. AW Advocates were sometimes clearly angry with AW Foes about these matters. As one workshop participant put it: "Why don't the environmentalists just get out of the way and let the agencies do what they know best how to do, which is manage our wildlife?"

AW Advocates, especially hunters, also verbally emphasized the importance of community, which was a theme largely absent from their writings. As observed by Broyles (1997) and Slivka (2001), agency personnel as well as hunters focused their sense of community and solidarity on constructing and maintaining AWs and associated roads. More broadly, this community included bighorn sheep, around which were organized symbolically important activities of "the hunt" and nurturance by providing water. Those who spoke for this community unambiguously expressed affection, not just for the other people involved but also for the animals (e.g., Pols 1994; Sandoval 1997). One hunter was even moved to tears while observing: "we believe that these noble animals appreciate our efforts." AW Advocates apparently saw AW Foes as a threat to this community of people and animals by their obstruction of activities organized around AWs.

Management doctrines

Institutionalized management doctrines played an important role in this case by configuring power and related patterns of interaction among the participants (Collins 1997; Clark 2002). In the case of AWs, much like other natural resource cases in the western United States, bureaucratized scientific management was the dominant doctrine, with TQM a recent derivative (Hunt 1993). The strategies used by the participants to advance their interests arose not only from their personalities and prior experience, but also from the power formally invested them by government bureaus, their relations and myths shared with those who had power, and their access to other value resources (Lasswell and McDougal 1992).

Bureaucratized scientific management was pervasively evident in the management of AWs by both federal and state agencies. Scientific management is an enduring legacy of the era of progressive conservation, which gave rise to all the bureaus featured in this case (Culhane 1981; Clarke and McCool 1996). The core doctrine of this approach assumes that policies are unambiguous expressions of democratic processes; that the locus of "problems" is in the objective biophysical world; and that agency experts are uniquely qualified to identify and solve these problems (Fischer 2000; Forsyth 2003; Brunner and Steelman 2005).

A rich body of research and experience has revealed that the assumptions of scientific management consistently fail. There are several reoccurring reasons, including: (1) policies are virtually never unambiguous and almost always entail de facto policy-making (i.e., intelligence, promotion, and selection) by agencies during invocation and application (Gruber 1987); (2) problem definition is subjectively related to participant interests and is not about discovering something objectively biophysical (Rochefort and Cobb 1993; Clark 2002; Fischer 2003); and (3) some policies are not democratic because some policy processes were designed and are maintained to serve parochial rather than majority interests (Culhane 1981; Durant 1992).

Recognition of these failings by federal policy makers was instrumental in creation of the National Environmental Policy Act (42 U.S.C. § 4321 *et seq.*) in 1969. Law-makers intended to provide stakeholders access to policy making during policy implementation, primarily through Environmental Impact Statement (EIS) processes (Clark and Canter 1997). NEPA and other federal planning policies (e.g., for the BLM, the Federal Land Policy and Management Act [43 U.S·C. § 1702]) did afford stakeholders some access to the BLM, USFWS, and NPS decision making about AWs, but primarily through formal workshops and comment processes. These processes were consultative rather than authoritatively collaborative, by design, which left many facets of expert-based power intact (Culhane 1981; Clarke and McCool 1996).

State wildlife management agencies with a stake in AWs differed from federal bureaus by their particularly strong allegiance to the traditional precepts of bureaucratized scientific management (Nie 2004; Clark and Rutherford 2005). State-authored documents frequently referred to "managing for the good of the resource" or "of wildlife" (e.g., Arizona Game & Fish Department 8–9 August [2003] and Bleich [2005]), which presupposes that resources existed independent of human desires, and that judgment of "good" and "bad" existed independent of human morality. This framing tacitly left power over determining these matters to experts in agencies, but without acknowledging the important normative stakes. This objectification of nature—that is, the implicit denial that demands on the world and definitions of problems arise from peoples' subjectivities—was one sure diagnostic of the doctrine of scientific management. Even so, state agencies in this case did have a tradition of consultation, but almost exclusively focused on "customers," and increasingly under the rubric of TQM, which provided customers opportunities to identify desired products (Hunt 1993; McMullin 1993). Although modified from pure scientific management, the doctrine of TQM perpetuated a focus on physical products rather than governance by continuing to assign authority to experts, who were tasked with defining and solving "objective" biophysical problems.

State-level management of AWs also differed from federal-level management by a more pronounced pattern of deference to the parochial interests of hunters, organized around the justifying language of scientific management. Previous studies have amply documented this phenomenon, which arose not only from a culture shared among hunters and agency personnel, but also from agency reliance for revenues on hunting-related taxes and license sales, and decision making buffered from the influences of elected officials by appointed boards or commissions (Decker et al. 1996; Gill 1996, 2001; Byrd 2002; Nie 2004; Clark and Rutherford 2005; Jacobson and Decker 2006). All aspects of routine state-level wildlife decision making, from intelligence to termination, were sequestered from electoral processes and comparatively unresponsive to those, such as AW Foes, who pursued "non-consumptive" interests in wildlife.

Participant strategies

Some stakeholder strategies were publicly transparent, as in the case of media campaigns or litigation, whereas other strategies were less obviously embedded in private relations and acculturated preferences. AW Advocates had the advantage of privileged access to power principally because they included amongst themselves virtually all state wildlife managers, who had nearly exclusive authority in state-level management of AWs. Even in instances where state agencies initially may not have been strong AW advocates, our evidence suggested that hunters were positioned to use non-public persuasive strategies to stimulate greater agency action.

