Theoretical Concerns in Networks of Protected Areas: Symmetry and Asymmetry

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Abstract

THE MIGRATORY BIRD TREATY OF 1916 EXHIBITS SYMMETRY IN THREE DIMENSIONS: A MIGRATORY species, land managers with shared goals, and stakeholders with shared goals that are largely consistent with manager goals. This is the basic model for a politically-successful network of protected areas. Changing any one of these three conditions may make a network politically infeasible. Interestingly, changing two of these conditions simultaneously may be conducive to successful management. This simple analytical framework can explain variation in successful and unsuccessful networks managing species such as migratory birds, bison, and wolves, as well as marine resources. This analysis makes policy recommendations conditional on both the type of the biological resource, and on key features of the political matrix within which networks exist.

Introduction

Networks of protected areas play a key role in preserving natural processes. Though protected units and the corridors that connect them exist in a human matrix, biological approaches have tended to dominate discussions of political problems. The implicit baseline is something like the Algonquin-to-Adirondack or Yellowstone-to-Yukon (Y2Y) networks, linking populations in protected areas through corridors, or secondary habitat, at a regional or landscape level (Chester 2006; Klyza 2001).

This baseline rests on a number of political and biological assumptions. When those assumptions are made explicit, such networks do not seem all that typical. For example, in many settings some managers want more animals, while an adjacent manager may want fewer of the same species. Species such as bison, wolves, feral boars, burros, and goats provide examples of such differences in preferences over the same animal, even within a single agency.

This paper seeks to delineate key elements of the political problem for managing networks of connected protected areas. Asymmetry in agency goals, stakeholder interests, and/or natural resources poses easily-understood political challenges of varying difficulty.

When we consider those (a)symmetries, a better analytical baseline is the migratory bird case, where managers and stakeholders all want improved habitat and healthy populations, and

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where all habitats play a similar, seasonal role for each species. Departures from the migratory bird case in any of these three variables (agencies, stakeholders, and resources) pose significant political challenges. Confounding factors include non-migratory species, non-native species, "undesirable" species, such as wolves or prairie dogs, and differences in mandates across land managers. Anticipating these future management problems can help us better understand how to design networks to minimize management problems.

Unconditional and conditional recommendations for networks of reserves

Writers on the challenges of protected areas often give surprisingly uniform recommendations. Many advocate "greater stakeholder involvement," others suggest that protected areas coordinate better if participants develop better personal relationships, trust, and goodwill, put more effort into developing a shared vision, improve communication, choose leaders with greater political will, or some combination thereof (e.g., Fall 2003; Wondolleck and Yaffee 2000, Chapter 3; Zbicz 2003).

Implicitly, such recommendations assume that protected area administrations are homogenous, without political differences of opinion or power struggles (*contra* Fall 2005, Chapter 6; Pahre 2011). Generally speaking, the only political opponents are certain kinds of stakeholders. Resource extraction industries, such as logging, grazing, petroleum, and hardrock mining, have interests opposed to the environmental goals of protected area land managers and preservationists, though recreationists may have more mixed interests.

While the public policy scholars worry about stakeholders, the natural scientists take their own, often homogenous approach to designing reserves and networks of reserves. They tend to identify desired biological resources, try to obtain those resources, and then change the goals of the managers (if necessary) in accordance with the overall design (e.g., Agardy 2000; Soulé and Terborgh 1999).

For example, Noss and Harris (1996) classically advocated networks based on multiple-use modules, designed around biologically key locations—old-growth forests, unique geological sites, ice-free bays, artesian springs, or mineral licks (Klyza ed. 2001). Networks of marine protected areas consider ecological processes, such as spawning, recruitment, and larval dispersal, while also allowing margins of error for the many species whose needs are poorly understood (Roberts et al. 2001; Sala et al. 2002).

Finally, some authors examine the interaction of human and natural considerations. For example, core preserved areas should protect species and ecosystems that cannot persist in the human sphere. Examples include large carnivores, species whose reproductive success is easily disrupted, and habitats and natural processes that conflict with human needs, such as wetlands, wildfire, and flooding (Klyza 2001).

I do not wish to take issue with the substance of any of those recommendations, which are individually and collectively sensible for a wide range of problems. However, we should note that the policy recommendations are *unconditional*. They do not recommend including biological hot spots under some political conditions but not others, or getting stakeholders involved under conditions Y but not Z. If all management problems are fundamentally similar, unconditional recommendations would be suitable.

This project assumes that management problems differ. It seeks to delineate differences in the political matrix and in the natural resource being managed, making management recommendations conditional on a parsimonious set of conditions that define the policy problem.

