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## National Parks with Benefits: How Protecting the Planet's Biodiversity Also Provides Ecosystem Services

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### In Brief:

Ecosystem services are declining just when their value is being fully appreciated for the first time. The world's protected areas, currently covering over 12 percent of land surface in the form of national parks and nature reserves, provide the largest single source of secure ecosystem services alongside their more recognized roles of biodiversity conservation and recreation. The natural ecosystems in protected areas provide food security; regular, clean water supplies; disaster mitigation; carbon sequestration; and a wealth of cultural and spiritual services. Yet discussions about protected areas rarely focus on the ecosystem services they provide and from which they could benefit financially. Rather than look at protected areas as preserves cut off from our human activity except as tourist destinations, we need to recognize their broader role in our economies. Last year, signatory countries to the Convention on Biological Diversity agreed to increase total protected area coverage to 17 percent of land and freshwater and 10 percent of coastal waters. Well-designed, equitably managed protected areas could provide a powerful solution for maintaining ecosystem services, conserving biodiversity, and addressing the needs of human communities.

### Key Concepts:

- Our view of protected areas such as national parks and nature reserves needs to be transformed. Beyond habitat and wildlife preservation, and the tourism industry they sustain, protected areas should be recognized for the services they provide: mitigation of climate change and natural disasters, disease control, maintenance of water quality, and cultural services, including recreation, maintenance of historical or iconic landscapes, and protection of sacred natural sites.
- Numerous assessments show that protected areas are more effective than other land and water management strategies in ensuring that natural ecosystems remain intact and functioning.
- Economists are starting to look more seriously at the wider socioeconomic values of the ecosystem services maintained by protected areas. These are often a far cheaper investment than either the costs of restoring degraded ecosystem services or trying to engineer expensive alternatives.
- Protected areas also have an important social function and only work effectively in the long term if supported by a broad cross-section of society. The current planned expansion of the global protected area estate provides a unique opportunity to secure ecosystem services on the scale identified as necessary by the Millennium Ecosystem Assessment.

The world is currently facing a paradox: the true value of ecosystem services is finally being recognized by governments and intergovernmental bodies at the very time that these services are declining more rapidly than ever before. The total economic value of ecosystem services is estimated in terms of tens of trillions of dollars every year, far larger than global GDP,<sup>1</sup> yet the Millennium Ecosystem Assessment estimates that 60 percent of these services are being degraded or used unsustainably, with up to 70 percent of global ecosystems' regulating services (affecting floods, climate, water quality, etc.) and cultural services (including recreational, aesthetic, and spiritual benefits) currently in decline.<sup>2</sup> We recognize the value of ecosystems in theory, but squander them in practice.

Politicians, natural resource managers, conservationists as well as some business leaders acknowledge that halting and reversing the loss of ecosystem services is a critical step in combating climate change, promoting food security, mitigating natural disasters, and maintaining supplies of fresh water. Achieving these goals, however, will require a fundamental shift in our attitudes toward the valuation and management of natural ecosystems. Such a shift will not come easily; the idea that nature provides us with "free goods" is deeply rooted in many cultural, farming, and business practices. It is often perceived to be more profitable for an individual to convert a natural ecosystem than to leave it intact, even though the services it provides may be more valuable, in total, to a widely dispersed community. Politicians are searching for ways to maintain services from natural ecosystems without outraging their electorate. Legislation preventing ecosystem conversion is a critically important tool. Examples include logging bans on steep slopes, anti-hunting regulations for endangered species, laws controlling the proportion of forest land converted to agriculture, and fishing quotas. Such laws are never universally popular, but are often nonetheless essential elements in preventing a minority from squandering the ecosystem benefits used by the rest of the population.