Our evidence also suggested that AW Advocates benefited from allies in federal policy processes. National-level political elites authoritatively not only advanced the interests of AW Advocates prescriptively in federal legislation, as we described before, but also through intervention in invocation and application of existing policies. The latter was exemplified by a deputy assistant secretary of the Interior Department, who acted on behalf of AW Advocates to counter policy invocations by the superintendent of a desert NPS unit that would have disallowed more AWs (Cart 2005). Within the BLM and USFWS, AW Advocates probably also benefited during routine invocation and application of federal policies from a shared history of investing in AWs. To the extent that such an advantage existed, its expression likely occurred through interpretations of relevant policies,

constituting the de facto policy-making power of federal land management bureaus (Culhane 1981; Durant 1992). Although we do not have direct evidence for this effect, frequent statements by BLM managers in support of AWs (e.g., Burch and Grossi 1997; Lee 1997), and no statements in opposition, was consistent with tacit deference to AW Advocates in routine decision making.

In marked contrast to AW Advocates, we found no indication that AW Foes were able to advance their interests through state-level wildlife management. We also found no indication that AW Foes were able to substantively affect routine invocations and applications of policy by BLM and USFWS managers. Instead, AW Foes resorted to media-based promotional strategies and to contesting routine implementation of policy by federal land management agencies, in part through appeals to federal courts and the Interior Board of Land Appeals. AW Foes have so far invoked the Administrative Procedure Act (5 U.S.C. § 706), National Environmental Policy Act (42 U.S.C. § 4321 *et seq.*), Council on Environmental Quality regulations (40 CFR 1508.27[b][4]), Wilderness Act, the NPS Organic Act, and language authorizing the Sonoran Desert National Monument and Mojave National Preserve (Hamin 2003; Bleich 2005).

As an outcome, federal land managers have been confronted with adjudicating demands by AW Foes and more ardent AW Advocates among hunters and state agencies. Legal appeals were filed against federal land management agencies, but in one case a state wildlife agency intervened on behalf of the federal government, against AW Foes (Arizona Game & Fish Commission, 13 February 2004). These invocations fueled controversy (e.g., Arizona Game and Fish Commission 8–9 August 2003) and precipitated much of the media attention given AWs in recent years. As our analysis of media and promotional literature showed, public arguments by AW Foes against AWs focused on potential harm to ecosystems, non-target wildlife, and game species, as well as on lack of proven benefits. Written claims about incompatibilities with natural ecosystems and wilderness values were secondary, plausibly because the "best-available-science" principle favored a focus on tangible rather than intangible interests.

Synopsis and interpretation

The patterns of written and verbal statements by participants in this case bespoke different underlying mythic views of nature and humanity's place in it, organized around AWs. In the parlance of Kellert (1996), AW Foes evidenced aesthetic, moralistic, and naturalistic world- or nature-views, holding that the proper state of nature was wild, untrammeled, and free of human devices such as AWs. They also voiced scientific/ecologistic nature-views but, for reasons we elaborate later, perhaps strategically and certainly not as emotively as their ecocentric views. By contrast, AW Advocates more often evidenced dominionistic and utilitarian nature-views in which humans had a controlling role to play, if for no other reason than to reverse human impacts on desert areas (Burch and Grossi 1997; Tobin 2004; Dolan 2006). Domination was a theme, yet mixed with it were naturalistic sensitivities and expositions of scientific and ecologistic perspectives that were perhaps as strategic as those of AW Foes.

Our evidence suggested that the identities and demands of both AW Foes and Advocates had less to do with science-based understandings of the world and more to do with core structure of the psyche (cf. Epstein 1994; McAdams 1996). If so, there was no reason to expect that science would play a transformational role in the participants' perspectives about AWs given the well-documented resistance of worldviews to revision and, in fact, the key role of worldviews in making meaning of information (Koltko-Rivera 2004). On

the other hand, fundamentally different worldviews and psychological leanings did not preclude changes of attitude toward other participants or specific issues (Petty et al. 1997), which allowed for constructive outcomes from increased social learning and problem-oriented rather than strategic uses of science (Brunner 2002; Brunner and Steelman 2005; Lubell et al. 2005).

Participants in the AW case expressed multiple competing definitions of problems that plausibly arose from perceived threats to their unique claims on the world. These "problems"—understood as discrepancies between perceived and desired conditions (Dery 1984)—are potentially explained by each participant's value orientations as well as by their expectations rooted in beliefs about nature, people, and governance (Rochefort and Cobb 1993). For AW Foes, the lack of untrammeled wilderness was clearly a central problem, manifest in deprivations of well-being by exposure to vehicles, roads, and AWs in what they otherwise often described as pristine nature. Likewise, perceived transgressions of ecocentric policies by management agencies was a problem, experienced as deprivations of power and rectitude (i.e., experiencing "incorrect" behavior by managers; e.g., Hughes 2002, 2003).

AW Advocates considered deprivations of rectitude, power, and skill opportunities to be core problems—a result of being thwarted in their attempts to fix perceived physical "problems" such as insufficient water for wildlife, AWs in disrepair, and inadequate AW designs. This particular problem definition was apparently strongly influenced by the power premises of scientific management, which held that agency experts should have authority and control over matters related to wildlife and wildland management, without interference by non-experts such as AW Foes (Collins 1997; Fischer 2000; Forsyth 2003; Brunner and Steelman 2005). Many AW Advocates were also apparently troubled by the problematic deprivations of affection and respect precipitated by instances when AW Foes discounted or interfered with iconic activities such as building and maintaining AWs that were central to their community.

