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PROTECTED AREAS, ECOLOGICAL SCALE, AND GOVERNANCE – A FRAMING PAPER

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I. Defining the Problem

Humans have crisscrossed the entire earth’s surface with lines demarcating different claims of use, access, and sovereignty. The world has been divided into towns, provinces, states, logging concessions, agricultural fields, pastures, exclusive economic zones, hunting leases, private estates and countless other categories of human use. These human boundaries rarely correspond to boundaries formed by natural processes, but cut across forests, rivers, watersheds, mountain ranges, and even oceans. This is not surprising as human-established boundaries are created mostly to manage the economic affairs of men and women and not to maintain the resilience, productivity and function of natural systems. Such economic partitioning of the planet has allowed humanity to capture over 50% of the planet’s photosynthetic output and to mold terrestrial and aquatic systems in ways that preferentially generate goods and services of value to people. It has also, unfortunately, delineated protected areas for biodiversity that fail to satisfy the ecological requirements of the plants, animals, and processes which they were established to conserve over the long-term.

Protected areas are those spaces on the planet where biodiversity conservation is the primary, but not necessarily the sole, land use objective. They can be public

places such as national parks and reserves, communally owned lands, or private property. Protected areas are essential to the conservation of biodiversity because, in all other places, concerns for the protection of species, ecosystems, and ecological phenomena are subordinated by concerns for direct and indirect human use. Producing commodities for human use is most economically efficient if complex natural systems are simplified so that a greater proportion of nutrients and energy flows through only those species or processes of value to humans. As a result, ecological simplification and loss of biodiversity has happened, and is still occurring, across all but 10% of the terrestrial surface of the planet – that small portion formally designated as protected areas. And even within many of these protected areas human use continues.

In the 2007 World Conservation Monitoring Center global database, 50% of formally recognized terrestrial protected areas are smaller than 98 hectares and only 5% are larger than 14,000 hectares. Given the typically small size of most protected areas it comes as no surprise that the ecological requirements (food, shelter, breeding areas, etc.) of many species are not met by the resources contained within a single protected area. Pioneering work by Newmark (1998), Woodroffe and Ginsberg (1998) and others show that species could go extinct, and are going extinct, despite existing within a protected area. The lessons from these studies are that even very large protected areas are often not large enough to contain self-sustaining populations of some kinds of animals. Working on conservation of the contiguous population outside the limits of the protected area has become a requirement of effective conservation. As a result, there is a growing recognition within the conservation community that the future population status of large and mobile organisms in particular will require conservation actions and management systems that extend beyond protected areas into lands designated primarily for economic development and the production of commodities valued by humans. This recognition is further strengthened by the arriving impacts of climate change which may very well force species to move outside of the boundaries of the protected areas established to try to save them.

Similarly, though a protected area may be of sufficient extent and appropriate ecological configuration to meet the current needs of some, most, or all resident species, some threats to their long term persistence and functional roles originate from outside the protected area. These can only be abated by actions that operate at a spatial and political scale that extends well beyond the boundaries of an individual protected area. For example, acid rain, mercury pollution, and climate change often originate far outside of protected areas, but can have severe

adverse impacts on the plants and animals resident within distant parks and reserves. For these threats to be abated they require actions within jurisdictions far outside the protected areas themselves, and often beyond the frontiers of the nation.

Current protected areas are not only insufficient in size and configuration for species but also for ecosystems with large-scale or complex dynamics such as grasslands, wetlands, lakes or marine systems. All too often the long term conservation of viable segments of these systems depends on what happens beyond the protected area boundaries. As with species, conservation of these ecosystems within protected areas requires working beyond the boundaries.

Lastly, the delineation and legal establishment of individual protected areas is typically a one-off event, and rarely modified. As a result, protected areas are effectively stuck in place and their integrity and conservation value can be jeopardized by shifts in ecological conditions associated with catastrophic physical events such as volcanic eruptions, tsunamis and hurricanes, or disease, and anthropogenic shocks such as climate change and human displacement as a result of civil strife.

If we are to conserve functional ecological systems representative of the planet's biodiversity, then we need to: 1) conjure governance mechanisms that can address the fact that protected areas are often too small to meet the needs of many species, 2) understand that threats to protected areas often originate far beyond their borders, and that future natural or anthropogenic shocks can diminish or obliterate the conservation value of or isolate protected areas, and 3) develop and implement tools and approaches that take appropriate conservation action well beyond the boundaries of protected areas.