In addition, societies use two other broad approaches to protect natural ecosystems. First is the spontaneous and voluntary recognition of the need to maintain ecosystem services by individuals and communities.<sup>3</sup> This is by far the earliest form of ecosystem protection, with examples stretching back to the beginning of recorded history. Archaeologists and historical ecologists show us that when societies ignore or underestimate the importance of maintaining ecosystem services they often collapse, like the people of Easter Island or some early cultures in what is now the southern United States.<sup>4</sup> Bottom-up, community-driven conservation is still flourishing, often unnoticed, today and the widespread interest in indigenous and community conserved areas is one such manifestation. Sacred natural sites, such as sacred groves, mountains, or even whole landscapes, continue to be protected in many parts of the world, sometimes successfully shifting and morphing from one religion to another as cultures change; many of these sites are also rich in biodiversity and natural values.<sup>5</sup>

Second, and perhaps most significant in the long term, governments and others with control over land and water can designate areas of natural or semi-natural ecosystems for long-term protection, through acquisition, purchase, or enforced changes in management policy. Who should pay for such services is currently the subject of much debate and is starkly illustrated by the Ecuadorian government's offer to stop drilling for oil in the Yasuni National Park in the Amazon if anyone is willing to pay the equivalent of the forgone oil revenues.<sup>6</sup> But the concept of establishing areas of the planet specifically for the conservation of nature is now almost universally accepted and is even extending to common property areas such as the high seas and Antarctica. Virtually all governments are protecting large habitats of natural ecosystems for biodiversity conservation. The world already has well over a tenth of its land surface and a growing area of coastal and marine areas set aside in a global network of protected areas that, in different ways, contribute to successful management of ecosystem services on a huge scale.

Yet these protected areas, which are being consciously managed and valued for their ecosystem services as well as their wildlife and recreational values, represent the exception rather than the rule. When we looked at links between drinking water supplies and protected areas, as described below,<sup>7</sup> we found that a few local governments in cities like Melbourne, New York, and Jakarta were well aware of the links. But, in many other cases, both protected-area managers and water companies lacked understanding of the benefits that ecosystem protections supply.

The situation is slowly changing. Governments and other beneficiaries have started to pay landowners and stewards to maintain ecosystem services.<sup>8</sup> In the payments for ecosystem services schemes, landowners in watersheds may be paid by downstream consumers, usually through water utilities that incorporate the costs of environmental protection into water tariffs. The Quito Water Fund in Ecuador is one example in which end users in the city of Quito help pay for the preservation of over 500,000 hectares of key watershed land. In some countries, governments also pay farmers to reduce grazing pressure on sensitive hill slopes. The development of various voluntary and mandatory carbon credit schemes has begun to transform this market approach into a critical factor in managing natural ecosystems and to substantially increase its impact.<sup>9</sup> Publication of reports from The Economics of Ecosystems and Biodiversity (TEEB) process has also significantly raised the profile of ecosystem services in the minds of politicians and companies.<sup>10</sup>

It was against this backdrop last year that the Convention on Biological Diversity (CBD) set a new target for at least 17 percent of the world's land surface and 10 percent of the oceans to be designated within protected areas by 2020.<sup>11</sup> While this is an excellent move for guaranteeing biodiversity, we argue that the chances of persuading governments to meet this target would be strengthened if greater emphasis is also placed on ecosystem benefits, both to incentivize governments and landowners to create the expanded protected areas and to provide an expanding test bed for large-scale management of ecosystem services on the scale that, according to TEEB, is necessary.

Indeed, many environmental scientists argue that the 17 percent figure is still too low,<sup>12</sup> particularly if the needs of carbon storage are taken into account. Yet to reach or exceed this figure will require that governments understand

the values that they are protecting and be able to match these with the value of benefits that have been lost as a result of setting aside land or waters for protection. Better understanding of the ecosystem values of the global protected areas system could provide win-win solutions for biodiversity conservation, wider natural resource management, and efforts to address climate change.

### The Global Protected Areas Network

It is easy to forget just what a radical change the creation of protected areas represents. A little more than a hundred years after the first “modern” protected areas were established—the national parks at Yellowstone in the United States, Royal National Park in Australia, and Lake St. Lucia in South Africa—an estimated 12.7 percent of the world's land surface and a rapidly increasing 7.2 percent of coastal regions are now under some form of protection in national parks, nature reserves, wilderness areas, and the like.<sup>13</sup> Over half of this area was designated in the last fifty years and the total continues to grow. Protected area establishment almost certainly represents the largest and fastest conscious change of land management in the history of the planet. European colonial expansion is the nearest equivalent, but this stretched over hundreds of years and, in practice, did not change day-to-day management in much of the colonized territory.