Overall, the problems perceived by the participants seemed to arise primarily from symbolic rather than overtly material considerations. Few if any participants faced significant impacts to their day-to-day material transactions, much less loss of life, health, or livelihood. Evidently at stake were a "proper" world, the symbolic primacy of nature-views, perceived affirmations of community, symbolic rather than substantive exercise of power, and the quality of recreational or hobby activities. For all that the persistence of bighorn sheep was perceived by AW Advocates to be at stake, the truth of this view was still considered doubtful by key researchers (Krausman et al. 2006). More certainly, bighorn sheep were iconic for Advocates, and thus perceived threats to their existence were an important rallying cry (e.g., Cart 2005). Similarly, "wilderness" was for AW Foes apparently as much a tacit symbolic commentary on the spiritual and material woes of modern culture as it was an objective material condition (Payne 1996). Moreover, wilderness, as a symbolic construct, was in this context an exclusive rather than inclusive idea. To have wilderness meant that the artifacts and activities dear to AW Advocates needed to be absent. Overall, these numerous symbolic facets seemed to inflame conflict and distract people from defining pragmatic problems that were amenable to solution.

One striking but not unique feature of this case was the extent to which the participants publicly constructed problems in the language of science. Rather than acknowledging the deprivations of power, skill, affection, well-being, and rectitude that seemed, at root, to be at stake, they invoked "science," suggesting that problems in the case of AWs pertained primarily to deficient, neglected, or misused enlightenment. By most indications, participants were actually advancing their core (non-science) interests by configuring them in the

legitimizing language of science. The primary means for doing this was by allocating the burden of proof—expressed outright, by casting doubts on the other side's methods, by highlighting specific uncertainties, or by selectively featuring information (e.g. Broyles 1995; deVos et al. 1997; Lee 1997; Rosenstock et al. 1999; Hughes 2002, 2003; Dolan 2006).

The apparent masking of core value demands as matters of science by both AW Foes and Advocates contributed in large measure to the scientization of AW politics. In practice, science was used primarily to advance partisan interests rather than to build common ground in a shared understanding of the world. This scientization plausibly arose out of the doctrinal legacies of progressive conservation and scientific management embedded in policies, agency cultures, and participant beliefs (Habermas 1970; Culhane 1981; Clarke and McCool 1996; Clark and Rutherford 2005). According to these living myths, science was an authoritative source of expertise and participant legitimacy, and the definitive basis for virtually all decisions (Culhane 1981; Clarke and McCool 1996; Collins 1997; Sarewitz 2004). Under such circumstances it is not surprising that participants in this case seemingly believed, or found by experience, that influence and access to power depended on effectively invoking science.

The doctrine and formulas of scientific management exacted a price on the dignity of those involved with AWs. In application, scientific management provided only limited opportunities for the participants to engage in a civil, constructive dialogue about their core interests and concerns. When these opportunities did occur, as during the 1997 and 2004 ASU College of Law workshops, the participants seemed captive to their science-based constructions and unable or unwilling to discuss normative issues in a transparent manner (e.g., Lee 1997). Otherwise, the prevailing bureaucratic and litigious procedures of AW management offered to participants, at best, advisory roles in which they might assert their positions, reiterate scientized arguments, and figuratively vote for policies (i.e., "alternatives").

In the absence of venues that might have ameliorated the conflict, it was perhaps natural that people turned to parochial power, media-based promotion, and position-based adjudication to advance their interests. Such strategies tended to accentuate differences, create win-lose rather than win-win situations, and lead to disparagement of others' motives and capabilities (e.g., Riehl 2002; Tobin 2004; Matthews 2005). As a consequence, civility was lost, trust was eroded, and a focus maintained on special rather than common interests. As evidenced primarily by verbal statements, almost everyone involved in AW management felt disrespected, even in instances where they had "won" a political battle. Such outcomes signaled decision processes that had failed to serve common interests or foster human dignity.

Projections: the foreseeable future

Several projected trends in the physical and human environments are relevant to the case of AWs. Warming of the region's climate will probably increase the perceived need for AWs among AW Advocates, as they have already said in several scientific and promotional articles (Bleich 2005; Dolan 2006). This trend, coupled with the impacts of growing human populations on what little free water remains available to wildlife, will likely intensify Advocates' demands for a free hand in building, maintaining, and provisioning AWs (e.g., Dolan 2006). Laboratory investigations of whether bighorn sheep "need" free water are planned (Cain et al. 2006), but will likely have little effect on this projection, other than to give AW Advocates a stronger hand politically if the findings are interpreted in their favor.

However, AW programs are expensive (Broyles 1997; Tobin 2004), and the prospective trend is for state wildlife agencies to face increasing budget shortfalls in part because of declining hunting-related revenues (Brown et al. 2000). In response, state agencies will likely need to broaden their constituencies or turn increasingly to private hunting groups to finance AW-related activities. Although the latter might provide short-term financial relief, it would probably also aggravate disaffection among vocal non-hunting public interest groups by increasing appearances that state managers were catering to parochial hunting interests. No matter what happens, AW Advocates will be forced to engage with AW Foes about matters of governance and finance, and they will continue to face choices of whether to do so in ways that enhance or degrade civility and the commonwealth of human dignity.

Of particular relevance to AW Foes, "wilderness" has seemingly declined in potency as a policy goal (Jacques and Ostergren 2006; Goodman and McCool 1999). Wilderness areas continue to be designated, but the philosophical and historical legitimacy of "wilderness" is under increasing attack, and ongoing social costs, as in the case of AWs, continue to precipitate political backlash (Cronon 1996; Callicott and Nelson 1998). By contrast, the more newly minted concepts of "ecosystem health" and "integrity" are increasingly effective political coinage, but, because of their ambiguity in application, they give potentially equal advantage to both AW Advocates and Foes (Lackey 2001; Abrams et al. 2005). Of more immediate relevance to the future development of AWs, increasing exemptions in the legislation pertaining to wilderness and other protected areas, which expressly allow motorized activities for AWs, will keep AW Foes from demanding strict adherence to the Wilderness Act. AW Foes will likely need to move away from the ideological tenets of "wilderness" and instead define their interests in terms of functional, and negotiable, facets of naturalness and beauty.