The century of working *inside* parks to conserve wildlife has ended. Conservationists have learned that to conserve wildlife and other valued biodiversity we must now work *outside* of parks and reserves in complex areas designated for economic development. This simple, though elusive, realization has brought a new world of work to conservation professionals, most of whom were trained in the sciences necessary to work on biological, not social issues. Yet clearly, working outside parks means working in a world dominated by humans and their concerns and on a set of issues fraught with historical discord and modern rhetoric.

This paper focuses on only one piece of this complex challenge – the ways in which conservation action has been informed, and should be informed, by the interaction between ecological scale and governance. The published literature does not provide much guidance – work on the biological dimensions is largely modeling, done at small scales, or largely silent on the challenges of implementation. Social science work is largely critical of the work done by conservationists and offers little guidance about how best to proceed. This paper lays out a heuristic framework for analyzing where and with whom to work outside the boundaries of protected areas to achieve the conservation of specific elements of biodiversity. It is designed to help frame the work of practitioners who have been engaged in this work already and enable informed comparison of work done across sites. Ultimately, it is hoped that this analysis will provide tools to enable more effective conservation outcomes – for both biodiversity and people.

II. Conservation Targets, Spatial Scale and Governance

Effectively conserving biodiversity requires that conservationists specify clearly and explicitly the targets of conservation efforts. Setting conservation targets is essential if our investments are to be focused, and the outcomes measurable and verifiable. Conservation targets are those attributes of the biodiversity of an area (species, ecosystems) that a project is explicitly committed to conserving, and the status of which will be used to assess whether or not the investment, over the long term, has been successful. Conservation targets are chosen because their long term conservation is a priority. They are also critical for prioritizing those actions most likely to abate key threats. Implicit in selection of conservation targets is the belief that conserving all of them and the habitats upon which they depend will achieve the overall conservation goal for the protected landscape – that is, maintenance of intact and ecologically functional assemblages of native wildlife and plants.

The needs of the conservation targets help define if and why actions may be necessary outside of the boundaries of a protected area. Using these needs as a means of deciding where to work allows creation of a ‘management landscape’ for each conservation target. This management landscape overlaps with multiple other geographies of governance which incorporate resource tenure, resource use, and resource control.

Understanding the needs of conservation targets also helps us to explicitly to identify the conservation goods and services emanating from *beyond* protected area boundaries that are necessary to ensure conservation *within* the protected areas, and the patterns and processes of governance that are relevant to them. An illustrative list features: management of habitats that support migratory flyways or pathways, or seasonal habitats; management of landscape elements that allow movement of individual animals and plants both beyond the boundaries as well as between the protected areas and other habitat blocks; management of external habitat that supports parts of populations principally located within the protected area; land use and environmental management practices potentially detrimental to the survival of individuals moving beyond protected area boundaries; and management practices in the broader landscape that allow the continuity of required ecological dynamics within the protected area (e.g., wildfire and flooding)

In the past, conservation spaces have been determined less by the ecological requirements of the plants and animals and more by the expedience of aligning with land-use or jurisdictional boundaries or simply for ease of delineation. This is clearly manifest in the un-naturally straight edges of protected areas such as Yellowstone and Everglades National Parks. Protected areas based primarily on political boundaries may reduce the number of local, state, and national agencies that have jurisdiction over the management of the protected area, and thus the transaction costs associated with coordinating management across jurisdictions. However, they may be of insufficient size and inappropriate configuration to meet the needs of wildlife. In these cases even substantial financial investments may come to naught as species populations decline or ecological phenomena such as migrations wink out for lack of adequate resources or sufficiently permeable movement corridors.

Growing demand for food, fiber, and fuel for human use is evident in the fact that already 83% of the terrestrial surface of the planet has been influenced by human uses as is 98% of all land where it is possible to grow rice, wheat, or maize (Sanderson *et al.* 2002). This means that it is highly unlikely that existing terrestrial protected areas will be substantially increased in size to meet the needs of the species they were established to protect, or that vast new protected areas will be set aside. Given this, effective conservation of most wildlife species will require management of larger landscapes that extend beyond the boundaries of protected areas into spaces dominated by human land-uses focused on

generating valued commodities. Managing these complex landscapes that combine areas that preference biodiversity conservation with areas that preference generating goods for human consumption is a new challenge to the conservation community and one that will require new skills, new partnerships, and new incentives to ensure that the spaces between protected areas remain permeable to provide wildlife with needed resources and safe passage, whilst simultaneously generating goods sufficient to meet human needs.

Making explicit the conservation needs will allow willing partners outside protected areas, including the public and private sector organizations and civil society groups, to understand and collaborate on the requirements.

