
International Trends in Protected Areas Policy and Management

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1. Introduction

Traditional human societies have protected natural areas for various cultural purposes for millennia. Examples include the sacred forests of South Asia and parts of Africa, sacred burial grounds of some native American groups and traditional royal hunting reserves in many parts of Europe, Asia and Africa, which were generally only seasonally opened for hunting by royalty (Borgerhoff Mulder & Coppolillo, 2006). The modern concept of the national ownership and protection of natural areas for the benefit of society at large is a much more recent phenomenon; the United States became the first country to conserve nationally protected areas with the creation of Yellowstone National Park in 1872. This Category II (below) protected area is now close to 9,000 square kilometers in size and was inscribed as a World Heritage Natural Site in 1978.

The management of many of the earliest protected areas would be at odds with modern conservation practices. For example, for several decades after its creation, the US Calvary managed Yellowstone and mounted soldiers regularly hunted bison and elk for food - and wolves as vermin - within its borders. By the 1930s, wolves had been eradicated from the park, and remained absent until the mid-1990s when the US Park Service and US Fish and Wildlife Service jointly reintroduced the species from animals captured in Canada. Within several decades of the creation of Yellowstone National Park, Canada, New Zealand and Australia all had set aside protected areas and had begun developing national legislation to manage them, and the United States began establishing wildlife refuges as a separate category of protected area (Fischman, 2003).

Much has been written about the historical and cultural context of this (then) new phenomenon, and the similarities of its earliest adherents. All were British colonies, spoke English as their national language, and were being quickly populated by immigrating Europeans. All four countries also had *de facto* policies of subduing their native peoples to

the point of what many now consider cultural genocide. This had the effect of depopulating large natural areas, within even larger countries with low population densities to begin with, in a rather short time period during the late 19th and early 20th Centuries. Some historians also note that the European Diaspora naturally tended to look to Europe for its cultural inspiration. The countries of the Old World had great universities, museums, artworks, palaces and ruins dating back to ancient Greece and Rome, while the New World had scenery and natural areas unsurpassed by anything in densely populated Europe. This school of thought considers the movement to create national protected areas to be motivated, at least in part, by 'Europe envy' (Zaslowsky and Watkins, 1986). By the early 20th Century, all four of those countries and a few others (*e.g.* Sweden) had set aside multiple natural areas and had created professional management authorities to protect them. Canada was the first country to create a national park management agency (in 1911) followed by the USA (in 1916).

In any case, there is much evidence to suggest to that the earliest parks (and many still; see below) were not set aside with particular reference to conservation in any form, and thus the 'Europe Envy' thesis is generally accepted. Most of the earliest units contained spectacular scenery, but their borders did not relate to the habitat needs of native species, much less the dynamics of entire ecosystems (Norton, 2005). By the 1930s, the American park system received criticism from within with a report by Dixon and Wright, two Federal employees, that received widespread attention. The authors stated that most units were "mountain top parks" and preserved only scenery with no regard for wildlife. Seasonal movements of many species were such that large populations of birds and mammals were left outside park boundaries (and therefore subjected to hunting); the early American 'mountain top parks' were, therefore, ineffective for many conservation purposes (Dombeck & Williams, 2003).

Modern conservation biology has also greatly expanded our ideas of the geometric design and placement of protected areas across landscapes (Primack, 2006), but the problem of 'mountain top parks' still remains. For national governments, it is simply easier to set aside large protected areas in places such as high elevations, deserts, tundra, *etc.*, *i.e.* where there are few competing economic demands, than in areas of high biological productivity. The latter tend to be at low elevations, in temperate or subtropical zones, and receive adequate rainfall. In short, the most productive ecosystems are also those where humans tend to concentrate. Tropical rainforests, with their primary productivity largely found in the canopy and frequently harboring human diseases, are possible exceptions to this generality, but in that cases too, they are at risk worldwide (Wilson, 1999).

Canada and the United States also pioneered several other conservation movements during the Progressive era of the early 20th Century. They developed the world's first international treaties on the protection of migratory wildlife, with separate instruments for wild salmon, fur seals and migratory birds (Dorsey, 1998). The last, The Migratory Bird Treaty Act of 1918, is still in force. Canada and the United States also developed the world's first transboundary protected area in 1932, with the creation of Waterton-Glacier International Peace Park, a large area that conserves habitat on both sides of the international border in

the northern Rocky Mountains. With this came the recognition that many species and ecosystems cannot be conserved within the borders of single nations and these legal instruments were watershed events in the history of conservation worldwide (Susskind, 1994). From these humble beginnings, many other bilateral, regional and global conservation conventions have been developed for the protection of both migratory species and natural areas.