Of promise to this case and many others is the trend in natural resource management toward increasing opportunities for meaningful stakeholder participation. The BLM and USFS, in particular, have a long tradition under NEPA of practicing consultative, public involvement methods (Culhane 1981; Clarke and McCool 1996). The BLM has, moreover, an even longer tradition (albeit with mixed common interest results) of stakeholder Advisory Committees, recently revised to emphasize "resources" rather than grazing and to allow representation of more diverse interests than in the past (Culhane 1981; Thomas 2003; 43 CFR 1784.6-1 and 6–2). We observed that most interest in constructively ameliorating conflict over AWs originated in local BLM offices. By contrast, the NPS and USFWS have been historically less successful at collaboration (Clarke and McCool 1996), and among state agencies meaningful consultation has been extended primarily to sportsmen and agricultural interests (Decker et al. 1996; Gill 1996, 2001). Even so, the broader picture is one of widespread and enthusiastic innovation in public involvement with natural resource management, pioneered at the regional and local level by the watershed council movement, with good prospects of diffusion and continued innovation in arenas such as federal-level management of AWs (Wondolleck and Yaffee 2000; Sabatier et al. 2005). For reasons discussed earlier, prospects at the state level are more uncertain, but, we suspect, more likely to exhibit positive rather negative trends in the common interest.

The problem?

Put succinctly, we consider "the problem" in this case to be the institutionalized and bureaucratized doctrine of scientific management. Destructive interactions among

participants seemed largely preordained by this doctrine and its derivative formulas. Over all, human dignity was eroded by the deprivations of respect and losses of civility and public trust generated by the divisive, polarizing, and zero-sum strategies of participants built into the design and function of decision processes governing management of AWs. The doctrine of scientific management especially led those in authority to neglect constitutive and governance issues, the quality of the decision processes, and the core worldviews and value orientations of all the people involved. This neglect was manifest in a lack of venues and related opportunities for participants to engage in civil and authoritative exchanges that focused on building common ground and identifying and securing their majoritarian or common interests. Instead, for lack of ameliorative alternatives, participants tended to obscure what appeared to be their core interests and demands with the language of science, used science to advance their special interests, and resorted to asserting divisive claims. Throughout, science was used to restrict decision space rather than to fulfill its Enlightenment promise of expanding options, encouraging creativity, and fostering common ground among participants through a shared understanding of the world (e.g.; Hankins 1985).

Alternatives: prospects for fostering dignity

We see two basic alternatives for the future of AW and other natural resource policy and management: perpetuation of the status quo or deliberate redesign of decision-making processes to foster human dignity. The first option is perhaps a misnomer because we project changes that will fundamentally alter current conditions. More to the point, the status quo would perpetuate current structures of governance based on the doctrine of bureaucratized scientific management. For reasons elaborated in this paper, this option is likely to continue generating corrosive interactions, related attrition of civility and public trust, and consolidation of exclusive rather than inclusive participant identities. For those who care about human dignity and democratic principles this path is presumably acceptable only in the absence of feasible alternatives.

But there is a feasible alternative—the constitution of authoritative stakeholder groups embracing governance principles that foster civility, creativity, and a focus on common interests (Wondolleck and Yaffee 2000; Brunner 2002; Brunner and Steelman 2005; Sabatier et al. 2005). Such groups would ideally break down the exclusive advocate-and-foe polarization that typifies current discourses, and they would emphasize inclusive identities organized around discovering and consolidating common ground. Rather than focusing on irresolvable symbolic conflicts, the focus would be on the pragmatics of dealing with concrete problems, such as rebuilding to improved specifications AWs deemed worthy by all who are involved, or even simply cleaning up garbage left by people around AWs.

The details of structure and function for collaborative management groups necessarily depend upon context, but several general principles apply, and some challenges are foreseeable in the case of AWs (Smith and McDonough 2001; Keough and Blahna 2006; Leach 2006). Investitures of power (i.e., authority, control, responsibility, and accountability) are pervasive considerations (Lasswell and Kaplan 1950). Who has standing to make what decisions with what degree of authority? The trend embraced by this alternative is to invest less authority and control with agencies and more with stakeholders. Yet a practical problem would be transferring power from agencies that are protective of current arrangements, especially at the state level (Clark and Rutherford 2005), while insuring

accountability to the public interest in newly constituted participatory arrangements (e.g., Manring 2005). There is a clear role in this for visionary elected officials and employees of public agencies.

But is it possible for participants in the AW case to find common ground and craft common interests? More central, is divisive conflict inevitable in human affairs? Numerous reputable scholars have observed that liberal democracies cannot, and do not, persist without citizens who internalize a broadly shared identity grounded in civility and public trust—without some measure of willingness to negotiate and abide inevitable personal losses out of loyalty to a common good (Dahl 1982; Lasswell and McDougal 1992; Shils 1997). In the case of AWs, participants at the very least likely share common ground in adherence to principles of fairness and democracy as well as in a shared appreciation of natural environments and solitude. When coupled with ameliorative decision processes, science and technology can enhance this probable common ground by expanding accepted options, which potentially include AW designs that are visually less intrusive, more efficient, and otherwise less demanding of motorized maintenance and provisioning (i.e., by minimizing "minimum tools," Bureau of Land Management [2005] and Association of Fish & Wildlife Agencies et al. [2006]). However, any move toward pragmatics and constructive creativity requires that processes shift attention from intrinsically divisive ideological concerns, such as "appropriate" relations between people and nature, to solving concrete problems (Shils 1997; Brunner 2002; Brunner and Steelman 2005). Such a shift almost certainly requires venues that enhance the shaping and sharing of respect and even affection (McDougal et al. 1980).