This approach can help us avoid a kind of selection bias that is found when the literature only looks at cases of *attempted* collaboration. In those cases, players often have shared interests—those interests bring them to the table—but stakeholders with conflicts of interest may not appear at the table. Unless we give attention to this selection issue, we may wrongly generalize about the factors that lead to success only for those players with shared interests. Applying those factors to groups with divergent interests will lead to faulty prescriptions.

Most generally, divergent (or "asymmetric") goals pose a particularly stark problem when we consider a political matrix that includes some form of sustainable harvest. Where surplus animals disperse from a core protected area into an adjacent area managed for harvest, political support for a network will be relatively easy among agencies and stakeholders. For a migratory species facing possible bottlenecks, the politics become more complicated (Roberts et al. 2001). This example highlights key variables of the analysis here: manager goals, stakeholder goals, and the nature of the resource (migratory or non-migratory).

Symmetry, agencies, and wildlife

We can define a network of protected areas in terms of whether three variables are "symmetric"—land managers' goals, stakeholder interests, and the wildlife resource itself. I begin with the baseline case, in which managers and stakeholders share goals for a network containing a migratory species. In this case, a species leaves a winter habitat, managed by one agency, travels to a summer habitat, managed by another agency, and returns. If one agency fails to manage its resources well, the other agency will see a smaller returning population. That will result in a smaller population returning to the first manager's lands the next year. This simple biological logic gives both agencies an incentive to work together. With a supportive political matrix, there should be no opposition to actions that the agencies take to manage the protected areas for this species. All the variables are "symmetric" in that both agencies want more animals, stakeholder preferences match agency preferences, and the animals move back and forth between units.

The earliest network of protected areas fits this model exactly. Canada and the United States signed the Migratory Bird Treaty in 1916. The USA and Canada each implemented the treaty through legislative acts in the 1920s, and Mexico joined the treaty in 1936. These acts produced an extensive network of national wildlife refuges and other protected areas, providing key habitat for migratory birds (Dorsey 1998). Land managers all favored more birds. Stakeholders favored larger and more robust populations, either for reasons of preservation, or to provide opportunities for sustainable hunting. Key stakeholder groups, such as Ducks Unlimited, mobilized politically for duck stamp legislation that collects fees to pay for habitat acquisition.

With this baseline case established, we now turn to more complex cases. We start with cases that diverge from the baseline in only one variable, and then consider when two or more variables are asymmetric.

Non-migratory species and symmetric interests. A number of species along the US-Canadian border are listed in the USA but not in Canada: grizzly bears, lynx, wolverines, and wolves among them. Source populations in Canada can provide surplus animals for dispersal into the United States, helping recovery of these species in the Cascades, Selway-Bitterroot, and Glacier-Waterton regions. This strategy would work best collaboratively, with British Columbia and Alberta agreeing not to harvest these species within a certain distance of the border.

However, most Canadians live near the border, and prefer to hunt near where they live. As a result, wildlife populations at the border generally face greater hunting pressure than non-border populations. Despite the advantages of US-Canadian collaboration for US species recovery, a network of protected areas is politically challenging. Abstractly, the problem lies in a resource asymmetry, despite a symmetry in managers' preferences. Without symmetry in both, collaborative management does not occur.

Migratory species with asymmetric manager goals. Yellowstone's bison are essentially nomadic in biological terms, but their patterned annual movements outside the park in severe winters makes them migratory in political terms: they exit the park and then return. Montana state government and, for the most part, Gallatin National Forest want fewer bison on their lands in winter. Yellowstone National Park wants a healthy bison herd. These interests are compatible if the bison stay inside the park. Because they often do not, and because of the political salience of the herd, the NPS has been compelled to participate in hazing and culling operations around the park's boundaries (Franke 2005). The resource is symmetric but managers' and stakeholders' preferences are not, so collaborative management of adjacent protected areas is very difficult.

Double deviations: non-migratory networks with harvest in the sinks. The preceding two cases considered deviations from the migratory bird case in only one dimension at a time. Interestingly, two deviations may cancel each other out politically, facilitating a stable network. The best example is biological source-sink relationships, where surplus animals in the core disperse to an adjacent area, where they are subject to harvest. This issue has played an important role in the analysis of marine protected areas, where reserves have become an attractive alternative to traditional fisheries management (Agardy 2000). However, the politics of harvest has been left out of most analyses of terrestrial networks, though it remains part of many case studies of individual protected areas in developing countries (e.g., Robinson and Bennett 2000).