III. Governance and Institutions

If conservation strategies are to incorporate the wider landscapes around protected areas, they must not only address the much larger physical areas beyond protected area borders, but also the human and natural processes that influence the ecology of these wider areas. In the wider landscape, human economic production activities will typically dominate, and so an understanding of the capacity of these landscapes to support the biodiversity of protected areas demands consideration of prevailing social, economic, and political processes. Above all it demands an understanding of the way land and other resources are used and governed. The governance of land outside protected areas can be surprisingly complex, as can the institutions that determine land use outcomes. Below we develop a framework detailing the most important dimensions of understanding and action necessary to achieve conservation anchored in protected areas but informed by ecological scale and governance outside of the protected areas.

What is Governance?

When thinking about governance conservationists often distill this down to the question : Are protected areas well or badly governed, and as a consequence are they achieving their remit, the conservation of valued plants, animals, and ecological processes? Success is typically predicated on: 1) whether protected area managers have sufficient knowledge about the ecological requirements of the plants and animals resident in the protected area, and the processes and patterns that affect them, and 2) whether they can muster sufficient control to avoid or abate threats to species and ecosystems within the protected area (e.g.,

Bruner *et al.*, 2001). In areas where biodiversity conservation is the primary, formal land-use objective, land and resource rights are usually well-defined in legal terms (most commonly in terms of designated ownership by the national or local state, although private ownership is also important). Questions of governance then focus on the ability of managers to enforce regulations. Good governance is commonly interpreted as the inverse of corruption (e.g., Smith *et al.*, 2003), or where rules or norms are not contested by rights bearers and rule enforcement is not abdicated by duty holders. If conservation requires that protected area managers extend their influence over land and resource use beyond the boundaries of a protected area, the governance problem might seem simple: how to geographically extend regulations and control rule-breaking. Such strategies can indeed be important (e.g., action against illegal hunting). However, the governance problem in the wider landscape is considerably more complex, as within these larger spaces the primary objectives of land-use are multiple and often contrary to those needed to conserve biodiversity.

There is an important distinction to be drawn between the formal governance as ‘the traditions and institutions by which authority in a country is exercised for the common good’ (World Bank¹), and the governance of resources (‘the use of institutions, structures of authority and collaboration to allocate resources and coordinate or control activity in society or the economy’²). The governance of landscapes outside protected areas typically involves the latter: the coordination or control of activities undertaken by a variety of actors across a wide spectrum of space, society, and economy.

Conservation outside parks is therefore a *common action* problem, familiar from work in political science and institutional economics (e.g., Pretty 2002; Ostrom *et al.*, 2003). An attempt to create forms of land and resource use outside parks that support conservation within them is likely to involve a range of different kinds of actors who value the land and its resources for different reasons, holding land and resources under a variety of different kinds of institutions. The word ‘institutions’ here is not used in the popular sense of an established public organization (the Catholic Church, the US Navy, The Wildlife Conservation

¹ Governance includes (i) the process by which those in authority are selected, monitored and replaced, (ii) the capacity of the government to effectively manage its resources and implement sound policies, and (iii) the respect of citizens and the state for the institutions that govern economic and social interactions among them.

<http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:20678937~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.html>;

² After Wikipedia: <http://en.wikipedia.org/wiki/Governance>.

Society), but in the technical sense developed in economics: *the formal and informal rules and accepted conventions that regulate collective human action* (Bromley 1989).

There are three critical dimensions of the challenge of extending conservation-friendly management beyond protected area borders. First, we need to know **who** manages the land or ocean and its resources, i.e., what **actors** are involved. Second, we need to know **how** they hold the land, i.e., what **forms of tenure** are involved. Third, we need to know **what** they have tenure over, i.e., what kind of rights they hold. These are explored in the following sections.

What Actors are Relevant?

Land in parks is often owned and managed by single organizations, very often by the national state or local state (for example as a national reserve or state park), although increasingly, protected areas are being created that are in whole or in part privately owned or managed (Carter *et al.*, 2008). Land immediately outside protected areas may be held by the state (for example as forest reserve). But as agriculture and other forms of intensive land use expand, protected areas are increasingly surrounded by land held by a variety of different kinds of state and private owners and occupiers with a range of different sets of rights and interests.

This section reviews the range of actors who may be relevant to attempts to bring about conservation management outside protected areas. This is important because when viewing wider landscapes beyond parks it is easy to underestimate the complexity of ownership patterns and to miss identifying key actors. Furthermore, different kinds of actors will have different rights, interests, and capacities, and will need to be approached in different ways. Thus persuading a large state organization (e.g., a forestry or fisheries ministry) to change its policies to favor conservation is a very different task to engaging a small number of large ranch owners in managing their land differently, and different again from the challenge of engaging several thousand small farmers. If we do not understand whose management we need to influence, our efforts are unlikely to bear much fruit.