The largely Western ideal of protected areas as raw nature devoid of humans (except for tourism) was never really true to begin with; most areas set aside in the nations that began the movement had been occupied by pre-industrial people who were removed. This concept was also largely out of synch with realities on the ground in developing nations. During the post World War II period of decolonization, many seminal wildlife studies were conducted in various places in Africa and Asia and the world became much more aware of their unique heritage. The International Union for the Conservation of Nature and Natural Resources (now IUCN – The World Conservation Union; www.iucn.org) was begun in 1948 with a charter to develop world wide standards for conservation and the World Wildlife Fund (www.worldwildlife.org; now the Worldwide Fund for Nature) was established several years later, initially as a fund raising mechanism for IUCN. Having been developed in the West, with essentially all funding coming from West, meant that Western standards of nature conservation were becoming global (Swanson, 1997). IUCN's World Commission on Protected Areas (WCPA) was organized in the 1950s, and developed internationally-recognized categories of protected areas by the 1970s, which were modified in the 1990s (see below).

Post-colonial governments in developing nations began setting aside protected areas by the 1960s, but the 'fences and fines' approach of the West had its limits in this context. Some, such as Kenya, Tanzania and India, already had the semblance of a protected area system as a result of colonial British rule, but these were areas largely set aside for use by British government officials and indigenous elites for hunting reserves, and effectively prohibited rural residents, who were dependent on natural resources, from entry (e.g. Gillingham & Lee, 2003; Bruyere *et al.* 2009). In 1962 and 1972, IUCN held its First and Second World Conferences on Protected Areas, respectively. Both were characterized by over-representation of delegates from developed countries and there was little focus on the issues relevant for newly emerged developing countries. This began to change with the Third World Conference on Protected Areas, held in 1982, in Bali, Indonesia. The Conference was renamed "National Parks, Conservation and People" and the theme was the role of protected areas in economic development; a majority of participants came from developing countries. The Fourth and Fifth World Conferences were held in Venezuela (1992) and South Africa (2002) respectively, and the global agenda for protected areas in each decade expanded from the one preceding it.

The relative success of national parks in the United States, Canada, Australia and New Zealand was due at least in part to the fact that population densities were low in those countries to begin with and that indigenous peoples had been largely removed from many

ancestral areas as part of national policy as those countries were developing. Such was not the case in the developing world, and there is now near universal agreement that the Western national park model is generally inappropriate for the situation in most developing countries with their large rural populations dependent (at least in part) on extractive activities in natural areas (*e.g.* Campbell & Vainio-Mattila, 2003; De Boer & Baquete, 1998; Groom & Harris, 2008; McShane and Wells, 2004)). The WCPA recognized this with the liberalization of rules regarding national parks and more strictly protected areas, and with the modification of protected area categories recognized worldwide in 1994 (below).

2. IUCN – WCPA categories of protected areas

IUCN defines a protected area as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means." According to the World Database on Protected Areas compiled by the WCPA, there were over 7,000 separate units covering over 17,000,000 square kilometers as of 2007. This includes about 3.3% of Earth's total surface area and nearly 10 % of Earth's land surface, but less than 0.5% of its sea surface, although there has been recent growth in the designation of near-shore marine protected areas as well. The WCPA's mission is to "promote the establishment and effective management of a world-wide representative network of terrestrial and marine protected areas as an integral contribution to IUCN's mission." A general goal is to bring 10% of the Earth's land surface, including 10% of all recognized ecosystem types, under one or another internationally recognized category of protected area. The growth of such areas has been very rapid during the past several decades, but, based on the aforementioned criteria, some ecosystem types are over-represented, while most, and especially the more productive ones, are under-represented (Chape *et al.* 2008).

The WCPA uses a system in place since 1994 to define these areas (Table 1). Here I describe the major management categories, but please note that many nations have additional protected natural areas that do not fit within the IUCN criteria and are thus not included on the United Nations List of Protected Areas. Based on IUCN criteria, national protected areas are those managed by the "highest competent authority" which, in most cases, is the national government. Yet many countries have State, County, Provincial or Urban parks, recreation areas, *etc.*, in addition to those designated at the national level. In some cases, depending on the management plan, size and remoteness of such areas, they are included on the World List, but in many other cases they are not.

Similarly, many countries have private reserves (*e.g.* Nature Conservancy reserves, land trusts, *etc.* in the United States and elsewhere) or reserves managed by other entities (*e.g.* university-owned research reserves), that are generally not included based on IUCN criteria. In many cases, national forests or rangelands, which can be important for habitat for many native species, are also not included because their permitted uses exceed that considered appropriate by IUCN. With these caveats in mind, it is generally true that there is much more natural area set aside (about 17% of the Earth's land area; Chape *et al.* 2008), albeit in

small reserves and/or under greater degrees of human uses, than is recognized internationally based on IUCN criteria. IUCN categories, based on a numbering system from most to least strictly protected, are as follows (from www.iucn.org/about/union/commissions/wcpa):

Ia. Strict Nature/Scientific Reserve. The main purposes of Category Ia reserves are scientific research and species conservation, and other human uses are generally banned. Because of this, few nations recognize Category Ia reserves within national law, but quite a few have *de facto* Strict Nature reserves. These may include, for example, very remote regions of much larger protected areas in which inaccessibility precludes tourism or other uses.