If human dignity is the desired outcome, any alternative would insure that those with valid interests have authoritative access to equitable, ameliorative, decision-making processes (Lasswell and McDougal 1992; Clark 2002). Although research on collaboration has dealt extensively with the contingencies of success, including adequate time, resources, commitment, facilitation, and vision, the critical issue of representation has received comparatively less attention (e.g., recommendations that processes be "inclusive," Wondolleck and Yaffee [2000] and Leach and Pelkey [2001]). Yet representation is central to constitutive considerations (Susskind and Cruikshank 1987; Marshall and Jones 2005). This issue is further complicated by the mix of local, regional, and national constituencies in the case of AWs. What standing should the numerous stakeholders in national wilderness policy have relative to the fewer stakeholders in local hunting opportunities? We do not have space to address this important issue at length, but suffice by referencing others who have suggested that federal policies attend to national interests in matters such as AWs by providing broad guidance (Susskind and Cruikshank 1987; Moote et al. 1997; Manring 2005), and, within those strictures, standing is granted according to the magnitude of stakes, considering all values (Lasswell and McDougal 1992; Clark 2002). Of course, "the devil is in the details" of implementing such a notion, the success of which plausibly requires professionals who are expert at integrating in the service of democratic ideals (Clark 2001; Susskind and Cruikshank 2006).

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References

Abrams, J., Kelly, E., Shindler, B., & Wilton, J. (2005). Value orientation and forest management: The forest health debate. *Environmental Management, 36*, 495–505. doi:10.1007/s00267-004-7256-8.

Arizona Game & Fish Commission (2003, January 17). *Minutes of the meeting of the Arizona Game and Fish Commission Friday, January 17, 2003—8:00 a.m.* Phoenix, AZ: Arizona Game & Fish Commission.

Arizona Game & Fish Commission (2003, August 8–9). *Minutes of the meeting of the Arizona Game and Fish Commission Friday, August 8, 2003—8:00 a.m. Saturday, August 9, 2003—8:00 a.m.* Phoenix, AZ: Arizona Game & Fish Commission.

Arizona Game & Fish Commission (2004, February 13). *Minutes of the meeting of the Arizona Game and Fish Commission Friday, February 13, 2004—8:00 a.m.* Phoenix, AZ: Arizona Game & Fish Commission.

Arizona Game & Fish Commission (2004, March 13). *Minutes of the meeting of the Arizona Game and Fish Commission Saturday, March 13, 2004—8:00 a.m.* Phoenix, AZ: Arizona Game & Fish Commission.

Arizona Game & Fish Department. (2003). *2003 Wildlife water development team implementation plan*. Phoenix, AZ: Arizona Game & Fish Department.

Ascher, W. (2004). Scientific information and uncertainty: Challenges for the use of science in policy making. *Science and Engineering Ethics, 10*, 437–455. doi:10.1007/s11948-004-0002-z.

Association of Fish & Wildlife Agencies, Bureau of Land Management, & U.S. Forest Service. (2006). *Policies and guidelines for fish and wildlife management in National Forest and Bureau of Land Management Wilderness*. Washington: Association of Fish & Wildlife Agencies.

Ballard, W. B., Rosenstock, S. S., & deVos, J. C., Jr. (1997). The effects of artificial water developments on ungulates and large carnivores in the Southwest. In *Proceedings of a Symposium on Environmental, Economic and Legal Issues Related to Rangeland Water Developments*. Tempe, AZ: Center for Study of Law, Science & Technology, Arizona State University.

Bleich, V. C. (2005). In my opinion: Politics, promises, and illogical legislation confound wildlife conservation. *Wildlife Society Bulletin, 33*, 66–73. doi:10.2193/0091-7648(2005)33[66:IMOPPA]2.0.CO;2.

Blom, G. (1958). *Statistical estimates and transformed beta variables*. New York, NY: Wiley.

Brown, D. E. (1997). Water for wildlife: Belief before science. In *Proceedings of a Symposium on Environmental, Economic and Legal Issues Related to Rangeland Water Developments*. Tempe, AZ: Center for Study of Law, Science & Technology, Arizona State University.

Brown, T. L., Decker, D. J., Siemer, W. F., & Enck, J. W. (2000). Trends in hunting participation and implications for management of game species. In W. C. Gartner & D. W. Lime (Eds.), *Trends in outdoor recreation, leisure, and tourism*. Cambridge, MA: CABI Publishing.

Broyles, B. (1995). Desert wildlife water developments: Questioning use in the Southwest. *Wildlife Society Bulletin, 23*, 663–675.

Broyles, B. (1997). Reckoning real costs and secondary benefits of artificial game waters in southwestern Arizona. In *Proceedings of a Symposium on Environmental, Economic and Legal Issues Related to Rangeland Water Developments*. Tempe, AZ: Center for Study of Law, Science & Technology, Arizona State University.

Broyles, B., & Cutler, T. L. (1999). Effect of surface water on desert bighorn sheep in the Cabeza Prieta National Wildlife Refuge, Arizona. *Wildlife Society Bulletin, 27*, 1082–1088.

Broyles, B., Cutler, T. L., et al. (2001). Reply to Rosenstock et al. (2001) regarding effects of water on desert bighorn sheep at the Cabeza Prieta National Wildlife Refuge, Arizona. *Wildlife Society Bulletin, 29*, 738–743.

Brulle, R. J. (2000). *Agency, democracy, and nature: The U.S. environmental movement from a critical theory perspective*. Cambridge, MA: MIT Press.

Brunner, R. D. (2002). Problems of governance. In R. D. Brunner, C. H. Colburn, C. M. Cromley, R. A. Klein, & E. A. Olson (Eds.), *Finding common ground: Governance and natural resources in the American West*. New Haven, CT: Yale University Press.