Individuals. It has become conventional to think of individual people as social actors of great importance in industrialized western economies. The discipline of economics has traditionally sought to explain human behavior in terms of aggregated individual decisions to maximize welfare. Individuals are relevant to extra-park management in several ways: as subsistence entrepreneurs, whose

activities within the wider ecosystem affect the protected area (e.g., hunters or fishermen); as landowners, whose decisions about the management of their farms, lands, or homes affect the park (e.g., use of pesticides within a catchment, felling of timber on surrounding land); as consumers who live far away, but whose decisions about what they buy, eat, or use can have profound effects on the incentives driving local actors' uses of biodiversity within and surrounding protected areas (e.g., Beijing consumers of Asian traditional medicine influence bear conservation in Idaho; US consumers of soymeal- fed poultry influence land clearing for agriculture in Bolivia); and as citizens/voters, whose degree of support for environmental measures could affect the management of a protected area (e.g., attitudes to restrictions on infrastructure development; attitudes to human-animal conflict such as wolves around Yellowstone).

Households. It is often assumed (especially in studies of the rural developing world) that households operate as a unit. This may be a reasonable assumption for analytical purposes (for example in distinguishing between the livelihood options and strategies of richer and poorer households, or those with access to livestock or without, or with HIV-positive adults or without), although the technical difficulties of defining 'who eats out of one pot' can be considerable). There can also be strong divergences in attitudes, material interests and actions within households (e.g., between young and old, men and women, blood kin and in-laws).

Communities. Some groups of individuals and households may form communities, and there may be political structures (e.g., village heads or village councils) and shared formal institutions (e.g., local rules such as rules about when and where resources can be used), or informal institutions (e.g., shared cultural norms related to ethnicity or religion). It is easy to assume that such institutions always exist in the rural developing world (in a way that we may not assume they exist in suburbia), but in practice many co-resident people are divided by ethnicity, wealth or class, and many areas of land and resources are contested between groups living together (e.g., people of two ethnic identities in one village) or apart (e.g., between resident farmers and mobile pastoralists). When we talk of communities we must make clear distinction among communities of place (folks that just happen to live near one another), communities of practice (folks that derive their livelihoods from similar activities – i.e., fishers, farmers, loggers, lawyers, conservationists, etc.), and communities of interests (folks that care about the same things). When seeking to identify groups that may together form a constituency for conservation in landscapes that

extend beyond protected areas, *communities of interest* should be the focus as such actors can be the best allies or the most challenging opponents.

Firms. Business corporations, either privately or publicly held, often hold land around protected areas (for example as farms, urban development land, mines or forest concessions), or control or affect environments or resources relevant to the biodiversity in a park (for example by releasing pollutants or by managing logging concessions). Business and other corporate entities exist in a range of forms, including large transnational companies, family-owned businesses, and cooperatives that can include private sector, public sector and civil society groups. In some cases it may be hard to distinguish between a 'community' organization such as a cooperative and a 'private' business, or (where the state is a shareholder) between private business and the state organizations. The prevalence of 'tri-sector' partnerships in conservation (state/community/private) makes this more problematic.

Municipalities (Ward, District, Town, County). Local governments are important makers of laws, with powers devolved from (or more often abdicated by) central (national) government.

State/Provincial Governments. In federal jurisdictions, various kinds of powers can be devolved from central (national) government, such as waste management and co-regulation of land use by zoning. For example, the power to limit pollution usually resides with national government, but state and local governments can set higher standards if their constituencies so demand, for example with respect to carbon pollution.³

National Governments. Governments have power to legislate in a wide variety of ways that are directly relevant to conservation outside parks, e.g., hunting, forest management, pollution.

International Governance. An array of international agreements limits or influences the power of states and their citizens to manage the environment. Some international agreements seek to control the global commons (e.g., Convention for the Conservation of Antarctic Marine Living Resources, UNFCCC).

³ For example, Boulder, Colorado's, vote for a carbon tax (<http://www.msnbc.msn.com/id/15651688/>) and California's 'Global Warming Solutions Act' 2006 (<http://www.climatechange.ca.gov/>).

What Forms of Tenure are Relevant?