1b. Wilderness Areas. Wilderness areas are generally large and remote. Tourism is permitted, but since permanent human dwellings and motorable roads generally are not, tourist numbers are few and generally involve backpacking style camping. They provide for the protection of wilderness and maintenance of ecosystem services. This category was added in the WCPA category revisions of 1994.

Management Objectives

<u>Category and Name</u>	<u>SR</u>	<u>WP</u>	<u>SD</u>	<u>ES</u>	<u>NF</u>	<u>TR</u>	<u>ED</u>	<u>SU</u>
1a: Strict Nature Reserve	***	**	***	**	-	-	-	-
1b: Wilderness Area	*	***	**	***	-	**	-	-
II: National Park	**	**	***	***	**	***	**	*
III: National Natural Monument	**	*	***	-	***	***	**	-
IV: Habitat or Species Management Area	*	*	***	***	*	*	**	**
V.: Protected Landscape Or Seascape	**	-	**	**	***	***	**	**
VI: Managed Resource or Extractive Reserve	*	**	***	***	*	*	*	***

Table 1. IUCN -The World Conservation Union Protected Area Management Categories (adapted from IUCN 2003)

Key to Management Objectives: SR, scientific research; WP, wilderness protection; SD, species or genetic diversity conservation; ES, environmental services; NF, natural or cultural features; TR, tourism and recreation; ED, education; SU, sustainable use; and CA, cultural attributes.

Key to importance of objectives by category: *** designates a primary objective; **, a secondary objective; *, potentially not applicable; and -, not applicable.

Category II. National Parks. This has been the most used protected area category worldwide. National parks are generally large areas that protect more than one important natural feature and/or wildlife population, and in which tourism is generally permitted and

promoted. Other important functions include providing environmental services and opportunities for environmental education as well as scientific research. National parks tend to be the best known and most important protected areas economically, and many of the best examples worldwide are also recognized internationally as World Heritage Sites.

Category III. National (Natural) Monuments. This category has, in general, the same aims as Category II, but national monuments are generally smaller than national parks and are set aside to protect one or several important natural features. In some cases, these can be combined with cultural features in a natural setting (*e.g.* Mt. Rushmore in the United States). Because of their generally smaller size, they are usually not important for broader conservation purposes such as ecosystem services, but many contain important wildlife populations.

Category IV. Managed Habitat/Wildlife Reserves. By sheer numbers, this is the second most important protected area category worldwide. In general, these reserves are established to protect one or more important wildlife populations and, for the larger units, they can also be important for providing ecosystem services. Tourism is frequently permitted within them, but not promoted as in the case of II and III, above. In addition, material alteration can take place within Category IV protected areas to enhance habitat for the species of conservation concern. For example, maintaining pastures for ungulate grazing, creating empoundments for waterfowl habitat, *etc.*, may all be permitted within them. These activities are generally not permitted in the previous categories. Sustainable use is frequently a secondary goal of Category IV reserves, and some (limited) hunting of common game species may be permitted within some, or in adjacent areas.

Category V. Protected Landscapes/Seascapes. Category V reserves are perhaps the most interesting for their breadth of permitted activities and management options. These are generally large areas set aside for a combination of their natural and cultural features, and they generally promote tourism. In many places, human habitations are found within them, including small towns with examples of rural working landscapes. As such they are generally designated across landscapes that contain an admixture of public, semi-public and private lands, and may be quite altered from their natural state.

Category VI: Managed Resource/Extractive Reserves. Category VI, like Ia, was added to the list of protected area categories with the 1994 revisions. These are generally large reserves that provide for ecosystem services, but their main purpose is the conservation and sustainable use of important species and their gene pools. Active removal of forest products is permitted and in fact encouraged, and, as such, they tend to be important economically for local communities. The general rule for a protected area to qualify under this category is that no more than one third the area can be subject to intense harvest. Many countries (the United States included) have large areas set aside in which more extensive harvesting is permitted. Such areas may be managed in a semi-natural state for national purposes, but do not qualify as Category VI internationally (*e.g.* National Forests in many countries).

3. Some caveats of protected area categories

In the modern era (post 1990), greater areas under Category V and VI reserves, both terrestrial and marine, have been created worldwide than other reserve types. This is especially true in developing countries, but is also true in some of the large marine protected areas created in the United States (*e.g.* the Florida Keys National Marine Sanctuary). Given their more lenient management regimes, this is also not surprising due to the dependence in many places that rural residents have on natural resource extraction and use. However, there has been a great deal of concern expressed, especially by natural scientists, about this phenomenon. Since large predators, especially, are generally not tolerated by humans (and vice versa), and yet are keystone species in many ecosystems, Category V and VI reserves are especially problematic from a purely ecological standpoint (*e.g.* Heinen and Mehta, 1999). Yet these reserves can be the most important from a purely economic standpoint (*e.g.* Sherman and Dixon 1990) and from the standpoint of human cultural values.

