Contextual Factors in the Development of State Wildlife Management Regimes in the United States of America

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Abstract:

Edwards & Steins (*The Role of Contextual Factors in Common Pool Resource Analysis*. Paper presented to 7th Conference of the International Association for the Study of Common Property, Vancouver, British Columbia, June 1998) developed an analytic framework for multiple-use common pool resource (CPR) regimes that emphasizes the importance of contextual factors. As a preliminary application of the framework, this paper 'backsolves' from outcomes to underlying contextual factors, and identifies primary cultural factors that occur in the development of American state wildlife management agencies. The factors are then placed into five categories: physical, political, economic, legal and scientific. The resulting examination of the management regime clarifies changes in agencies' action strategies, and potential patterns of interaction, as they respond to new institutional pressures from recreation and conservation interests. The paper concludes with four important research directions that have emerged from the discussion. (1) Are contextual factors better expressed as a matrix (network/decision tree/hierarchy) rather than a list? (2) To what extent do spatial factors influence contextual factors? (3) How do contextual factors affect decisions at the three levels of institutional choice: constitutional, collective and operational? (4) How can we develop a structured research agenda that examines increasingly complex CPRs as we refine the analytic framework?

Key words: common pool resources; wildlife management; contextual factors

Article:

Introduction

In relatively simple common pool resource (CPR) regimes (for example, single, small-scale irrigation systems), factors that affect resource appropriation may be readily isolated and tracked longitudinally to provide a fairly accurate picture of the institutional structure of the regime. However, in complex, multiple-use, multiple-user CPR regimes, the factors increase exponentially, and a clarifying analytic framework becomes essential to make sense of the institutions and their interactions.

This paper explores the usefulness of the framework developed by Edwards & Steins (1998) through the example found in the CPR regime of American state wildlife management. The focus is on state wildlife management agencies and contextual factors that have influenced their institutional design and sustainability.[1] American state wildlife agencies are used as an *example* rather than a *case study*; a case study of wildlife management in the USA is far too complex to present in a journal paper. Readers who desire a full treatment of the evolution of American wildlife law and management should consult Lund (1980), Tober (1981), Belanger (1988), Orr (1992), Bean & Rowland (1997). International wildlife issues are covered in Birnie & Boyle (1993). However, it is for just such a complex problem that Edwards & Steins (1998) have offered their analytic framework.

Wildlife management in the USA presents an especially interesting analytical problem: the US government is a federal system with overlapping legal authorities for many natural resources, and wildlife is used for a variety of purposes by a multiplicity of appropriators. Initially, states had exclusive jurisdiction over wildlife within state borders, but wildlife management in the USA is now a unique blend of federal and state policies. The federal government has pre-empted state jurisdiction over some species that are threatened, or endangered, or that are subject to international treaty obligations,[2] and wildlife on federal land is generally subject to federal jurisdiction, rather than to the jurisdiction of the states within which the land is located. Even though the level of government that holds property rights in wildlife may vary by both species and location, virtually all property rights in wildlife are vested in governments rather than in landowners.[3] I have chosen to focus on state management agencies for two reasons. First, state agencies are the primary institutions with responsibility for implementation of wildlife management policies. Second, they are nested (albeit not in a tidy Weberian hierarchy) within the national wildlife management regime and are, therefore, more acted *upon* than are federal agencies.

In this paper, I identify contextual factors (as defined by Edwards & Steins, 1998) as they occur in the example of the evolution of state wildlife management agencies. The identified factors are then placed in general categories to commence operationalization of contextual factors, that is, to move 'contextual factors' from an environment-embracing framework diagram to a set of categories applicable to multiple-use CPRs in general. In the section on future research of this paper, I explore how the factors identified in the example provide analytic insights that aid in the analysis current management pressures faced by the agencies, and to identify the range of future scenarios which agencies may face. The final section of the paper suggests future avenues for research.

Identifying contextual factors in state wildlife management

In this section, the evolution of American state wildlife management agencies is summarized. The purpose of the discussion is twofold: to identify contextual factors that have had a substantial effect on either changing or sustaining the agencies' institutional designs, and to illustrate the usefulness of contextual factors in understanding the development of CPR institutions.