Furthermore, the official figures for the amount of land currently under protection, collected on the International Union for Conservation of Nature (IUCN) and United Nations Environment Programme (UNEP) World Conservation Monitoring Centre World Database on Protected Areas, housed in Cambridge, UK, do not include many unofficial community protection measures: the indigenous and community conserved areas that have been established by communities and form a kind of shadow protected-area system running alongside and sometimes overlapping official parks and reserves. Although many of these community conserved areas are small, they are also providing important ecosystem services, for example, by protecting critical water sources.

The explosive growth of government-designated protected areas has not been without its critics, especially when local peoples have been displaced from their traditional lands in the name of conservation.<sup>14,15</sup> This is a genuine grievance in some cases and has done much to undermine support for conservation in a number of countries, although it should, at least in theory, no longer be possible under agreements reached in the Convention on Biological Diversity.<sup>12</sup> Some in the industrial and agricultural sector also argue that tying up large areas of natural mineral resources and potential agricultural land is a price too high to pay for “wildlife preservation.”<sup>16</sup> Criticism of protected areas, however, is usually more about the ways in which protection is implemented than about the premise that we need to protect natural ecosystems and keep some areas of the planet free from development pressures.

Discussing protected areas as if they took a single, unified management approach also rather misses the point. Protected areas give the impression of permanence while actually undergoing quite dramatic shifts in purpose, management strategies, priorities, and objectives over time. The creators of the earliest national parks were not aiming to protect wildlife at all (and still less biodiversity), but instead sought to maintain iconic landscapes and places for recreation. For instance, the Grand Canyon and Victoria Falls were protected primarily for their spectacular natural phenomena and landforms. Interest in endangered wildlife only really grew after the Second World War and focused initially on preserving the largest and most charismatic species, until wider understanding of biodiversity shifted the emphasis of protection again in the 1980s toward all species and ecosystems. Similarly, management approaches vary dramatically with time and place, from total exclusion of humans to the kind of lived-in, protected cultural landscapes that characterize European national parks. IUCN recognizes six categories of protected areas, based on management objectives, which encompass a surprisingly wide variety of approaches, and four governance types covering state, private (for-profit and not-for-profit), and indigenous and community management, along with various forms of shared governance.<sup>17</sup>

Protected areas have been successful at maintaining biodiversity, but only up to a point. In conditions of poor governance and weak law enforcement, protected areas are losing habitat. Agricultural encroachment, poaching, and the bushmeat trade continue to take a toll on species, leaving behind habitats like the so-called cemetery forests where the trees remain but the wildlife has gone.<sup>18</sup> Nevertheless, many species only continue to survive today because they are in protected areas, such as the Asian rhino populations preserved in Kaziranga National Park, India. Moreover research shows that protected areas are the most effective—in some situations the only—way of maintaining natural ecosystems in the face of development pressures, rapid agricultural expansion, and a rush to exploit mineral resources.<sup>19,20,21</sup>

Many conservation analysts see a shift toward greater emphasis on ecosystem services as the next logical stage in the gradual evolution of the protected area philosophy.<sup>22</sup> Bringing ecosystem services more consciously into the purview of national park agencies is therefore an important step in the process of learning how to share space with the rest of life on earth.

## Arguments for Protection

Over the past ten years, the conservation organization WWF has been collaborating with the World Bank and other partners on the Arguments for Protection project to investigate the wider benefits of protected areas. In a series of seven reports, numerous papers, and a book,<sup>23</sup> we have looked at how the existing global protected area system also protects a wide range of ecosystem services, from flood control to sacred sites.

We found that natural ecosystems in protected areas play a key role in ensuring food security, both for people living nearby and for the wider global community. Community and state-run protected areas can also provide occasional emergency food supplies for people and livestock in times of crop failure. Some 250 million people globally are dependent on small-scale fisheries for their protein, and fishing communities, both freshwater and coastal, are increasingly setting aside waters to provide safe nursery grounds for fish to maintain stocks. A review of 112 studies in 80 marine protected areas found strikingly larger fish populations inside the reserves compared with surrounding areas (or the same area before a marine protected area was established). These additional fish provide valuable spillover into adjacent fished areas, replenishing them.<sup>24</sup> On land, protected areas help to conserve the wild relatives of crops, providing vital genetic material for crop breeding. Reserves in cultural landscapes (i.e., traditionally managed areas where biodiversity has, over long time periods, adapted to ecosystems influenced by humans) also protect endangered land races and old-crop varieties, providing genetic resources to an industry with an annual value estimated to be worth billions of dollars every year.<sup>25</sup> Our analysis showed that protection is lower than average in some of the traditional centers of crop diversity, particularly in Central Asia, where some reserves are now being set up specifically to maintain their agrobiodiversity value.<sup>26</sup>