Not only can a wide variety of actors hold land outside protected areas that is relevant to the biodiversity inside it, but they can also hold it in a complex range of ways. It is easy to think of landholders as freehold 'owners' of land who control almost every aspect of the land's use. However, there are in fact often a number of different rights, and they can be held by different actors. Similarly, in the developing world, it is easy to think of smallholder farmers without written ownership documents as existing in some kind of limbo of 'traditional' tenure. But here, too, there are usually quite specific bundles of rights held by identifiable people. In any attempt to extend conservation-friendly land management beyond park boundaries, it is as important to know **how** people hold their land as it is to know **who** holds it. This section therefore sets out the different tenure regimes under which land and resources relevant to parks can be held:

Legal or Formal Tenure: Many parks are surrounded by land held under formal legal tenure. Legal tenure can either be privately held or publicly held. The former does not solely mean individual tenure, rather it means confined to particular persons or groups, i.e., tenure held by an individual, family, community, or firm. The latter is the state.

Customary Tenure: In many places land and natural resources are held in common among a specified group of people and managed according to communal institutions, i.e., rules and regulations defined and enforced through tradition not the law of the land. Many areas of pastoral land and forest are held in this way (Ostrom *et al.*, 1999; 2003; Dietz *et al.*, 2003). The famous paper on The Tragedy of the Commons by Garret Hardin (1968) confuses such customary property regimes with open-access resources, which lack a defined management group.

Open Access: This category includes land and resources held by no one, without legal restrictions on entry and use. The open ocean and the atmosphere are the classic open-access resources, but many pieces of land of unclear or disputed ownership can be effectively open-access resources.

De Jure and De Facto Tenure: It is important to distinguish between the legal basis on which land and resources are held, and the regime prevailing at any given time. De jure rights are those that exist in law. De facto rights are those that exist in practice. If the rule of law is closely maintained, the two should coincide. However, this is often not the case. Additionally, there can be problems where

new resources are created (e.g., carbon or other commoditized ecosystem elements paid for in direct payment or payment for ecosystem services programs).

Very often, conservation faces the problem that *de jure* tenure regimes are either unclear, contested or simply ignored. Thus people occupy land or exploit resources illegally, either in direct contravention of known and accepted laws or because formal legal regimes contradict locally recognized traditions. Whatever the *de jure* tenure regime, it is relatively common for the *de facto* regime to be open access (e.g., poaching by anyone of any amount). Such *de facto* open access resource use can be fostered by corrupt payments to law enforcement officials and at times the complicit support of local people who may perceive the *de jure* regime to be illegitimate and counter to their material needs.

What Rights do Actors Have?

It is easy to think that the person who manages a piece of land has complete control on what is done on it. But things are often more complicated than that. Rights can be thought of as a bundle, and it is important to know which rights form part of the bundle and which do not. Quite a few rights relevant to conservation may be separated from rights to the land itself, for example rights to air and water, or to mobile species. Even where land ownership is formally and legally fixed (as in many industrialized countries), some rights can be held by other actors (e.g., subsurface rights), who then must be made part of the equation. In developing countries, where rights to land can be less firmly lodged in formal legal procedures, diverse ownership of such complex resource bundles can be very important. Even in industrialized countries, some rights may be subject to tradition (e.g., rights of access, or rights of commons in the UK). Where questions of rights are contested (e.g., in classic disputes between local people and park authorities; or between home owners and utility companies) it is often these wider bundles of rights that are in dispute rather than any simple claim to land ownership (e.g., issues or rights of access to religious or ancestral sites).

Mineral rights: Landowners often do not have the rights to extract oil, gas and other sub-surface minerals. Often these rights are retained by the state, and licensed to private companies, who have the power to enter land and search for or extract minerals. Such rights can conflict with other uses of the land, such as

conservation.⁴ Agreements with landowners around parks need to take account of the threat to biodiversity from mineral rights that they do not own and agreements need to be extended to include these mineral rights holders.

Water: Rights to extract groundwater are often licensed separately from land ownership. In developing countries, rules about who can use wells or other water sources in drylands are often quite complex (for example relating to kinship, need, and other factors), but also quite specific. Rights to extract water from streams or rivers are subject to differing formal and informal legal regimes. Protected areas are often affected by upstream water extraction. The extension of conservation outside protected areas needs to address the powers of other parties to consume or access water in surrounding landscapes.

Timber: Rights to harvest timber (sometimes tied to the regeneration of forests, e.g., the Canadian Tree Farm License) are often retained by the state, and leased to commercial enterprises. Such rights can conflict with other rights on the same land, for example the occupancy or use rights of indigenous people. Because of these rights, government licensing authorities and private corporations are important actors in wider landscape conservation efforts.