Brunner, R. D., & Steelman, T. A. (2005). Toward adaptive governance. In R. D. Brunner, T. A. Steelman, L. Coe-Juell, C. M. Cromley, C. M. Edwards, & D. W. Tucker (Eds.), *Adaptive governance: Integrating science, policy, and decision making*. New York, NY: Columbia University Press.

Bureau of Land Management. (2005). *Wildlife water development/maintenance coordination with Arizona Game and Fish Department. BLM Instruction Memorandum, AZ-2005–023*. Phoenix, AZ: BLM Arizona State Office.

Burch, A. L., & Grossi, W. F. (1997). The U.S. Bureau of land management perspective on rangeland water developments in Arizona. In *Proceedings of a Symposium on Environmental, Economic and Legal*

Issues Related to Rangeland Water Developments. Tempe, AZ: Center for Study of Law, Science & Technology, Arizona State University.

Byrd, K. (2002). Mirrors and metaphors: Contemporary narratives of the wolf in Minnesota. *Ethics Place and Environment, 5*, 50–65. doi:10.1080/13668790220146456.

Cain, J. W., III., Krausman, P. R., Rosenstock, S. S., & Turner, J. C. (2006). Mechanisms of thermoregulation and water balance in desert ungulates. *Wildlife Society Bulletin, 34*, 570–581. doi:10.2193/0091-7648(2006)34[570:MOTAWB]2.0.CO;2.

Callicott, J. B., & Nelson, M. P. (Eds.). (1998). *The great new wilderness debate*. Athens, GA: University of Georgia Press.

Cart, J. (2005). Water fight in the Mojave: U.S. sides with hunters, who clash with naturalists on well issue. *Los Angeles Times*, 4 March 2005, B1.

Center for Biological Diversity; Public Employees for Environmental Responsibility vs. Jonathan Jarvis. (2005). Complaint for declaratory and injunctive relief. United States District Court for the Northern District of California.

Clark, R., & Canter, L. (Eds.). (1997). *Environmental policy and NEPA: Past, present, and future*. Boca Raton, FL: St. Lucie Press.

Clark, T. W. (2001). Developing policy-oriented curricula for conservation biology: Professional and leadership education in the public interest. *Conservation Biology, 15*, 31–39. doi:10.1046/j.1523-1739.2001.99007.x.

Clark, T. W. (2002). *The policy process: A practical guide for natural resource professionals*. New Haven, CT: Yale University Press.

Clark, T. W., & Rutherford, M. B. (2005). The institutional system of wildlife management: Making it more effective. In T. W. Clark, M. B. Rutherford, & D. Casey (Eds.), *Coexisting with large carnivores: Lessons from Greater Yellowstone*. Washington, DC: Island Press.

Clarke, J. N., & McCool, D. C. (1996). *Staking out the terrain: Power and performance among natural resource agencies* (2nd ed.). Albany, NY: State University of New York Press.

Collins, J. P. (1997). Adjudicating nature: Science, law and policy in a southern Arizona grassland. In *Proceedings of a Symposium on Environmental, Economic and Legal Issues Related to Rangeland Water Developments*. Tempe, AZ: Center for Study of Law, Science & Technology, Arizona State University.

Congressional Record. (2002). H.R. 5200, to establish wilderness area, promote conservation, improve public land, and provide for high quality development in Clark County, Nevada, and for other purposes. *Congressional Record*, H7977–H7981.

Congressional Record. (2004). S.2532, a bill to establish wilderness areas, promote conservation, improve public land, and provide for the high quality development in Lincoln County, Nevada, and for other purposes. *Congressional Record*, S6898–S6905.

Congressional Record. (2005). S.339, a bill to reaffirm the authority of states to regulate certain hunting and fishing activities. *Congressional Record*, S1214–S1215.

Cronon, W. (Ed.). (1996). *Uncommon ground: Rethinking the human place in nature*. New York, NY: W.W. Norton.

Culhane, P. J. (1981). *Public land politics: Interest group influence on the Forest Service and Bureau of Land Management*. Baltimore, MD: John Hopkins University Press.

Czech, B., & Krausman, P. R. (1999). Controversial wildlife management issues in southwestern U.S. wilderness. *International Journal of Wilderness, 5*, 22–28.

Dahl, R. A. (1982). *Dilemmas of a pluralist democracy*. New Haven, CT: Yale University Press.

Decker, D. J., Kruger, C. C., Baer, R. A., Jr., Knuth, B. A., & Richmond, M. E. (1996). From clients to stakeholders: A philosophical shift for fish and wildlife management. *Human Dimensions of Wildlife, 1*, 70–82.

Dery, D. (1984). *Problem definition in policy analysis*. Lawrence, KS: University of Kansas Press.

deVos, J. C., Jr., Ballard, W. B., & Rosenstock, S. S. (1997). Research design considerations to evaluate efficacy of wildlife water developments. In *Proceedings of a Symposium on Environmental, Economic and Legal Issues Related to Rangeland Water Developments*. Tempe, AZ: Center for Study of Law, Science & Technology, Arizona State University.

Dilsaver, L. M., & Wyckoff, W. (2005). The political geography of national parks. *Pacific Historical Review, 74*, 237–266. doi:10.1525/phr.2005.74.2.237.

Dolan, B. F. (2006). Water developments and desert bighorn sheep: Implications for desert conservation. *Wildlife Society Bulletin, 34*, 642–646. doi:10.2193/0091-7648(2006)34[642:WDADBS]2.0.CO;2.

Durant, R. F. (1992). *The administrative presidency revisited: Public lands, the BLM, and the Reagan revolution*. Albany, NY: State University of New York Press.