While debates were ongoing in the western academic literature largely between natural and social sciences on the competing values of different types of protected areas and their uses, with ecologists generally favoring more strict protection and social scientists favoring less strict protection (*e.g.* Redford and Sanderson, 2000), many nations, as well as less philosophically-driven researchers and development workers, were slowly arriving at a different consensus. That is, both sides have valid arguments and large reserves, and the regions in which they are found, can have elements meeting these competing demands via zoning criteria. For example, India and Nepal added less strict regulations to some of their national parks (including some limited extractive uses), while keeping more strict regulations in others, and both also actively supported buffer zone policies in the vicinity of more strictly protected areas beginning in the 1990s (*e.g.* Heinen and Shrestha, 2006). In those cases, many Category II and IV protected areas are surrounded by buffer zones that are managed more like Category V or VI protected areas, whether or not they are recognized as such internationally.

To promote the broad goals of sustainable development as articulated in the 1987 Brundtland Report (Brundtland, 1987), Agenda 21 (Sitarz, 1993) and the 1992 Convention on Biological Diversity (Glowka *et al.*, 1994), rather intensive local development inputs are needed in such areas to reduce demands on the core protected area (*i.e.* the Category IV or lower reserve). This may include rural enterprise development such as farm fisheries, agro- and community forestry and training of local people for tourism related jobs. There is now a large and growing literature on the development and success of community-based conservation (CBC) programs and integrated conservation and development programs (ICDPs) that is generally outside the scope here. Suffice it is to say that, for our purposes, from both socio-economic and ecological standpoints, there is growing evidence that this mixed approach has many advantages and pitfalls (*e.g.* Fiallo & Jacobson, 1995; Lepp & Holland, 2006; Lepp, 2007).

Some ecological factors that may lead to success (or not) include the types of species protected in core areas (*e.g.* large mammals frequently cause much loss to local farmers, including lost human lives on occasion) and the types of natural plant products and other resources (*e.g.* fish), their growth and sustainable harvest rates and local market values, that may be harvested legally from designated extractive zones. Socio-economic and other factors are many and varied. For example, human population density alone, and especially the ethnic heterogeneity and recency of immigration to an area, can determine the degree of difficulty of developing and sustaining CBD programs (Heinen, 1996). Recent research has shown that the creation of protected areas and development inputs into their surroundings can act as attractants for new immigrants, further complicating the issue (Wittemyer *et al.* 2008). In addition, increased wealth (due to tourism and other employment opportunities) of residents around protected areas can also create difficult managerial consequences in their vicinity via increasing demand for many forest products (*e.g.* Fu *et al.*, 2004). But, in general, CBD programs in areas that are more stable demographically and/or especially areas in which they have been in place for longer time periods (and thus institutional trust and social capital has been built), have been shown to be effective over time in many case studies (Baral *et al.* 2007). But this can take many years to a few decades.

The protected area categories used by IUCN's WCPA are broad enough to cover quite a bit of the world's protected natural heritage adequately, but individual countries deviate from international standards frequently. As previously mentioned, they are not inclusive enough to capture many of the world's smaller protected areas (*e.g.* state, provincial and country parks) or important private reserves. Such reserves can be very important for the conservation of local plant and insect species, as stopover areas for birds during migration, as important nesting areas for species such as sea turtles, and for the ever-increasingly important purposes of introducing urban and suburban populations to environmental and science education, which are all very important objectives. For example, the Counties and the State of Florida maintain a system of such reserves in the urban and suburban matrix of Miami-Dade, Broward and Palm Beach in Southeast Florida that are heavily visited by residents and tourists (Alonzo & Heinen, 2011); their combined attendance annually is thought to be greater than for nearby Everglades National Park. As such, small reserves can be disproportionately more important for several simultaneous conservation goals than some internationally recognized large reserves.

Individual countries may also vary quite a bit in terms of management practices and hence in terms of how the WCPA categorizes their protected areas. For example, 'National Parks' under both British and Japanese standards are frequently too materially altered to be considered Category II protected areas by WCPA. Because they may include many important cultural components and have private in-holdings, and, in some cases, entire towns, they are generally classified as Category V by IUCN. Many of the large extractive reserves in the USA (and elsewhere) simply allow too much extraction to be classified as Category VI reserves (*e.g.* US National Forests managed by the Forest Service and Grazing Areas managed by the Bureau of Land Management). Other units within the same system, under less intensive management, do qualify, and thus IUCN's WCPA must consider each

unit on a case by case basis by reviewing individual management plans in deriving the United Nations List of Protected Areas to determine if each qualifies. World wide, the effort required is huge and the list is always in need of updating. In spite of these caveats, the system has proven useful for over 15 years; it is also adaptable and widely recognized, so there is little reason to change it at the present time.

