PROTECTED AREAS AND CLIMATE CHANGE

Protected areas, while under threat from climate change, provide a natural and economical means of mitigating and adapting to its effects. Protected areas need to be strengthened (e.g., in respect of management and governance), expanded and connected to improve the global response to climate change. The Convention on Biological Diversity's programme of work on protected areas represents a globally accepted framework for that purpose. Channelling funding for climate change mitigation and adaptation to national implementation of the programme of work would ensure measurable, reportable and verifiable results, increasing the resilience of ecosystems and producing multiple benefits.

Climate change is one of the principal threats to biodiversity in protected areas. Its terrestrial impacts include shifting ranges of species and habitats, altered migration patterns and timing, increased habitat fragmentation and increased frequency and intensity of storms, fires and flooding. Marine impacts include rising sea levels and coastal erosion, increasing sea temperatures, increasing acidification, decreasing salinity and altered habitats and migration patterns (Intergovernmental Panel on Climate Change, 2007).

At risk is the fundamental support system for humankind. Protected area networks provide essential ecosystem services that can be divided into four categories (Hassan et al., 2005):

(a)Supporting services, including primary and secondary production and biodiversity, which sustain goods and services;

(b) Provisioning services, such as food, material, fuel and medicine;

(c) Regulating services, such as carbon sequestration, climate and water regulation, protection from floods, avalanches or rockfall, water and air purification and disease and pest regulation;

(d) Cultural services, i.e., the protection of spiritually or historically important sites.

These ecosystem services will prove critical in enabling communities to mitigate and adapt to the effects of climate change. The Convention's programme of work on protected areas, adopted in 2004, outlines goals and targets for establishing participatory, comprehensive, ecologically representative and effectively managed national and regional systems of protected areas that integrate other land uses and contribute to human well-being. National implementation of key elements of the programme of work will naturally lead to and bolster the securing of ecosystem services, thereby providing the best and most cost-effective global response to climate change.

Box 1: Species response to climate change

Butterflies in the Sierra de Guadarrama mountain range in central Spain have shifted their ranges upwards by an average of 200 metres since they were mapped over 35 years ago. As the climate warms in mountainous areas, there is an increase in temperature at any given elevation. Species often move up the mountain towards cooler areas until they reach the top and face local or global extinction. Expanding, connecting and buffering protected area networks provides some flexibility to species under pressure from climate change. (Marris, 2007)

Role of protected areas in climate change adaptation

Viable, functional and well-managed protected area networks can play a key role in minimizing climate change impacts on terrestrial and marine ecosystems. Intact ecosystems such as islands, reefs and mangroves can act as buffers against the devastating effects of the storm surges and coastal erosion that are likely to increase with climate change. In Viet Nam, for example, nearly 12,000 hectares of mangroves, planted at a cost of $1.1 million, led to savings of an estimated $7.3 million per year in dyke maintenance while providing protection against a typhoon that devastated neighbouring areas (Reid and Huq, 2005). Droughts and wildfires can be avoided or reduced by expanding and managing ecosystems appropriately, and the destruction wrought by landslides can be reduced through soil stabilization provided by plant communities. Access to clean drinking water, recently declared a basic human right by the United Nations and rendered increasingly precarious by climate change, is also facilitated through protected areas. In fact, many of the world's largest cities rely on protected areas for their water supply.

Article 2 of the United Nations Framework Convention on Climate Change recognizes the value of ecosystem resilience. At its fourteenth session, the Conference of the Parties to the

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Convention introduced the term "ecosystem-based adaptation". The contribution of protected areas to ecosystem resilience and ecosystem-based adaptation is not, however, explicitly recognized by the Convention as yet. Climate adaptation on the ground cannot and should not comprise exclusively human-made infrastructure. Climate-resilient development should include, where appropriate, ecosystem-based adaptation. Given the importance of protected areas in biodiversity conservation and ecosystem resilience, their use should constitute an explicitly recognized component of an ecosystem-based adaptation strategy.