Contextual factors are environmental factors that both surround and permeate the establishment and maintenance of a CPR regime.[4] Edwards & Steins (1999) developed a framework for organizing and analysing information about multiple-use, multiple-user CPR regimes that incorporates contextual factors. They distinguish two types of contextual factors: *local* contextual factors, such as the availability of alternative sources of income that 'have a *direct* influence on the situational variables of the CPR [regime], including the user community, and can largely be affected by the user community'; and *remote* contextual factors, such as international treaty agreements that 'have an *indirect* influence on the situational variables of the CPR [regime] and are usually outside the control of the user community' (Edwards & Steins, 1999, pp. 207, 208).[5]

Identification of contextual factors is important because they are a rich and complex influence on the options and strategies of all appropriators, regardless of the size or sophistication of the regimes in which the appropriators operate. Many CPR studies focus on the decision-making rules (institutions) that govern appropriation of the resource flow, and contextual factors become an analytic given. In multiple-use, multiple-user CPR regimes, however, sets of operational, collective-choice and even constitutional rules vary with each intersection of use and user. For example, migratory bird hunters are affected by unwritten sportsmen's codes, local rules regarding access to hunting sites, gun laws, state hunting seasons, and federal regulations on certain species. Birdwatchers for these same migratory birds can utilize different sites, have no gun or season restrictions, and do not seek to disturb or to take the birds. Research scientists may have the same institutional constraints as both of the other groups, in addition to their own professional decision-making rules. Thus, both the resource domains and the resource flows vary, and the sets of rules for each use and users are different also.

The user community in the case of state wildlife management is, in theory, the entire population of the state. However, because states are constitutionally barred from interfering with interstate commerce, citizens of other states may use public state facilities and, assuming they have the proper licenses, may even hunt within another

state.[6] Thus, the user community for American wildlife is comprised of any person engaged in wildlife-related activities who has complied with appropriation and access rules set by the state.[7]

Contextual factors are important in single-use regimes; however, in a single-use regime, local and remote factors will bear on any individual appropriator with roughly equivalent weight. In contrast, in multiple-use, multiple-user regimes, the range of local and remote factors that might affect the regime is increased; a set of factors that influences one may have little, more, or no effect on another user. Thus, for multiple-use, multiple-user regimes, contextual factors are more important *analytically* than they are in single-use regimes. In the discussion that follows, a number of important contextual factors in the complicated regime that has evolved around American wildlife resources are identified. They have been developed by 'backsolving' (Feeny, 1994) and draw heavily from the implementation framework of Mazmanian & Sabatier (1983) supplemented by insights from Ostrom (1990) and McCay (1998).

At the time of the American Revolution, and for over 100 years following it, traditional ownership of wildlife was vested in state governments through the transfer of the powers of the English sovereign to the colonies and hence to the states. The 'state ownership doctrine' assigned property rights in wildlife to the state in which the wildlife was found, and the state then held this property in trust for its citizens (*Geer* vs *Connecticut*, 161 US 519 (1896)).[8] Initially, the federal government was powerless to protect wildlife because the existing understanding of federalism barred federal interference in state wildlife management [*remote factors: US Constitution, federal court decisions*].

In the early days of the 20th century, species that are abundant today, such as eastern white-tailed deer and wild turkey, were on the brink of extinction; some, such as the passenger pigeon, slipped over the brink and were lost forever. Interest groups concerned at that time with wildlife were fairly well defined (market hunters, sportsmen and conservationists), but their interests were usually limited by their state borders. Across the nation, a patchwork of state hunting regulations and irregular enforcement left many species at the mercy of the casual hunter, and there was no effort to coordinate the states' legislation (Orr, 1992). In the first decade of the 20th century, national interest groups arose that recognized the need for national solutions to interjurisdictional policy problems, and they began to focus their attention on the federal government. By 1920, the states had lost their absolute control over wildlife through treaties (e.g. 1916 Migratory Bird Treaty), legislation (e.g. 1900 Lacey Act), and court decisions (e.g. *Missouri* vs *Holland*, 252 US 416 (1920)),[9] and the mix of federal and state jurisdiction that exists today began to develop [*remote factors: treaties, international agreements, US Constitution, national legislation, interstate commerce, federal court decisions, national interest groups; local factors: state legislation, state agency regulations, employment opportunities, state and local tax structures*].

Throughout the 19th century, the inability of the states to provide sustainable game resources stemmed from many factors. (1) Game seemed so plentiful that many were unconvinced that a problem existed or, if convinced, refused to accept that diminishing numbers were the result of indiscriminate hunting. We see this denial at the end of the 20th century also, with many fishermen on both coasts refusing to accept that over-fishing is a major cause of declining fish stocks [*remote factors and local factors: scientific data*]. (2) Local custom dating to colonial times endorsed unrestricted hunting even on private land; vestiges of this attitude remain today in state laws that assume private land is open to hunting unless it is posted (Lund, 1980) [*local factors: custom*]. (3) As wealthy sportsmen often brought substantial business into rural areas, rural-dominated legislatures were understandably reluctant to cut off the income supply by restricting hunting (Tober, 1981) [*local factors: interest groups, constituencies, employment opportunities*]. (4) States that shared both migratory stocks and borders frequently suffered long-standing and often violent disputes, over resources and had little incentive to join multi-state compacts; such compacts would, in any case, require congressional approval, and states were reluctant to involve Congress in their internal affairs (Buck,1988) [*remote factors: political decisions of remote states; local factors: political decisions of adjoining states, interest groups*]. (5) No established professional class of administrators for wildlife existed; the Pendleton Act, passed in 1887, initiated a professional civil service corps at the federal level, but most states lagged far behind; state governments were so far from professional game management that, in many states, sportsmen's clubs and conservation groups

such as the fledgling Audubon Society paid private detectives to enforce the game laws (Orr, 1992; Tober, 1981, pp. 215–216) [*local factors: state legislation, agency resource allocation*].