Another issue that is frequently debated and studied is that of 'paper parks.' These can be defined as units that are protected at the national level via appropriate laws, and in some cases, recognized under international conventions as very important protected areas, but in which there is either inadequate or no active enforcement on the ground. This term is now applied to many parks and reserves in developing countries where inadequate budgets and manpower for conservation are the norm. The World Heritage Convention (below) has focused on this issue and has developed the "List of World Heritage in Danger" (whc.unesco.org/en/danger). Inscription of this list should cause national shame, for these are some of the most spectacular parks on Earth, but in fact, the vast majority of protected areas are not World Heritage Sites, and there are many 'paper parks' in which poaching, logging, or other extraction go on regularly in spite of laws. WCPA has no means currently to assess these issues on a case by case basis worldwide, so many listed sites (especially Category II) either should be placed in another less strict category or removed from the List.

4. International regimes concerning protected areas

There are currently dozens of international instruments related to the conservation of species, natural areas, or both. The vast majority are bilateral or regional; some are quite well studied while others are more obscure (Klemm & Shine, 1993). Regional treaties in this area exist in Europe, the Commonwealth of Independent States (*i.e.* most of the former Soviet Republics), Southeast Asia, sub-Saharan Africa and Central America. Here I briefly discuss the major international regimes that are subject to ratification or acceptance by all United Nations members, but interested readers are referred to Klemm and Shine (1993) for more information on some of the regional agreements.

4.1. The man and biosphere program

In the late 1960s, the Man and Biosphere Program (MAB) was conceived under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO) based in Paris (Batisse, 1982, 1986). By 1971, MAB was implemented with the broad goals studying human relationships with the biosphere, especially for studying long-term human induced impacts and conservation for sustainable development. A major objective of MAB since its beginning was to develop a worldwide network of international biosphere reserves and, and there are currently (2009) 553 MAB-designated Biosphere Reserves in 107 countries (www.portal.unesco.org).

Based on MAB criteria, biosphere reserves are established in representative ecosystems for research purposes, with several secondary goals. These include: preserving traditional forms

of land use, disseminating knowledge to manage resources, and promoting cooperation in solving resource related problems. The biosphere reserve model is one in which more strictly protected core reserves are surrounded by nested buffers permitting more human uses with distances from the core. Given the time period, the goals of the program and the concept of reserves with functional buffers, were quite progressive and a number of countries have since followed suit with the zoning implicit in the MAB reserve design (above). Education and training are also promoted under MAB, as is ecosystem level management. A number of countries in Latin America and the former Soviet Union now use 'biosphere reserve' as a category of nationally-protected areas; many of these sites are listed on UNESCO's international list, while others are not.

The type and scale of reserves listed under MAB vary quite a bit based on national norms and conventions, and national MAB programs are given a great deal of leeway in nominating sites (Heinen & Vande Kopple, 2003). Any nomination is subject to acceptance by the international MAB program. MAB is also quite fluid in maintaining ties with international organizations (*e.g.* the World Wide Fund for Nature, WWF; the World Wildlife Fund in the USA), and United Nations agencies such as the United Nations Environmental and Development Programs, respectively, and with Secretariats of international conventions such as Ramsar and CBD (below). Through international as well as regional programs, MAB fosters exchanges among reserves and facilitates interactions through networks such as AfriMAB and EuroMAB.

Sites listed under MAB range from large and nationally protected areas (*e.g.* Everglades National Park) to much smaller reserves maintained by sub-national entities (*e.g.* The University of Michigan Biological Station). While some may perceive this as a weakness in that such disparity in size and purpose leads to little uniformity in management of these reserves, this can also be considered a strength of MAB. That is, individual national programs can promote the overarching goal with a number of different reserve types, and can take part in various levels of international cooperation, as long as the reserve meets the general criteria of research, education and outreach and includes some semblance of the zoning criteria in which core areas are well protected. As such the program is quite flexible and unique. The fact that it is not legally binding can also be considered both a strength and a weakness as it, again, promotes more flexibility but less uniformity. In any case, the MAB program has existed for four decades and in many ways set additional standards for protected areas management internationally. As such, it is quite important for the movement worldwide.

4.2. The Ramsar convention

The Convention on Wetlands of International Importance, Especially for Waterfowl Habitat was conceived in Ramsar, Iran in 1971, and is generally known as the Ramsar Convention (Hails, 1996). Ramsar was the first truly international convention promoting the protection of natural areas and, in many ways, it remains the most important. Like MAB, it was also very progressive for its time (below). To date (2009) there are 159 contracting parties and

1,847 sites included on the List of Wetlands of International Importance, which collectively cover about 1.8 million square kilometers of area (www.ramsar.org). The purpose of Ramsar as articulated in the Preamble is to recognize the interdependence of humans and the environment and to consider the ecological and economic functions of wetlands as fundamentally important. Parties are instructed to develop national wetlands policy with the aim of decreasing wetland loss, and to recognize that waterfowl, by virtue of their annual migrations, are an important international resource. All Parties must nominate at least one Wetland of International Importance from within their borders.