The double deviation works politically because the harvest in the sink does not affect the population in the source core. In contrast, if the species migrated, harvest in one unit would reduce the returning population in other units. The network would also not function if there was hunting in the core source habitat, since it would be unlikely to produce a surplus for dispersion into adjacent sinks. One important policy implication of this difference is that sustainable harvest of wolves, prairie dogs, and other controversial non-migratory species may play a role within a network that includes no-harvest source reserves.

Conclusions

This paper has argued that relaxing any of three conditions from the migratory bird case will complicate the political problem of managing a network of preserved areas. The analysis implies that a diversity of protected areas and manager goals will be effective for managing some natural resources, particularly asymmetric ones. For symmetric problems such as migratory birds, shared visions will be more effective.

We have considered only the single-species problem. A network managing both carnivores and their prey, such as migratory caribou and non-migratory wolves, introduces complications for future theoretical work.

The analysis also implies that network designers should choose their stakeholders carefully, when choice is possible. When some stakeholder goals lie at odds with manager goals, designers can avoid future problems by removing the stakeholders, or redesigning the network to avoid stakeholder interests (see Sala et al. 2002). Removing difficult stakeholders, such as grazing leaseholders that conflict with bison in Montana, or the small set of leases that account for most of the wolf depredation in the GYA, would reduce the political controversies over bison and wolves.

In other cases, managers may want to include stakeholders whose interests are consistent with the goal of the network. Bringing in hunters, outfitters, and commercial fishermen could support a source-sink network with harvest in the sinks. In contrast, commercial harvest has proven challenging with migratory species such as tuna, since fleets can move to undepleted populations after overfishing an area.

Those complications among stakeholder groups also point to the need for richer theorization than provided in this brief introduction to the problem.

References

Agardy, Tundi. 2000. Information needs for marine protected areas: Scientific and societal. *Bulletin of Marine Science* 66:3, 875–888.

Chester, Charles C. 2006. *Conservation across borders: Biodiversity in an interdependent world*. Washington, DC: Island Press.

Dorsey, Kurkpatrick. 1998. *The dawn of conservation diplomacy: U.S.-Canadian wildlife protection treaties in the progressive era*. Seattle: University of Washington Press.

Fall, Juliet J. 2003. Planning protected areas across boundaries: New paradigms and old ghosts. In *Transboundary protected areas: The viability of regional conservation strategies*, ed. Uromi Manage Goodale, Marc J. Stern, Cheryl Margoluis, Ashley G. Lanfer and Matthew Fladeland, *Journal of Sustainable Forestry* 17:1/2, 75–96.

Fall, Juliet. 2005. *Drawing the line: Nature, hybridity and politics in transboundary spaces*. Aldershot, England: Ashgate Publishing Ltd.

Franke, Mary Ann. 2005. *To save the wild bison: Life on the edge in Yellowstone*. Norman, OK: University of Oklahoma Press.

Klyza, Christopher McGrory, ed. 2001. *Wilderness comes home: Rewilding the Northeast*. Hanover, NH: Middlebury College Press.

Noss, Reed F., and Larry D. Harris. 1986. Nodes, networks, and MUMs: Preserving diversity at all scales. *Environmental Management* 10:3, 299–309.

Pahre, Robert. 2011. Political opposition to transboundary cooperation in the Greater Yellowstone Area. *Journal of Tourism and Leisure Studies* 17:2, 99–128.

Roberts, Callum M., Benjamin Halpern, Stephen R. Palumbi, and Robert R. Warner. 2001. Designing marine reserve networks: Why small, isolated protected areas are not enough. *Conservation* 2:3, 10–17.

Robinson, John G., and Elizabeth L. Bennett, eds. 2000. *Hunting for sustainability in tropical forests*. New York: Columbia University Press.

Sala, Enric, Octavio Aburto-Oropeza, Gustavo Paredes, Ivan Parra, Juan C. Barrera, and Paul K. Dayton. 2002. A general model for designing networks of marine reserves. *Science* 298:1991–1993.

Soulé, Michael E., and John Terborgh, eds. 1999. *Continental conservation: Scientific foundations of regional reserve networks*. Washington, DC: Island Press.

Wondolleck, Julia M., and Steven L. Yaffee. 2000. *Making collaboration work: Lessons from innovation in natural resource management*. Washington, DC: Island Press.

Zbicz, Dorothy C. 2003. "Imposing transboundary conservation: Cooperation between internationally adjoining protected areas." In *Transboundary protected areas: The viability of regional conservation strategies*, ed. Uromi Manage Goodale, Marc J. Stern, Cheryl Margoluis, Ashley G. Lanfer, and Matthew Fladeland, *Journal of Sustainable Forestry* 17:1/2, 19–34.