Many state wildlife agencies began as citizen groups of sportsmen or conservationists eager to protect their own state interests. Sporting constituencies wanted regulation to restrain market hunters from demolishing stocks, although their reasons often differed. Some wanted to shield their own stocks from the encroachments of out-of-state hunters, while others wanted to protect private game preserves to lure wealthy hunters (often from out of state) into their communities. Regardless of the motives of the sportsmen, the conservation interests were their natural allies. Together they urged the creation of state fish and game agencies. Quite naturally, they also wanted to control the activities of the agencies. By the end of the 19th century, almost every state had established fish and game commissions (Tober, 1981, p. 160) [*local factors: interest groups, constituencies, employment opportunities*].

Today these commissions continue in 27 states. The commission form of regulatory agency, comprised of political appointees with expertise and experience in the policy arena, is frequently found in state government, although the close and usually cordial relationship between fish and wildlife agencies and their client groups is not common. In recent years, some states have consolidated their natural resource concerns into one centralized agency; six states have boards or commissions that oversee all natural resources, while several have retained some aspect of their old wildlife commissions nested within the larger agencies. Only two States—Maine and North Dakota—have separate wildlife agencies that are not overseen by a commission [*local factors: state legislation, interest groups, constituencies*].[10]

Commissioners are appointed by their state governors, occasionally subject to confirmation by the state senate, or other legislative body. Many states have distribution requirements for the commissions; for example, in West Virginia each congressional district provides one commissioner and the remainder is drawn from the state at large. Usually state law requires commissioners to have some expertise in fish and wildlife. Commissioners often have staggered terms which provides even more independence from political vagaries [local factors: state legislation, state court decisions, interest groups, constituencies]. Although on paper the authority and responsibility of the commissions, the agency directors and the other state natural resource agencies are clearly defined, in practice there is a great deal of informal communication, negotiation and compromise. For example, a commission is unlikely to overrule the recommendations of its state wildlife biologists who are in turn unlikely to recommend politically unrealistic policies [*local factors: interest groups, constituencies, scientific data*].

State wildlife management agencies are funded by a combination of state general funds, license fees and federal aid. License revenues and federal aid provide a stable funding mechanism for the agencies. State agencies receive funds from license fees that, as a condition of continuing federal fish and wildlife aid, cannot be diverted from the agency. Federal aid revenues to the states (provided to the states via the Federal Aid in Wildlife Restoration Act of 1937 and Federal Aid in Sport Fish Restoration Act of 1950) increase as prices rise because the source of the federal funds is an excise tax. The state share may also fluctuate with the number of hunters which is an additional incentive to provide an abundant, well-managed stock of game, but the agency can rely on a relatively predictable and steady source of income. Although the origin of the federal aid is tax revenue, it is, quite improbably, a tax voluntarily assumed by the taxpayers and vigorously defended against reductions by sportsmen, manufacturers and conservationists.[11] Even though wildlife -related activities generate significant expenditures ($101.2 billion in 1996; US Department of the Interior, Fish and Wildlife Service and US Department of Commerce, Bureau of the Census, 1996, p. 5), contemporary agency missions and their primary constituencies are not directly motivated by economic forces. There is little market for game animals, although some trophy animals such as bighorn sheep are themselves an economic commodity and there is a considerable market built around their appropriation [*remote factors: demographic change, national legislation, federal agency regulations, national interest groups, federal tax structures; local factors: state legislation, interest groups, constituencies, state tax structures*].

The performance of wildlife management agencies is largely measured by the extent to which they provide access to sustainable populations of mature, harvestable animals. Hunting seasons, bag limits and related regulations are adjusted to anticipate or to compensate, for shifts in animal populations. This is not necessarily an ecological approach.[12] There are, of course, substantial benefits for many wild species when any habitat is improved and preserved, and endangered species do receive special considerations, but the management of habitat primarily to sustain game species may also produce less than optimal conditions for non-game species [*remote factors: climate change, demographic change, incidence of disease, predator–prey relationships, national legislation, data; local factors: habitat conditions, incidence of disease, state agency regulations, enforcement, agency resource allocations, local ordinances*].

The contextual factors identified above, and listed in Table 1, are local and remote factors that would affect any given state wildlife management agency. They represent only a portion of the full panoply of local and remote factors that might influence the exceedingly complex resource regime of American wildlife management. They are used here to demonstrate how categorization and consideration of local and remote contextual factors enrich our understanding of multiple-use CPR regimes.