Maintaining natural vegetation is also often the cheapest and most effective way of securing water supply and quality. We looked at the water sources for the world's hundred largest cities and found that over a third, including Bogotá, Jakarta, Dar es Salaam, and Melbourne, were drawing a substantial amount of their drinking water from forest protected areas.<sup>9</sup> In addition, some ecosystems, such as cloud forests and the *paramos* vegetation of central South America, absorb water droplets from clouds, thus also increasing net water flow. Cities like Tegucigalpa, the capital of Honduras, protect their surrounding forests to ensure they have enough water for the population.<sup>9</sup> Forested watersheds can help mitigate any but the largest floods; in Spain, the city of Malaga finally solved a 500-year-old flood problem by replanting and protecting a relatively small area of the catchment.<sup>27</sup> Protecting natural wetlands can also provide absorption space for floodwaters and help regulate water flow. The Whangamarino wetland protected area and Ramsar site in New Zealand was originally protected for its biodiversity but has also been valued at U.S.\$601,037/year (2003 prices) on account of its flood control utility.<sup>28</sup>

Throughout the world, the human impact from natural disasters is rising steadily,<sup>29</sup> despite proportionately greater investments in protection and mitigation. Climate instability and more extreme weather events are combining with rising human populations and land tenure issues to put more people at risk, especially in marginal and vulnerable habitats. In addition to mitigating flooding, natural ecosystems such as coral reefs, mangrove swamps, and coastal wetlands, maintained within protected areas, are recognized as playing a key role in protecting against typhoons and hurricanes and tidal surges from storms and tsunamis.<sup>30</sup> Conversely, the loss of coastal wetlands was identified as a major contributing factor in the scale of impacts from Hurricane Katrina in New Orleans in 2005, leading to a large-scale restoration program in the Louisiana wetlands.<sup>31</sup> On land, forested slopes are better able to withstand avalanches and landslides, which cause significant loss of life in some countries and are also sometimes a major contributing factor to human casualties after earthquakes. Research in Pakistan<sup>32</sup> found that villages below mountains in reserves fared better after earthquakes than those under bare slopes. In the Middle East, countries like Kuwait are planning protected area systems in large part to maintain desert vegetation and stop the dune formation and dust storms that are growing more frequent every year.<sup>33</sup>

The World Health Organization believes that 23–25 percent of global disease burden (i.e., healthy years of life lost to disease) could be avoided by improved management of environmental conditions.<sup>34</sup> Protected areas can play several key roles in maintaining human health, including through ecosystem services such as provision of clean water; through direct provision of health benefits; and as the sources of local and global medicines, and especially as an accessible source of health care for the poor.<sup>35</sup> As natural ecosystems shrink, many local communities are looking to arrangements with protected area agencies to access medicines on a sustainable basis. In Colombia, the Alto Orto Indie-Ande Medicinal Plants Sanctuary was established by Parques Nacionales in collaboration with the indigenous Kofán community to protect biodiversity, medicinal plants, and the traditional ecological knowledge of local healers.<sup>35</sup> A possible anti-HIV compound was isolated from a plant in Manovo-Gounda-St. Floris National Park in the Central African Republic.<sup>36</sup> Surveys in Langtang National Park in Nepal found 411 species of medicinal plants, many of which have disappeared in surrounding districts.<sup>37</sup> In Australia, Parks Victoria has launched the Healthy Parks, Healthy People program, in collaboration with health authorities, that addresses the growing impacts of

noncommunicable diseases, including those related to exercise, diet, environmental pollution, and stress. In close collaboration with mental health organizations, they have found that nature offers palliative and curative therapy to those suffering from mental disorders.<sup>37</sup>