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *The American Psychologist, 49*, 709–724. doi:10.1037/0003-066X.49.8.709.
Fischer, F. (2000). *Citizens, experts, and the environment: The politics of local knowledge*. Durham, NC: Duke University Press.
Fischer, F. (2003). *Reframing public policy: Discursive politics and deliberative practices*. New York, NY: Oxford University Press.
Forsyth, T. (2003). *Critical political ecology: The politics of environmental science*. New York, NY: Routledge.
Foust, T. (1998). Bighorn sheep find home in mountains near Salome. *The Arizona Daily Star, 26*, 3E.
Gill, R. B. (1996). The wildlife professional subculture: The case of the crazy aunt. *Human Dimensions of Wildlife, 1*, 21–32.
Gill, R. B. (2001). Professionalism, advocacy, and credibility: A futile cycle? *Human Dimensions of Wildlife, 6*, 21–32. doi:10.1080/10871200152668661.
Goodman, D., & McCool, D. (1999). *Contested landscape: The politics of wilderness in Utah and the West*. Salt Lake City, UT: University of Utah Press.
Gruber, J. E. (1987). *Controlling bureaucracies: Dilemmas in democratic governance*. Berkeley, CA: University of California Press.
Habermas, J. (1970). *Toward a rational society: Student protest, science, and politics*. Boston, MA: Beacon Press.
Hamin, E. M. (2003). *Mojave lands: Interpretive planning and the national preserve*. Baltimore, MD: Johns Hopkins University Press.
Hankins, T. L. (1985). *Science and the enlightenment*. New York, NY: Cambridge University Press.
Hughes, E. (2002). Drowning in guzzlers. *Desert Report*, Winter, 7.
Hughes, E. (2003). Guzzlers put bighorn sheep at risk: Sheephole Valley wilderness guzzlers. *Desert Report*, Fall, 10–11.
Hughes, E. (2005). Mojave National Preserve: Guzzler battles continue. *Desert Report*, Summer, 5, 7.
Hunt, V. D. (1993). A government manager's guide to quality management. In V. D. Hunt (Ed.), *Quality management for government: A guide to federal, state, and local implementation*. Milwaukee, WI: ASQC Quality Press.
Interior Board of Land Appeals. (2006). Arizona Zoological Society, et al., 167 IBLA 347, January 25, 2006. IBLA 2002–412.
Jacobson, C. A., & Decker, D. J. (2006). Ensuring the future of state wildlife management: Understanding the challenges for institutional change. *Wildlife Society Bulletin, 34*, 531–536. doi:10.2193/0091-7648(2006)34[531:ETFOSW]2.0.CO;2.
Jacques, P., & Ostergren, D. M. (2006). The end of wilderness: Conflict and defeat of wilderness in the Grand Canyon. *Review of Policy Research, 23*, 573–587. doi:10.1111/j.1541-1338.2006.00216.x.
Kellert, S. R. (1996). *The value of life: Biological diversity and human society*. Washington, DC: Island Press.
Keough, H. L., & Blahna, D. J. (2006). Achieving integrative, collaborative ecosystem management. *Conservation Biology, 20*, 1373–1382. doi:10.1111/j.1523-1739.2006.00445.x.
Koltko-Rivera, M. E. (2004). The psychology of worldviews. *Review of General Psychology, 8*, 3–58. doi:10.1037/1089-2680.8.1.3.
Krausman, P. R., & Czech, B. (2000). Wildlife management activities in wilderness areas in the southwestern United States. *Wildlife Society Bulletin, 28*, 550–557.
Krausman, P. R., Rosenstock, S. S., & Cain, J. W., III. (2006). Developed waters for wildlife: Science, perception, values, and controversy. *Wildlife Society Bulletin, 34*, 563–569. doi:10.2193/0091-7648(2006)34[563:DWFWSP]2.0.CO;2.
Lackey, R. T. (2001). Values, policy, and ecosystem health. *BioScience, 51*, 437–443. doi:10.1641/0006-3568(2001)051[0437:VPAEH]2.0.CO;2.
Las Vegas Review-Journal. (2002). Wildlife conservation: Bentley receives Kirch award. *Las Vegas Review-Journal, 29*, 2K.
Las Vegas Review-Journal. (2005). Avid sportsman. *Las Vegas Review-Journal, 23*, 3L.
Lasswell, H. D. (1948). *Power and personality*. New York, NY: W.W. Norton.
Lasswell, H. D. (1971). *A pre-view of policy sciences*. New York, NY: Elsevier Press.
Lasswell, H. D., & Holmberg, A. R. (1992). Toward a general theory of directed value accumulation and institutional development. In H. D. Lasswell & M. S. McDougal (Eds.), *Jurisprudence for a free society: Studies in law, science, and politics* (Vol. II). New Haven, CT: New Haven Press.
Lasswell, H. D., & Kaplan, A. (1950). *Power and society: A framework for political inquiry*. New Haven, CT: Yale University Press.