Hunting: Regulations may involve what species can be hunted (quarry species); when (seasons); by whom (licensed hunters versus indigenous rights); and how (e.g. issues of cruelty, snares, sportsmanship). These provisions often conflict, so that, for example, formal hunting rights are retained by the state and licensed commercially, against the interests and traditional rights of local people. Engagements in wider landscapes must address commercial and state actors relevant to hunting rights.

Fishing: Fishing rights may be held by those with a government license (or marine quota), or those with membership of a fishing organization or specified community ownership of riparian land. Marine fishing is often poorly regulated or unregulated, even within the 200 mile coastal economic zone limit. Addressing marine fishing rights requires engagement with state agencies and commercial fishing interests, the latter potentially from a variety of nations (as in the case of EU fishing in territorial waters off Africa). Deep water fisheries are classically open-access, but may be subject to international agreements (e.g., the Southern Ocean, under the Convention on the Conservation of Antarctic Marine

⁴ Even in national parks, such as Yasuni National Park in Ecuador, see <http://www.corpwatch.org/article.php?id=14982>.

Living Resources).

Gathering/Harvesting: Rights to cut wood (or gather fallen timber), or to cut and collect thatching grass, medicinal herbs or other plants may be held by people other than the nominal landowner. Such rights are common in rural areas of developing countries (e.g., Jacoby 2001). In some countries such rights may extend to all citizens (e.g., Sweden with rights to collect fungi or berries; or British rights to gather shellfish from the intertidal zone).

Development Rights: The rights of landholders to change land from rural to urban use may be restricted by the state in the common good (e.g., measures in the UK to control urban sprawl and building regulations that restrict building density or design). Alternately, the state may take land through eminent domain from a land owner, if that taking is declared in the public good, e.g., when land is obtained to construct a school or a new airport.

Access: Ostrom and Schlager (1992) define rights over resources in terms of progressively more inclusive rights. Access confers rights of entry to enjoy non-extractive benefits. Withdrawal rights allow users to obtain resources. Rights to enter and cross land often exist where systems of private property are well developed (e.g., in the UK).

IV. Building Conservation Governance outside Protected Areas

The challenge of bringing about management regimes outside parks that support conservation within them is a complex commons problem. It is inherently political. A number of different kinds of actors are likely to be involved (individual, corporate, public, private, communal). The range of actors relevant to the park and the spatial extent of the area require to conserve particular species or ecosystems may not be clear to all actors. The rights of those actors to land and other relevant resources can overlap. Those holding rights may not come from a single political or communal unit. Systems of communication among all relevant actors may not exist. Rights can be unclear or contested, so that *de facto* and *de jure* rights may diverge. The park management agency (or its advisers) may not have legal standing or political legitimacy or effective voice in the wider landscape and community.

Scale is a critical factor in determining the extent of the challenge of securing conservation outcomes around parks, and the scale will vary with the conservation target. Broadly speaking we might expect the number of actors, uses for land and natural resources and motivations underlying land

management regimes, to increase with distance. Thus, the further you move outside a park boundary, the greater the complexity of the 'common action' problem, and therefore the challenge, of achieving conservation-friendly management.

The diversity of issues that need to be addressed and hence the scientific challenge of understanding threats (e.g., limits to knowledge of social or ecological conditions; and the political challenge of communicating threats to other actors), is likely to increase with spatial scale, as are the number of factors that might complicate negotiations between interest groups (e.g., number of ethnicities and civil jurisdictions; the challenge of communication; limits of face-to-face democracy; trans-boundary problems).

V. Potential Strategies

Clearly the range of actors relevant to land and resource management around protected areas is large, and the systems of land and resource tenure in place are complex, requiring a range of strategies to engage constructively with these people and organizations. No simple systemic framework can be defined to structure this engagement, nor can a recipe book be defined that is applicable to all circumstances. Instead, some menu suggestions are outlined here⁵. Most will already be familiar from experience with 'community conservation' (e.g., McShane and Wells 2004; Brosius *et al.* 2005), although here they need to be applied to new actors in a geographically wider and institutionally more challenging terrain. Site-level actions will require mixing these different strategies as the circumstances and challenges vary – yet another challenge to conservation success.

Moral Argument

A range of well-tried techniques seek to promote conservation-friendly behavior among human communities. The simplest is conservation education: a generic attempt to win support for conservation, or a specific attempt to promote particular forms of behavior change. Such changes might include particular changes (for example to persuade local rural communities to stop hunting for the wider good), or wider changes (for example attempting to influence patterns of resource consumption such as car travel among regional visitors to popular protected areas). Such campaigns often focus on the general public or the immediate neighbors of a protected area (for example 'Roots and Shoots' type activities). To address the wider landscape there may need to be something in

⁵ For a more detailed typology of conservation actions see http://conservationmeasures.org/CMP/IUCN/Site_Page.cfm

between. Such work would include Landcare in Australia⁶ or the UK Farming and Wildlife Advisory Group.⁷ Such groups work on long-term relationships with rural landowners and occupiers: There is much to learn from this approach in the developing world, where conservationists routinely lump rural people together under umbrella terms such as 'the community', and seek standardized approaches and quick gains.