Ramsar defines wetlands very broadly, to include fens, bogs, marshes and swamps as well as near-shore marine areas in which low tide does not exceed 6m in depth. In this way, the Convention was progressive in that near-shore marine areas can be included. At the time of its formulation, very few nations had created marine reserves, but this movement has increased greatly in the decades since, and many coastal areas are now listed as Ramsar sites. Similarly, Ramsar provides a very broad definition of waterfowl to include any species of migratory bird that uses wetlands for any part of its life cycle. As such, waterfowl in the traditional sense are included (*i.e.* ducks, geese and swans), as well as all species of waders and fishing birds, and a number of passerine species that breed in wetland areas.

Various Articles of Ramsar further articulate the responsibilities of Parties to conserve wetland areas. Article 4, for example, encourages Parties to create wetland reserves whether or not they are listed sites, and to train personnel for research and management of wetlands, while Article 5 instructs Parties to consult about implementing the Convention, an important provision for sites that may cross international borders. Ramsar was also historically important in promoting the concept wise use of wetland resources for sustainable development. This also made it very progressive for its time in the sense that the Bruntland Report was released 15 years after Ramsar, and the Convention on Biological Diversity followed Ramsar by 2 decades. It also preceded the changing concepts of the WCPA about protected area management categories and the promotion of sustainable human uses within more categories than had been the case previously (*above*). Ramsar also maintains a Trust Fund for which Parties that are developing nations can apply for funding for special projects to maintain sites, offer trainings, *etc.*

In another sense, however, Ramsar can be criticized for having relatively little control over Parties as to how they manage wetlands overall. The idea of no net loss of wetlands, inherent to Ramsar, has frequently not been met, even in the United States, and wetland drainage continues in many Party States. Listed Ramsar sites themselves vary quite a bit in terms of their importance. For example, Canada and the United States have relatively few listed sites, but all are large and of obvious importance for the broad goals of the Convention (*e.g.* Everglades National Park). While many of the smaller and much more densely populated European countries list large numbers of small sites, some of which are of dubious importance. Even with these caveats in mind, Ramsar is very important for international conservation for promoting wetland protection and for many broader issues related to protected areas management. It could also be used as a template to form other

Conventions focused on single broad ecosystem types (*e.g.* tropical forests or tropical grasslands), although none currently exist.

4.3. The world heritage convention

The International Convention for the Protection of World Cultural and Natural Heritage (The World Heritage Convention or WHC) as adopted by UNESCO in Paris in 1972. As of 2009, WHC had 186 Parties; of these, 148 have sites listed on the World Heritage List. Of the 890 sites listed worldwide, the majority are Cultural heritage sites (689) and will not be considered here (whc.unesco.org). Of the remaining, 176 are Natural heritage sites (mostly national parks) while 25 are mixed sites containing both cultural and natural heritage. WHC came into force in 1975 with the purposes of conserving both natural and cultural areas of outstanding universal importance. As such, Parties recognize that many sites are of importance to world's heritage and not just to the heritage of the countries that may contain them. In addition, to maintaining the World Heritage List, WHC's Secretariat also maintains the World Heritage Trust, under which developing countries can apply for project funds to help maintain sites. Lastly, the Secretariat also maintains a list of World Heritage Sites in Danger for previously listed sites that are under improper management or for some other reason at risk. Sadly, the site nearest my own desk, Everglades National Park, is currently on this list due to the lack of progress of the Comprehensive Everglades Restoration Project under the Bush Administration. Compliance is a major issue, and focus of study, regarding many such legal instruments (*e.g.* Faure & Lefevre, 1999).

Many of the Articles of WHC pertain solely or mainly to cultural sites but there are several important provisions that relate to natural sites. Article 2, for example, states that natural heritage consists of "physical and biological formations or groups of such formations, which are of outstanding universal value." The definition is further clarified to include areas that constitute important habitat for endangered species of universal value, outstanding geological formations, or other natural features of outstanding beauty. Parties to the Convention are responsible for proposing sites within their borders for listing, and providing strong evidence based on a set protocol for each place that allegedly constitutes a site of outstanding universal value. Most natural sites on the list were already world famous before they were listed (*e.g.* The Grand Canyon, The Serengeti, Mount Everest, The Great Barrier Reef, The Galapagos Islands), and in fact, most were already protected under national law as National Parks or other types of internally-recognized protected areas. None-the-less, there is national prestige to having sites listed as World Heritage, and the added (although rather meager) incentive for developing nations to garner some funds through the Trust. National governments and private tour operators alike frequently use listing in advertising as an incentive to attract more tourism, and World Heritage Natural Sites are among the most-visited protected areas on earth. In Nepal, for example, of 16 nationally protected areas, the two World Heritage Sites alone (Everest and Chitwan National Parks) typically account for over one third of tourist entries in protected areas in the country (Heinen and Kattel, 1992).