Lasswell, H. D., & McDougal, M. S. (Eds.). (1992). *Jurisprudence for a free society: Studies in law, science, and politics* (Vol. II). New Haven, CT: New Haven Press.
Leach, W. D. (2006). Collaborative public management and democracy: Evidence from western watershed partnerships. *Public Administration Review* (December), 100–110. doi:10.1111/j.1540-6210.2006.00670.x.
Leach, W. D., & Pelkey, N. W. (2001). Making watershed partnerships work: A review of the empirical literature. *Journal of Water Resources Planning and Management, 127*, 385–387. doi:10.1061/(ASCE)0733-9496(2001)127:6(378).
Lee, R. (Moderator). (1997). Panel discussion. In *Proceedings of a Symposium on Environmental, Economic and Legal Issues Related to Rangeland Water Developments*. Tempe, AZ: Center for Study of Law, Science & Technology, Arizona State University.
Lubell, M., Sabatier, P. A., Vedlitz, A., Focht, W., Trachtenberg, Z., & Matlock, M. (2005). Conclusions and recommendations. In P. A. Sabatier, W. Focht, M. Lubell, Z. Trachtenberg, A. Vedlitz, & M. Matlock (Eds.), *Swimming upstream: Collaborative approaches to watershed management*. Cambridge, MA: The MIT Press.
Madison, A. (1961). No. 10. In A. Hamilton, J. Madison, & J. Jay (Eds.), *The federalist papers*. New York, NY: Penguin Books.
Manring, N. J. (2005). The politics of accountability in national forest planning. *Administration & Society, 37*, 57–88. doi:10.1177/0095399704272401.
Marshall, B. K., & Jones, R. E. (2005). Citizen participation in natural resource management: Does representativeness matter? *Sociological Spectrum, 25*, 715–737. doi:10.1080/02732170500256732.
Matthews, J. (2005). Water must be restored. *The Sun* (San Bernardino, CA), 23 June 2005.
McAdams, D. P. (1996). Personality, modernity, and the storied self: A contemporary framework for studying persons. *Psychological Inquiry, 7*, 295–321. doi:10.1207/s15327965pli0704_1.
McDougal, M. S., Lasswell, H. D., & Chen, L.-C. (1980). *Human rights and world public order: The basic politics of an international law of human dignity*. New Haven, CT: Yale University Press.
McMullin, S. L. (1993). Characteristics and strategies of effective state fish and wildlife agencies. *Transactions of the North American Wildlife and Natural Resources Conference, 58*, 206–210.
McSpadden, L. (1997). Environmental policy in the courts. In N. J. Vig & M. E. Kraft (Eds.), *Environmental policy in the 1990s: Reform or reaction* (3rd ed.). Washington, DC: Congressional Quarterly Press.
Miller, D. T. (2001). Disrespect and the experience of justice. *Annual Review of Psychology, 52*, 527–553. doi:10.1146/annurev.psych.52.1.527.
Moote, M. A., McClaran, M. P., & Chickering, D. K. (1997). Theory in practice: Applying participatory democracy theory to public land planning. *Environmental Management, 6*, 877–889. doi:10.1007/s002679900074.
Nie, M. (2004). State wildlife policy and management: The scope and bias of political conflict. *Public Administration Review, 64*, 221–233. doi:10.1111/j.1540-6210.2004.00363.x.
Payne, D. G. (1996). *Voices in the wilderness: American nature writing and environmental politics*. Hanover, NH: University Press of New England.
Petty, R. E., Wegener, D. T., & Fabrigar, L. R. (1997). Attitudes and attitude change. *Annual Review of Psychology, 48*, 609–647. doi:10.1146/annurev.psych.48.1.609.
Pols, M. F. (1994). Wildlife water tank vandalized. *Los Angeles Times*, 16 April 1994, B1.
Riehl, M. (2002). Sonoran wildlife water supply drying up due to appeal. *Yuma Sun*, 8 September 2002.
Rochefort, D. A., & Cobb, R. W. (1993). Problem definition, agenda access, and policy choice. *Policy Studies Journal: the Journal of the Policy Studies Organization, 21*, 56–71. doi:10.1111/j.1541-0072.1993.tb01453.x.
Rosenstock, S. S., Ballard, W. B., & deVos, J. C., Jr. (1999). Viewpoint: Benefits and impacts of wildlife water developments. *Journal of Range Management, 52*, 302–311. doi:10.2307/4003538.
Rosenstock, S. S., Hervert, J. J., Bleich, V. C., & Krausman, P. R. (2001). Muddying the water with poor science: A reply to Broyles and Cutler. *Wildlife Society Bulletin, 29*, 734–737.
Sabatier, P. A., Focht, W., Lubell, M., Trachtenberg, Z., Vedlitz, A., & Matlock, M. (2005). *Swimming upstream: Collaborative approaches to watershed management*. Cambridge, MA: The MIT Press.
Sandoval, G. (1997). Artificial water holes bring relief to wildlife left high, dry in forest. *Los Angeles Times*, 16 June 1997, B1.
Sarewitz, D. (2004). How science makes environmental controversies worse. *Environmental Science & Policy, 7*, 385–403. doi:10.1016/j.envsci.2004.06.001.
SAS Institute (2002–2003). SAS 9.1: PROC CLUSTER. Cary, NC: SAS Institute.
Shils, E. (1997). The virtue of civility. In S. Grosby (Ed.), *The virtue of civility: Selected essays on liberalism, tradition, and civil society by Edward Shils*. Indianapolis, IN: Liberty Fund.
Slivka, J. (2001). Bighorn hunters help state relocate sheep. *The Arizona Republic*, 18 November 2001, B1.

Smith, P. D., & McDonough, M. H. (2001). Beyond public participation: Fairness in natural resource decision making. *Society & Natural Resources, 14*, 239–249. doi:10.1080/089419201750111056.
Susskind, L., & Cruikshank, J. (1987). *Breaking the impasse: Consensual approaches to resolving public disputes*. New York, NY: Basic Books.
Susskind, L., & Cruikshank, J. L. (2006). *Breaking Robert's rules: The new way to run your meeting, build consensus, and get results*. New York, NY: Oxford University Press.
Thomas, C. W. (2003). *Bureaucratic landscapes: Interagency cooperation and the preservation of biodiversity*. Cambridge, MA: MIT Press.
Tobin, M. (2004). Artificial water holes awash in controversy. *Arizona Daily Star*, 18 January 2004.
Wondolleck, J. M., & Yaffee, S. L. (2000). *Making collaboration work: Lessons from innovation in natural resources management*. Washington, DC: Island Press.