Table 1. Categorization of contextual factors

Local factors	Remote factors
Physical	
1. Habitat conditions	1. Climate change (storm events, precipitation, temperature)
2. Incidence of disease	2. Demographic change (immigration, urbanization, development, population change)
	3. Incidence of disease
	4. Recurring predator–prey relationships
Political	
3. Political decisions of adjoining states	5. Treaties and international agreements
4. State legislation	6. US Constitution
5. State court decisions	7. National legislation
6. State agency regulations	8. Federal court decisions
7. Agency resource allocation (funding, personnel)	9. Federal agency regulations
8. Enforcement	10. Political decisions of remote states
9. Custom	11. National interest groups
10. Interest groups	
11. Constituencies (number, heterogeneity)	
Economic	
12. Employment opportunities	12. Interstate commerce
13. State tax structures	13. Federal tax structure
Legal	
15. State court decisions	14. Federal court decisions
16. State agency regulations	15. Federal regulations
17. Local ordinances	
Scientific	
18. Data	16. Data

While most of these factors are self-explanatory, several do bear elaboration. First, ‘court decisions’ are both political and legal factors. They are political because the decision to continue a law suit, to fight a law suit rather than to settle or to arbitrate, and to some extent, the court opinions, are all political choices. Once an opinion is issued, compliance is also a political decision (How fully must an agency comply? What are the costs of compliance compared with the benefits of non-compliance?), as well as a legal constraint. Similarly, formulation and implementation of ‘agency regulations’ are both political and legal factors.

Second, there is some overlap between ‘constituencies’ and ‘interest groups’. On the one hand, the user community (sportsmen, recreational users, etc.) are constituents of the state wildlife management agencies, as agency actions directly affect their access and use of the resource. On the other hand, sportsmen and recreational users are also members of interest groups (e.g. National Rifle Association, Audubon Society and National Wildlife Federation) that seek to affect agency decisions. The agencies themselves are members of

interest groups, such as the International Association of Fish and Wildlife Agencies. In this paper, constituencies are the individuals who make up the user community, while interest groups are formally organized groups of individuals or of associations that influence policy decisions. The two sets are not mutually exclusive.

Finally, 'scientific data' is listed as both local and remote because of the amount of control a state agency has over the data collected. State level information may have a substantial impact on state decisions, and how that data set is collected and used is largely in the control of state agencies. State level information on biological systems is state specific and longitudinal, although it is frequently incompatible with data gathered in other jurisdictions. State agencies have almost a century of administrative experience with the species and habitats in the state; state biologists have longitudinal information on population shifts, weather patterns, water flows, flooding conditions—a myriad of data that can only be properly assessed through the lens of local experience. Data collected at more remote sites, or by scientists over whom the agencies have little control, is less useful to the states but may have a substantial effect on remote factors. However, even if an enormous centralized data collection process were initiated, it could never duplicate the 'time and place' information gathered locally over an extended period, and information costs are too high (Ostrom *et al*., 1993, pp. 120–122). Another impediment to multistate data collections is data incompatibility. For example, to be comparable, biological data should be collected using the same method and timing at each collection site, and samples should be analysed by identical processes. Data that do not meet these criteria may not be compatible even with sophisticated statistical analysis (Buck, 1988).

Exploring the multiple-use framework

The preceding section of this paper defined remote and local contextual factors, recounted the bare bones of the history of state wildlife management agencies, and identified a group of contextual factors that have affected either the physical and technological characteristics of the resource, the decision-making rules or the user community. In this section, I apply those factors to a discussion of how emerging trends in wildlife management will affect the efficiency and effectiveness of the agencies. Following the analytic framework developed by Edwards & Steins (1999) (here reproduced as Figure 1), we can see how changes in local and remote contextual factors have affected institutional stability of the agencies that manage resources.

As Edwards & Steins (1999) suggest, working backwards from changes in outcomes is useful in identifying critical contextual factors. Once identified, these factors also illuminate our understanding of current institutional arrangements. In the last 10 years, wildlife agencies have been under increasing political pressure to expand their mandates to include a greater concern with habitat preservation and biodiversity. At the same time, political pressure is exerted by a wide-ranging coalition of other interest groups to promote reduced government regulation, enhanced private property rights, economic and industrial expansion, urbanization and a host of other policy outcomes that are antithetical to protecting either habitat or biodiversity. This places state agencies in a politically precarious position.

Physical and technological characteristics of wildlife are especially susceptible to local and remote *physical* factors such as incidence of disease, habitat changes, climate change, demographic change or recurring predator–prey relationships that are largely beyond the control of management agencies. For example, changing patterns of urbanization fragment habitat, eliminate contiguous ranges necessary for some species, and drive others into areas where they interfere with human activities. Agencies usually respond to these factor changes through incremental adjustments in *decision-making rules*, especially operation rules (catch limits, seasons, etc.) Occasionally, large-scale interventions (e.g. closing fisheries or listing species under the Endangered Species Act) require changes to collective-choice or constitutional rules. In contrast, *political, economic* and *legal* remote factors (treaties and international agreements, the US Constitution, national legislation, federal court decisions, federal regulations, political decisions of remote states, national interest groups, interstate commerce, federal tax structure) have little direct impact on the characteristics of wildlife resources; rather they constrain the *collective-choice* and *constitutional rules* that define the options available to the managers by protecting

certain species or habitats, and curtailing the state manager's bundle of property rights (e.g. placing wildlife on federal lands under federal jurisdiction).