4.4. The convention on the conservation of migratory species of wild animals

The Convention on the Conservation of Migratory Species of Wild Animals, also known as CMS or the Bonn Convention, came into force in 1979; as of 2009, there were 112 Parties (www.cms.int). Throughout its history, CMS has attracted fewer Parties than the other Conventions described here, in part because many nations of the Western Hemisphere were already party to an older regional convention protecting migratory wildlife (the Western Convention of 1940). As such, most Parties to CMS are in the Eastern Hemisphere, but more recently, a number of Latin American countries have ratified it. As the name implies, CMS focuses on migratory wildlife and not with protected areas *per se*. It is thus much more of a species-based than area-based conservation convention, but within its 20 Articles there are some clauses that are germane for the topic at hand.

CMS's Article 1 considers conservation status to be favorable if (among other things) the distribution and abundance of migratory species approach historic coverage, suitable ecosystems for conservation exist, and that there is sufficient protected habitat to maintain migratory species. The Article further describes unfavorable conservation status as being those in which these (above) conditions are not met. CMS's fundamental principles (Article 2) similarly contains an important clause outlining the importance of conserving habitat: The Parties acknowledge the importance of migratory species . . . "taking individually or in cooperation appropriate and necessary steps to conserve such species and their habitats."

Through its long history, and in conjunction with other Conventions (especially Ramsar) CMS has been indirectly important in expanding protected area networks, and especially in Europe and Africa due to the large avian migrations between those two continents. A number of small reserves were created along flyways that offer staging and stepping-stone habitats, and many of these also contain significant wetland resources. None-the-less, with its focus on migratory species, its relatively few signatory nations, and its appendices of species under varying degrees of threat, it is not nearly as important for protected areas as the other instruments described here, but is important for species protection. Under its auspices, various important regional agreements have been established and form some rather interesting case studies in species (and area) conservation. Among these are: the Agreements for the Conservation of Cetaceans in the Black and Mediterranean Seas and Contiguous Atlantic Area; the Africa-Asia Migratory Waterbird Agreement, several agreements on sea turtles in the Pacific and Indian Oceans, and the Agreement on Gorillas and their Habitats. Some habitat protection clauses are found within all of these.

4.5. The United Nations Convention on Biological Diversity

The United Nations Convention on Biological Diversity (CBD), formulated prior to and during the 1992 United Nations Conference on Environment and Development in Rio de Janeiro, is far and away the broadest of the international conservation agreements. It came into force on 29 December 1993 and has three main objectives: to conserve biological diversity, to use biological diversity sustainably and to share the benefits of biological

diversity equitably (www.cbd.in). The CBD currently (2009) has 156 Parties. Many provisions of the Convention do not deal with protected areas *per se*, so I only highlight important aspects of CBD and focus on those few aspects that do relate to this topic.

Of its 42 Articles and 3 Annexes, Article 8 (*In Situ* Conservation) is the main one dealing with protected areas. Therein, contracting Parties are encouraged, as far as possible and as appropriate, to, establish systems of protected natural areas and to develop guidelines for their selection and management.

Article 8 of CBD further requests Parties to manage important biological diversity appropriately whether it is located within the protected area network or not, and to promote general ecosystem protection. Parties are also requested to promote environmentally sound sustainable development in the vicinity of protected areas, to promote restoration of degraded ecosystems, and to control exotic species that pose a risk to conservation. Parties are further encouraged to use innovative practices in management and to involve local and indigenous communities in protected areas management. The final clauses of Article 8 instruct Parties to develop appropriate regulatory legislation to conserve endangered species, cooperate in financial support for *ex situ* conservation, and regulate processes that may adversely affect biological diversity in accordance with Article 7, which addresses the identification and monitoring components of biological diversity. Annex 1 (referenced in Article 7) defines components to be monitored to include ecosystems and habitats with high diversity, large numbers of endemic or threatened species, wilderness, and/or important habitat for migratory species. It further instructs Parties to identify and monitor communities and species that are threatened, contain wild relatives of important domesticates or other value, or are important for research, conservation and sustainable use.

Much of the rest of CBD deals with issues of domestic biodiversity, genetic complexes, appropriate uses of biological diversity and trade, *ex situ* conservation, equitability and sustainability management of biodiversity, and not with protected areas *per se* (Glowka *et al.*, 1994). None-the-less, CBD is far and away the broadest in scope of any conservation treaty and recognizes explicitly that protected natural areas are essential for biodiversity conservation at all levels of integration (*i.e.* from genes to ecosystems) and such protected area systems are important to effectuating the CBD objectives. It is also useful to note that CBD articulates quite well the more modern view of protected areas as places in which human are an integral part, as opposed to the older view of raw nature and 'fences and fines' management characteristic of the first American model. Shortly after CBD came into force, WCPA modernized its protected area categories (above). Another aspect of CBD that has proven important since its passage is that many Parties have undertaken the task of creating national conservation strategies and action plans, which is promoted by Article 7 and Annex 1. Such plans have allowed for a fuller inventory of important biological diversity, and have generally contained parts that deal with the existing protected areas network of each Party, with recommendations for expansion and for better management of existing units.