Political Engagement or Campaigning

Sometimes local action in individual landscapes needs to be extended to the wider policy context. Policy reform may be important to work with local actors to promote change in wider economic policies. An example of this would be work by conservationists in the UK since the 1980s with farming organizations to develop agri-environment provisions of the European Union common Agricultural Policy. As in many tropical contexts (e.g., beef raising, oil palm or *Jatropha*), the agricultural economy is the chief driver of rural landscape change, and agricultural policy is therefore critical to preventing harmful change and promoting benign change in landscapes around protected areas. Such policy change might extend to attempts to influence national legislation.

At these larger (often national) scales, political lobbying can be important: attempting to work with existing structures of power (e.g., state institutions, local powerful landowners or political interests) to achieve outcomes that support conservation-favorable land uses. This might include issues such as transparency in government licensing of forestry or minerals, or taxation policy.

Such political negotiations may be difficult if governance is inadequate. Therefore promotion of democratic decision-making may be a necessary step to effective wider landscape conservation. Deliberative democracy (opening debate among residents about the place or nature or land use,) may promote such outcomes (O'Riordan and Stoll-Kleeman 2002).

Market Mechanisms

The markets are leading drivers of land management, so intervention for conservation in the wider landscape around protected areas may be promoted by direct market interventions. These have become fashionable in conservation (Ferraro and Kiss, 2002; Balmford and Whitten, 2003), although experience is still being gathered on their long-term effectiveness. Approaches include direct

⁶ See: <http://www.landcareonline.com/>.

⁷ See <http://www.fwag.org.uk/>.

payments for biodiversity: payments to landholders or other relevant groups (e.g., hunters) to ensure the survival of specified areas of habitat (e.g., forests) or species; and more general payments for ecosystem services: schemes where beneficiaries pay landholders for services provided (e.g., downstream, water consumers pay upstream landowners who keep forests), or where polluters pay others to change behavior in ways that reduces overall environmental problems (e.g., REDD).

Related economic measures include easements: payments for selected rights on land that remains private land (e.g., to restrict owners' rights to develop). This approach has been widely used in the USA, with some conservation organizations buying land, taking out easements and selling on to sympathetic private landowners.

There is also extensive international experience with land use incentives: schemes that compensate landowners who maintain production systems that maintain environmental features, or to switch to more beneficial land use. The European Union Agri-Environment Programme has enabled a range of such initiatives, such as the UK's Countryside Stewardship scheme. This defines a complex set of management regimes designed to favour biodiversity (or traditional landscape), offering per-hectare payments to landowners who agree to abide by the rules.⁸ The effectiveness of such approaches in ecological terms, and the cost-effectiveness of the scheme compared to other strategies are widely debated.

Legislation and Law Enforcement

A range of forms of land management injurious to biodiversity can be addressed by legislation and law enforcement. Examples would include legislation to control polluting activities by landowners (e.g., the release of pig slurry) or industrial activities (e.g., effluence from an industry such as leather tanning). Such approaches are especially useful where threats are diffuse.

Legislation is also relevant where specific activities are seen to be damaging, for example hunting or fishing. Such legislation can be national (e.g., to control what species may be shot or what methods used to control predators), or local (e.g., local by-laws to control where and when fishing is done).

⁸ See <http://www.defra.gov.uk/erdp/schemes/css/default.htm>.

Legislation is also important where the 'wider landscape' relevant to conservation within protected areas includes open-access resources (notably the High Seas). Here the challenge may be to fill a legislative vacuum, attempting to promote the creation of political institutions to control destructive activities in open access regimes, for example, controlling fishing for krill or Patagonian toothfish in the Southern Ocean off Antarctica.

VI. Conclusions

Conservation of functional populations of species and functional ecosystems demands that we look beyond the boundaries of protected areas to address the management of much wider areas. If protected areas are isolated islands they will not maintain their conservation value. Most protected areas are too small to meet the needs of the species they were created to protect, and while better management of protected areas themselves is a priority it is just part of the challenge of management that faces conservation today.