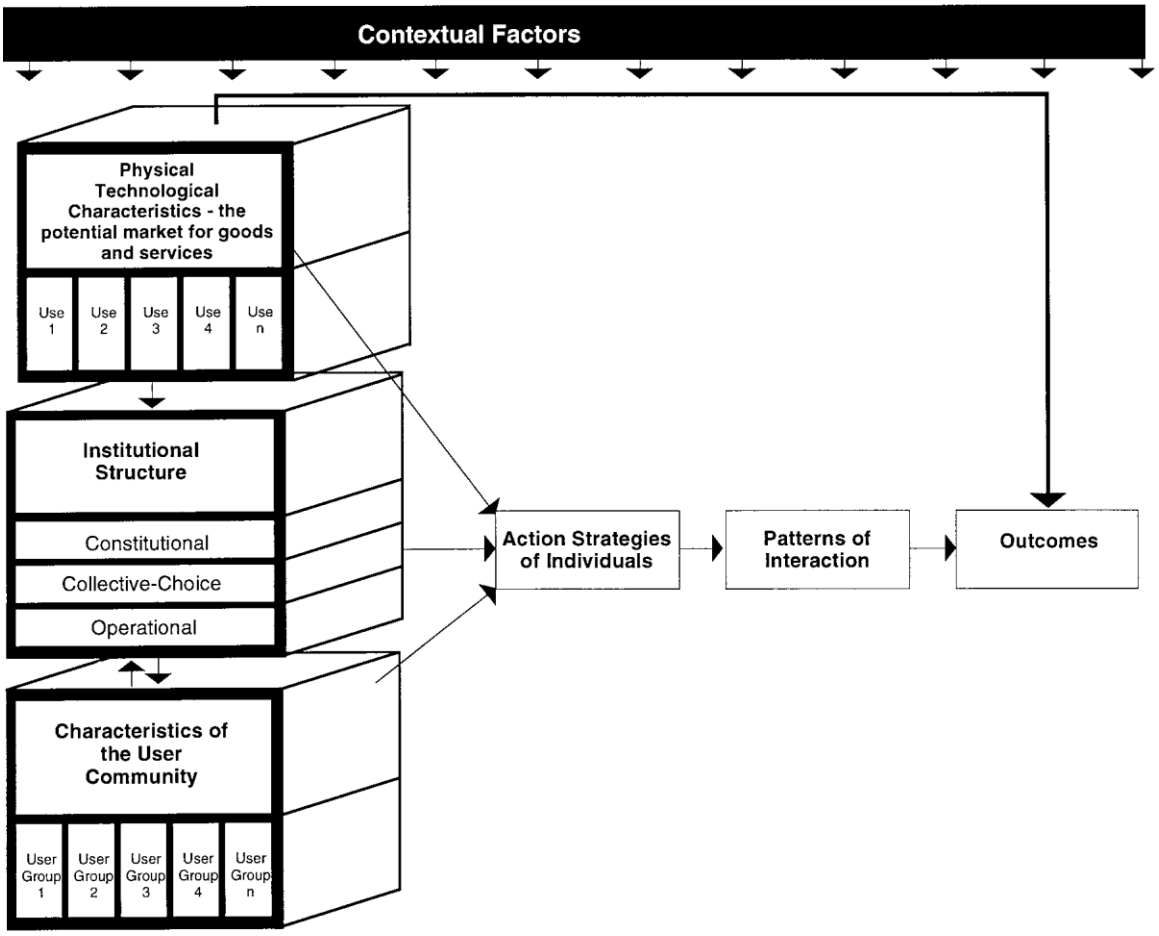

Figure 1. The multiple-use framework. (Reproduced with permission from Edwards & Steins, 1999.)