5. General discussion and overview

From its humble American beginnings in 1872, the international movement to conserve protected areas at the national level has mushroomed in the modern era. Most nations now maintain systems of protected areas, and the majority are now Parties to all of the international conservation conventions discussed above. The intellectual breadth of protected area management categories recognized worldwide, and of the types of both traditional and non-traditional uses permitted within them, has also expanded greatly, as has the use of zoning large areas to permit more or less uses in specific tracts depending both on the need for biological conservation and human enterprises. None-the-less, the stamp of the earlier history of a Western and largely American model still pervades many protected area systems. For example, of the categories recognized worldwide, four were derived largely from American law. These include Category Ib (Wilderness), II (National Parks); III (Natural Monuments) and to a lesser degree, Category IV (Wildlife Reserves, refuges, managed habitat areas, *etc.*). Categories V (Managed Landscapes and Seascapes) also had some precedent in the national protected area system of the United States, with its National Seashores, National Recreation Areas, *etc.* The nation that began the movement is thus still the most dominant player, at least in terms of general categories and many accepted management practices.

However, the internationalization of the protected areas movement created many opportunities and altered many previously accepted practices, which proved important for the continuous expansion of protected area systems. Allowing private in-holdings and some limited extractive uses from National Parks, for example, did not become recognized until the 1980s, and was only recognized by WCPA as a result of several national experiments to remove local people completely from Category II reserves. One such case happened in Nepal, where two local villages were removed from high-altitude Rara National Park, and their residents relocated into the western Terai (lowlands) of the country. Within a generation, over half of the original population had either left or died from malaria or other lowland diseases, and Nepal's Department of National Parks and Wildlife Conservation ended any plans to remove larger (but still rather small) local populations from other Himalayan national parks such as Langtang and Everest (Heinen & Kattel, 1992). The international movement, and the international organization in the form of IUCN's WCPA, was sensitive to these issues and adjusted Category II accordingly by allowing the zoning out of traditional villages (*i.e.* they are not recognized as part of the park, although they are surrounded by it). Similarly, the development of Category VI in 1994, and its subsequent worldwide expansion, was an important acknowledgement of the needs of many people in developing countries by recognizing that traditional local uses, and even some more modern commercial, uses of at least some protected areas should be permitted.

The literature on many facets of protected area management is similarly expanding greatly, and both space and topical content of this volume does not permit a closer look at some of the more scientific aspects. Suffice it is to say that the literature in conservation biology, a field only recognized since the 1980s, includes literally hundreds of well-done studies on issues such as placement of reserves, how to prioritize areas for protection based on scientific criteria, the appropriate size of reserves, the utility of maintaining natural corridors

to promote gene flow between reserves, the placement and uses of buffer zones, *etc.* (Primack, 2006). Modern conservation agencies thus have at their disposal a great arsenal to help them plan the most efficient uses of scarce resources in conserving biodiversity. But conservation biology, first defined by Michael Soule (one of its founders) as a “mission oriented, crisis discipline” also recognizes that time is running out for many wild species on earth, and for the places that harbor them.

We are in the midst of a mass extinction, recognized by science as the 6th such event in the history of life on Earth, and the only one to be caused by one species: ourselves (Wilson, 1999). Modern humans threaten to have a commensurate impact, albeit more slowly, of the great asteroid that landed in the Western Caribbean and wiped out the dinosaurs - and about half of all other life forms - some 65 million years ago. While much conservation literature, and the Convention on Biological Diversity, also discusses the importance of *ex situ* conservation in the form of seed banks, zoos, botanical gardens, *etc.* (and doubtlessly they are all important), science and much of society recognizes that *in situ* conservation of species - and complexes where they occur naturally - is a much more cost effective and efficient way to conserve biodiversity. It has the added advantage of keeping ecological phenomena (*e.g.* predation, competition, migratory behavior, pollination) intact (or at least partly so) and allows for the evolutionary game to continue. *Ex situ* conservation provides, at best, a short term buffer.

So the international movement to conserve protected areas will increase over time. As the planet becomes increasingly crowded, it will remain the major way to conserve biodiversity and, ultimately, ourselves. New ideas - and ideals - are constantly expanding the field with more recent foci on issues such as landscape-level conservation across wide regions, a recent major increase in the study of invasive species and their removal, and better ways to manage areas already protected. But like the situation with so much else, the legal and policy instruments, both within nations and across nations in the form of international treaties and programs, lag greatly behind the science (*e.g.* Jacobson and Weiss, 2000). To further this field, we will need much more land set aside, which may mean including even broader protected area categories recognized in the future, and we will need to pay much more attention and legal recognition to dynamic processes across landscapes. In short, we need to become much smarter and more adept at living with the functional natural world.

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