The role of the global protected areas system in addressing climate change is also increasingly being recognized through mitigation of impacts such as extreme weather events and through direct storage and sequestration of carbon.<sup>38,39</sup> A recent study estimates that 15 percent of terrestrial carbon forest stores are within protected areas.<sup>40</sup> Protected areas in Bolivia, Venezuela, and Mexico contain 25 million hectares of forest and are estimated to store over 4 billion tonnes of carbon, worth U.S.\$39–87 billion in terms of global damage costs avoided.<sup>41</sup> Successful protection not only keeps existing carbon locked up but can also increase rates of sequestration. In Belarus, a United Nations Development Programme/Global Environment Facility project is working to restore peatlands to increase their carbon storage potential.<sup>40</sup>

Apart from providing the goods and services on which livelihoods depend, protected areas can also contribute to spiritual and cultural welfare. Sacred natural sites remain of critical cultural value to virtually all the world's faiths, including even the monotheistic religions that in theory reject sacredness in nature as a sign of idolatry.<sup>42</sup> When we carried out a survey we found that many—and, in some countries, virtually all—protected areas include sacred sites, with managers often working with local communities and faith groups to maintain both sacred cultural and ecological values.<sup>43</sup> A survey of over 100 peer-reviewed papers looking at biological values of sacred natural sites found that they usually have richer biodiversity than surrounding habitat due to the high levels of protection afforded by communities.<sup>44</sup> Because the sacred values of lands and waters are often the most compelling argument for nature protection for local communities, this can be a double-edged sword for the conservation community, either resulting in increased support for the protected area management, or conflict. Much boils down to the sensitivity of management, and with improved understanding of these issues, this is getting better. In May 2010 the conservation organization WWF worked with the government of Bhutan to hold a workshop on links between nature, culture, spiritual values, and climate change,<sup>45</sup> one of a series of such discussions with faith groups over the last decade. It was striking that, although they came from very different starting points, the monks and scholars of Buddhism and the conservation biologists of WWF did not differ greatly on practical issues of land management. Protected areas can provide the forum for such synergies to be explored and developed among a wide range of disciplines.

## A Developing Paradigm

The CBD's Programme of Work on Protected Areas, which aims to establish an ecologically-representative network of protected areas around the world, is generally agreed to have been one of the most successful CBD programs<sup>46</sup> and a ray of hope amidst the generally bleak news about the maintenance of biodiversity.<sup>9</sup> But these protected areas, designated quickly and sometimes casually by governments, remain far from secure.<sup>47</sup> Some simply lose their protections when more immediately profitable opportunities come along,<sup>48</sup> as in Ethiopia where huge swathes of the Gambella National Park, home to one of the three largest mammal migrations on the planet, are being sold off for biofuel development.<sup>49</sup> Others are degraded through more subtle and unofficial channels, by creeping conversion or poaching.

One problem for those working to develop, consolidate, and defend a protected area system is that the debate is often framed in terms of wildlife needs versus human needs and the cultural and ethical reasons for protecting biodiversity for its own sake are often pitched against the immediate and more profitable options such as cattle-raising, biofuel production, or a new hydroelectric dam. On a more local scale, the debate often comes down to local food production versus the protection of natural ecosystems. Communities are, on the whole, well aware of the environmental services from natural ecosystems<sup>50</sup> but have other pressing priorities, such as getting enough food to eat. By recognizing that protected areas are not just a resource for biodiversity and recreation but also by far the world's largest repository of ecosystem services, we can change the game, bringing in new partners, stronger political arguments, and perhaps new sources of funding.

Some protected areas have been advertising and promoting their environmental services for years, successfully using them to finance protection. Fortunately, recent studies such as the TEEB report released at the CBD Conference of the Parties in Japan in October 2010 provide compelling evidence that the return on investment in protected areas justifies the financial investment required.<sup>11</sup> Furthermore, studies on financing protected areas show that relatively modest sums are necessary to upgrade protected areas systems and secure their effective management.<sup>51</sup> In the case of all 20 countries of Latin America, the total sum needed per annum represents a mere 0.018 percent of the average gross national product of these countries collectively, translating to less than the cost of a can of soda per capita for the citizens of those countries. Protecting biodiversity and securing ecosystem services is a smart investment option, particularly for those countries that have large intact ecosystems, since restoration is

likely to be a far more costly and complicated option and the costs of replacing ecosystem services through other means is prohibitive. Replicating the type of initiatives described above at a global level could provide a powerful solution for maintaining ecosystem services, conserving biodiversity, and addressing the needs of human communities—three of the greatest challenges facing us in the twenty-first century.

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