Scientific remote factors also have no effect *on physical and technological characteristics*. However, *social characteristics of the user community* may be affected by remote factors, as interest groups at both the local and remote levels strive to shift cultural attitudes towards animals and hunting. For example, loudly expressed national opinions about wild horses and burros led to federal protection under the Wild Free-Roaming Horses and Burros Act of 1971. The effect of these contextual factors on local communities which use the same resource domain as wild horses has been immediate and, for some users, substantial. The *physical* factor of more wild horses means that the user communities for western grazing land must adjust to new restrictions on removing herbivores that compete with their cattle for forage (*decision-making rules*). Some of the users now also forgo the income from selling wild horses for pet food. This generates new action strategies: some westerners have continued illegal round-ups, some cooperate with conservation groups to preserve mustang herds, while still others work with the state prisons to train inmates to break horses for the Bureau of Land Management (BLM) sales. This federal law has also increased frustration with federally imposed mandates on Western range management (*characteristics of user community*) which in turn increases support for the property rights movement.[13] A similar example on the local level is the impact of the 1996–1998 rabies epidemic (*local factor: incidence of disease*) on the east coast of the USA (*physical and technological characteristics of the resource*) which changed public attitudes towards viewing wildlife; harmless possums sleeping in city park trees have been surrounded by police, shaken down by firemen, and killed for fear of rabies (*changes in collective-choice and constitutional rules*).

Arguably, the greatest change in contextual factors faced by state management agencies today is driven by new constituencies of conservationists and recreational users; they look to their state (and local) agencies to provide

and to control wildlife, and wildlife habitat, for non-consumptive uses such as hiking, photography and wilderness adventure.[14] In recent years, conservation interests have also focused on two new concerns: biodiversity and sustainability. These concerns are a result of a powerful mix of local and remote factors: *scientific data* suggests to the risk-averse that irreversible environmental harm is imminent. Remote political factors have tended to support pro-business policy trends (e.g. deregulation, the property rights movement, changes in wetlands protection regulation) which again challenge the risk-averse conservation constituencies. Conservation interests have begun to see an opportunity for issue linkage by associating new non-game wildlife policy interests with existing game programmes. This puts the agencies on a political tightrope, with one side held by their traditional sportsmen's constituencies and the other by recreational users and conservation concerns.[15] As the agency constituencies become less homogenous, the political tightrope that the agencies must walk becomes thinner, and the crosswinds pick up.

As shown in the example of state wildlife agencies, the remote factors that were most influential on a regular basis were *national interest groups* and *national legislation* while at the local level, *state legislation, state interest groups, state agency regulations* and *constituencies* were frequently influential. The recent emphasis on recreation and non-game species is reinforced by new interest groups with different resources, policy networks, political orientations, and policy goals. They will influence state legislation, and they will force agencies to consider redistribution of resources. If they are successful, an even more profound effect will occur in the *patterns of interaction* between the agencies and their constituencies. The hunting constituency will find its influence diluted. Qualifications for commissioners are likely to change to include more conservation interests. Unless an insulated and reliable revenue source for non-game programmes is in place, the balance between the state legislatures and the agencies may become unstable, and in some states, legislative interests may seize the opportunity to rework the relationship. For example, if state legislatures simply mandate greater consideration of non-game programmes without increasing general revenue funding, agencies will be forced to cut game programmes, thereby aggravating the original hunting constituencies and disrupting their current smooth issue networks (Heclo, 1978). Newer, non-game constituencies will still be negotiating their role in the policy balance and may see this as an opportunity to garner more resources. The resulting conflict over agency resource allocation will place state wildlife agencies in vulnerable positions within state government.

Future research directions

Although the primary topic of this paper is not state wildlife agencies, the framework must be able to address case-specific questions if it is to be useful. In the early stages of building theory, it is best to be inclusive rather than exclusive; that is, it is easier to discard unneeded supplies than to find we are inadequately provisioned. Applying the analytic framework to the example of state wildlife management agencies suggests a number of interesting substantive questions that then give rise to methodological concerns.

Are contextual factors better expressed as a matrix (network/decision tree/hierarchy) rather than as a list?

In the analytic framework, contextual factors are shown as a 'rain of arrows'. The discussion of federal protection of wild horses on western lands shows that contextual factors affect each other as well as the other variables in the framework. Even a cursory examination of the list of local and remote factors shows mutual dependence; for example, interest groups have a direct effect on agencies, but they also affect legislation, regulations, and court decisions. It may be helpful to develop general *categories* to be used in the framework; for example, five categories are developed in this paper: physical, political, economic, legal and scientific. These categories might be null sets for some resources but because the framework is a conceptual tool, we should consider even the null sets. While excessive fidelity to every nuanced interconnection will turn our framework into a miserable Gordian knot, erring on the side of oversimplification robs the framework of validity. One promising graphic technique is the use of matrices that show intersection points in a concise chart. Clear graphic displays of relationships among and between the variables in the framework would make the framework easier to apply to other case studies.

To what extent do spatial factors influence contextual factors?

Agencies of adjoining states are likely to cooperate on a wide range of policy issues, but as states become more geographically remote, the likelihood of cooperation decreases.[16] However, wildlife is a fugitive resource that often crosses political borders, with the result that outcomes in one far-off jurisdiction may affect the resource in another jurisdiction. For example, if America's disappearing wetlands diminish the reproductive success of ducks, Canadian hunters may have insufficient game. Is American wetlands policy a local or remote factor for Canadian hunters? It has a 'direct' influence on the situation variables which under our definitions of local and remote factors would earn a 'local' label, but it is largely outside the control of the user community which should make it count as a remote factor. We need to think about how to operationalize spatial effects.