Conservationists must acquire new skills, to work *outside* protected areas on land subject to complex and conflicting demands of human economic development, and owned and managed by people and organizations that may not recognize conservation as a priority – or even a valid goal. Focusing our efforts outside protected areas demands that we work with a wide range of partners in areas that may be currently impoverished in their diversity. We need to understand the disciplines of economics and law, and above all we need to understand human society and human decision-making. We need to develop a greater understanding of how ecological processes interact with economic activities, and how species and ecosystems are impacted by human behavior, at larger spatial and temporal scales. We need new skills if we are to create landscapes that can succor and support protected areas and if we are to ensure that our protected areas provide the natural and cultural values to sustain the human populations that depend upon them. But more than those skills we need passion and vision to engage in the challenge ahead.

VII. References

- Balmford, A. and T. Whitten. (2003) Who should pay for tropical conservation, and how could the costs be met? *Oryx* 37: 238–250.
- Bromley, D.W. (1989) *Economic Interests and Institutions: the conceptual foundations of public policy*, Blackwell, New York.

- Brosius, J.P., A.L. Tsing, and C. Zerner. (2005) *Communities and conservation: histories and politics of community-based natural resource management*, Altamira Press, Walnut Creek Ca.
- Bruner, A.G., R.E. Gullison, R.E. Rice, and A.B. da Fonesca. 2001. Effectiveness of parks in protecting tropical biodiversity. *Science* 291: 125-8.
- Carter, E., Adams, W.M. and Hutton, J. (2008) 'Private Protected Areas: Management regimes, tenure arrangements and protected area categorization in East Africa', *Oryx* 42: 177-186.
- Dietz, T., Ostrom, E. and Stern, P.C. (2003) 'The struggle to govern the commons', *Science* 302: 1907-1912.
- Ferraro, P.J. and Kiss, A. (2002) Direct Payments to Conserve Biodiversity. *Science* 298: 1718-1719.
- Hardin, G. (1968) 'The Tragedy of the Commons', *Science*, 162, 1243-1248.
- Jacoby, K. (2001) *Crimes Against Nature: squatters, poachers, thieves, and the hidden history of American conservation*, California University Press, Berkeley.
- Leader-Williams, N & Dublin, HT (2000). Charismatic megafauna as 'flagship species'. In *Priorities for the Conservation of Mammalian Diversity: Has the Panda had its Day?*, A Entwistle & N Dunstone, (eds.) pp. 53-81. Cambridge: Cambridge University Press.
- McShane, T. & Wells, M., eds. (2004) *Getting Biodiversity Projects to Work: Towards More Effective Conservation and Development*. New York, USA: Columbia University Press.
- William D. Newmark 1995. Extinction of Mammal Populations in Western North American National Parks. *Conservation Biology* 9 (3) , 512-526
- Pretty, J. 2002. People, livelihoods and collective action in biodiversity management. In *Biodiversity, Sustainability and Human Communities: protecting beyond the protected* (eds. T. O'Riordan and S. Stoll-Kleeman), pp. 61-86. Cambridge University Press, Cambridge.
- O'Riordan, T. and S. Stoll-Kleeman (2002) Deliberative democracy and participatory biodiversity. In *Biodiversity, Sustainability and Human Communities: protecting beyond the protected* (eds. T. O'Riordan and S. Stoll-Kleeman), pp. 87-112. Cambridge University Press, Cambridge.
- Ostrom, E. and Schlager, E. (1992) Property-Rights Regimes and Natural Resources: A Conceptual Analysis. *Land Economics* 68: 249-262.
- Ostrom, E., Burger, J., Field, C.B., Norgaard R.B., Poliocansky D. (1999) 'Revisiting the commons: local lessons, global challenges', *Science* 284: 278-282.
- Ostrom, E., Dietz, T. and Stern, P. 'The struggle to govern the commons', *Science* 302(5652) (December 12, 2003): 1907-1912.

- Pretty, J. 2002. People, livelihoods and collective action in biodiversity management. In *Biodiversity, Sustainability and Human Communities: protecting beyond the protected* (eds. T. O'Riordan and S. Stoll-Kleeman), pp. 61-86. Cambridge University Press, Cambridge.
- Sanderson, E. W., M. Jaiteh, M. A. Levy, K. H. Redford, A. V. Wannebo, and G. Woolmer. 2002. The human footprint and the last of the wild. *Bioscience* 52: 891-904.
- Smith, R., R. Muir, M. Walpole, A. Balmford and N. Leader-Williams. 2003. Governance and the loss of biodiversity. *Nature* 426: 67-70.
- Woodroffe, R., and J.R. Ginsberg. 1998. Edge effects and the extinction of populations inside protected areas. *Science* 280: 2126-2128.