How do contextual factors affect decisions at the three levels of institutional choice: constitutional, collective and operational?

Constitutional choice

At the level of constitutional choice, the power of the states to regulate wildlife is quite literally a *constitutional* one; this is one of the 'reserved' powers of the states under the US Constitution. [17] In the past century, the balance between national and state power has shifted, and the responsibilities of the states over wildlife are constrained by such remote factors as treaties, legislation and court decisions. However, the states still largely control game animals, and this power is delegated by state legislatures to state management agencies. *Are multiple-use commons more likely to be affected at the constitutional level by contextual factors? If so, are remote factors more or less influential than local ones?*

Collective choice

Collective choice decisions are then made at the agency level through rule-making and adjudication as well as resource allocation (personnel, funding, etc.). Agency administrators conduct hearings on proposed regulatory changes, consider current research results, and consult with adjoining states that share wildlife ranges before making final decisions. Because these decisions are made at the administrative rather than the legislative level, they can be changed fairly rapidly in response to new scientific data or sudden, unanticipated changes in local factors such as habitat, disease, or climate. *How do the activities of agencies as agents affect the institutional design of the regime? They are embedded in a complex administrative structure. How do they balance policy mandates with bureaucratic imperatives?*

Operational choice

Operational choice decisions are also made at the agency level by 'street-level' bureaucrats (perhaps we need to coin a new term for environmental operations: the 'field-level' bureaucrat) because decisions about monitoring, enforcement, sanctioning, and implementation are made not by the appropriators (hunters and recreationists), but by agency personnel. For example, one prominent group of field-level administrators in the state wildlife management regime is state game wardens. They are also state citizens with the same rights of access and appropriation as other citizens. When they are acting in their official capacity, they are responsible for enforcing state wildlife laws and regulations. This involves both monitoring and, to some extent, sanctioning (in the same sense that a police officer can control sanctions by exercising discretion in choosing which charge to bring). Their authority comes from the state government, and the powers of the state government are, in turn, given to it by the citizens of the state. Thus, although citizens are not directly participating in the operational choice of the regime, they do participate directly in the constitutional choices (by electing officials), and the collective choice decisions (by public participation and influence on the elected officials who ultimately control the agencies). *To what extent does this shift in locus of operational choice decisions affect the operation of the multiple-use commons?*

How can we develop a structured research agenda that examines increasingly complex CPRs as we refine the analytic framework?

While regional differences among the states account for a great deal of variation in contextual factors, two issues especially germane to this initial paper draw our attention to the divisions between eastern and western states: the impact of federal landownership, and differences in water law. The federal lands comprise over 700 million acres, or about one-third of the USA, with most of the land held in the western states. In some western states, the federal government owns over half of the land. For western-state wildlife management agencies, the relative weight of remote and local contextual factors is different from the relative weight in the eastern states. In addition, water law in the west is based on prior appropriation rather than riparian rights. It seems likely that this difference would affect the ability of state agencies to manage habitat. In the narrow context of wildlife management, at some point we may need to disaggregate the American states into regions (perhaps prior appropriation (western) and riparian rights (eastern), or percentage of federal land within state boundaries). *How should the differences between eastern and western states be reflected in discussing contextual factors in American state wildlife management?* The difficulty here may be that the particular CPR used in this paper is too large for the framework in these early stages. We may be asking too much of an embryonic theory to embrace a resource domain covering most of a continent, 50 state agencies with different constituencies and cultures, and an uneven federal presence. Multiple-use CPRs differ widely in their complexity, and rather than encouraging a smorgasbord of case studies we should consider a more structured research agenda that examines increasingly complex multiple-use CPRs as the analytic framework becomes more sophisticated. The value of this exercise is in organized, explicit consideration of contextual factors and the elements of the framework: physical and technological characteristics of the resource, decision-making rules, social characteristics of the user community, action strategies, patterns of interaction and outcomes. We must begin to make routine analyses of multiple-use CPRs and to operationalize the variables in the framework. By using a common language, we identify analytic similarities that lead to a better descriptive theory for multiple-use CPRs. A single example does little by itself to advance a theory, but a series of examples subjected to a uniform analytic framework will improve our understanding of complex CPR institutions.

Conclusion

The value of this exercise is in organized, explicit consideration of contextual factors and the elements of the framework: physical and technological characteristics of the resource, decision-making rules, social characteristics of the user community, action strategies, patterns of interaction and outcomes. We should begin to perform routine analyses of multiple-use, multiple-user CPRs and to operationalize the variables in the framework. By using a common language, we identify analytic similarities that lead to a better descriptive theory for multiple-use CPRs. A single example does little by itself to advance theory, but a series of examples subjected to a uniform analytic framework will improve our understanding of complex CPR institutions.

Notes

1. The paper does not address fisheries for several reasons: in coastal states, inland and marine fisheries are frequently managed by separate agencies; in marine fisheries policy, the federal role is substantial and while commercial fisheries play a large part in state policies, there is no equivalent issue in wildlife management.
2. For example, Marine Mammal Protection Act of 1972, Endangered Species Act of 1973 and the Convention on International Trade in Endangered Species [CITES] of 1973.
3. Of course, landowners have property rights that affect use of wildlife on their property. For example, landowners may bar hunters or hikers, or they may charge fees for access to their land for hunting or other forms of recreation. But American wildlife is neither privately owned (*res privatae*) nor unowned until taken (*res nullius*).
4. Our discussion of contextual factors bears a strong resemblance to the public policy literature that addresses endogenous and exogenous factors affecting policy implementation (e.g. Mazmanian & Sabatier, 1983), and to the cultural theory approach that originated in cultural anthropology (Douglas, 1982) and was subsequently adopted by some public policy scholars (e.g. Buck, 1989; Thompson *et al*., 1990). This is an example of *convergent evolution* which in ecology is defined as ‘the independent evolution of similar traits among unrelated organisms resulting from similar selective pressures’ (Chiras,

1994, p. 71; Sunquist, 1996), but also occurs in the social sciences when similar concepts arise independently in different academic disciplines.

5. In a very small-scale system, personal local factors such as health or family size may have more effect than they would in a larger, more bureaucratic system. This, however, is not what we mean by *local factors*. Using personal factors is not analytically feasible; data collection would be impossible for any but the smallest of systems and the nightmare of infinite regression would soon overwhelm the analyst. Our discussion of local factors is limited to those local factors, which affect, or have the potential to affect, the user-pool as a whole.
6. This is not an undifferentiated right. In *Baldwin* vs *Fish and Game Commission of Montana*, 436 US 371 (1978), the Supreme Court upheld the right of Montana to charge out-of-state hunters a substantially higher fee for elk-hunting licenses.
7. This is *not* an open-access regime, although it bears a superficial resemblance to one. States do not use restricted access as a management technique (although they could). For example, hunters must purchase a license to exercise their rights to appropriate the resource (game); however, the license is not an exclusion device. This point was made clearly by the federal courts in 1983, when the state of Virginia argued that conservation interests allowed it to impose a residency requirement for licenses to fish in Virginia waters. The court ruled that Virginia clearly had no conservation interest that could override the national interest in interstate commerce because there was no limit on the number of Virginia residents allowed to have licenses (*Tangier Sound Watermen's Association* vs *Douglas*, 541 F. Supp. 1287 (E.D. Virginia, 1983)). State resource stocks are protected not by limiting access, but instead through limits on harvests and restricted seasons. This is politically astute. The legal right of citizens to hunt state wildlife is not infringed; instead, the community of appropriators approves the creation of game commissions and agencies, voluntarily assumes fees to support their work and delegates to them the responsibility for making appropriation rules.
8. In 1979, the Supreme Court explicitly overruled Geer in *Hughes* vs *Oklahoma*, 441 US 322.
9. For a fuller discussion of the erosion of the state ownership doctrine, see Bean & Rowland (1997, Chapter 1) and Buck (1996a, Chapter 6, especially pp. 117–22).
10. These data are compiled from the *1995 Conservation Directory* (Gordon, 1995) and the *State Wildlife Laws Handbook* (Musgrave & Stein, 1993) and supplemented by telephone interviews.
11. For a full account of the federal aid programmes, see Buck (1996a, pp. 122–125, 1996b).
12. It does not, for example, usually incorporate predator species as a natural counterweight to overpopulation of prey; on the rare occasions where predators have been included, the agencies have paid a high political price. The recent reintroduction of wolves into Yellowstone National Park in Wyoming and the Alligator River National Wildlife Refuge in North Carolina infuriated local ranchers, although research consistently shows that wolves rarely prey on livestock and have a positive culling effect on wild deer populations.
13. For an especially lucid introduction to the property rights movement, see Newton & Dillingham (1997, pp. 164–184).
14. Public expectation that *state* agencies will be the change agents is weaker in the West, where large tracts of land (and in some states, the majority of land holdings) are under federal jurisdiction. Western state citizens address many of their demands to federal agencies, although they would usually prefer the state agencies to have actual control.
15. There has been an interesting dichotomy in conservation thinking that has segregated hunting concerns from the concerns of mainstream conservationists, although their policy preferences are often remarkably similar. A thorough discussion of the extent of this dichotomy and the reasons for it are topics for another paper, but I believe they are based in cultural differences (Buck, 1989; Thompson *et al*., 1990) between the two user groups.
16. This discussion also raises the issue of diffusion of innovation defined by Walker (1969).
17. 'The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people' (Constitution of the United States, 10th Amendment, 1791).

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