Role of protected areas in climate change mitigation

Supporting and regulating services provided by protected areas are important tools for mitigating climate change. An estimated 15 per cent of the terrestrial carbon stock is currently held in protected areas (Campbell et al., 2008a). By expanding and improving the management of the protected areas that hold these carbon stocks, carbon storage is increased and its security improved. The infrastructure of many protected areas, including staff, equipment and other capacity, can give impetus to the provision of measurable, reportable and verifiable research on carbon storage and sequestration, which is critical to obtaining support under the REDD-plus initiative. Investment in a globally accepted framework of implementation, such as the programme of work on protected areas, is also likely to improve donor confidence (see table).

Protected areas are critical in preventing further carbon emissions caused by degradation and development and provide an important contribution to an overall strategy for climate change mitigation. For example, an estimated total of 312 gigatonnes of terrestrial carbon is currently stored in the protected area network, which if it were lost to the atmosphere would be equivalent to 1,142 gigatonnes of CO_2, or approximately 23 times the total amount of global anthropogenic carbon emissions for 2004 (Kapos et al., 2008). Furthermore, protected areas can act as important barriers to the conversion of forests and other ecosystems, thereby helping to contain greenhouse gas emissions. Deforestation and forest degradation (e.g., through agriculture, clearing for pasture, creation of infrastructure, destructive logging and fires) account for nearly 20 per cent of global greenhouse gas emissions, second only to the energy sector.

Protected areas and REDD-plus

REDD-plus is the most important funding opportunity for climate change mitigation activities in protected areas. Paragraph 6 of the Copenhagen Accord recognizes the need to enhance the removal of greenhouse gas emissions by forests and to provide positive incentives for such actions. This provides a possibility for countries and agencies implementing the programme of work on protected areas to explore funding opportunities under REDD-plus. Financial flows from REDD plus efforts to reduce greenhouse gas emissions could reach $30 billion a year. The percentage of forests that are located in protected areas has increased substantially since 1990. At present some 18.8 per cent of forests are located in nationally designated protected areas. When community conserved areas are included, this estimate rises to an impressive 40 per cent (Secretariat of the Convention on Biological Diversity, 2010). The carbon held within protected areas is not, however, always secure. Protected areas remain vulnerable to degradation, with a significant number of the world's protected areas being poorly or inadequately managed. The success of REDD-plus depends on effectively designated, managed and governed protected areas that can contribute to reducing carbon emissions and protect carbon into the foreseeable future. The designation, consolidation and expansion of protected areas at the landscape level offers one of the most effective means of large-scale implementation of the initiative to reduce emissions from deforestation and forest degradation. Implementing REDD-plus in areas of high carbon stocks and high biodiversity values can promote co-benefits for climate change mitigation, biodiversity conservation and sustainable use. Several tools and methodologies for supporting biodiversity co benefits are available or are being developed. In particular, the national gap analyses already carried out by Governments under the programme of work on protected areas constitutes a valuable tool for identifying areas for the implementation of REDD plus schemes, in particular regarding the identification of priority forest areas for REDD plus activities at the national level.

Box 2: Protecting peatlands

Globally, peatlands store 550 gigatonnes of carbon. Global CO2 emissions from drained peatlands have greatly increased. Excluding peat extraction and fires, these emissions grew from 1,058 megatonnes in 1990 to 1,298 megatonnes in 2008. Targeting peatlands for protection, along with appropriate management strategies such as re-wetting drained areas, would effectively secure more carbon stocks and provide co benefits for biodiversity.

(Joosten, Wetlands International and Greifswald University, 2010)

Looking ahead: enhancing protected area networks for climate change mitigation and adaptation

The services that ecosystems provide to communities are threatened by climate change. Enhanced national implementation of key elements of the programme of work on protected areas will become increasingly important to secure these services in a cost-effective manner. Key elements of the programme of work and examples are described in the following paragraphs.

1. Incorporating climate change issues into the programme of work on protected areas gap analysis

The Government of Papua New Guinea has recently assessed gaps in that country's protected area system (Lipsett-Moore et al., 2010). In addition to issues of representativeness, the assessment covered issues related to climate change. By overlaying existing protected areas, key biodiversity features and projected climate change impacts, the gap assessment team was able to identify areas that increased the protection of under-represented species and ecosystems, while focusing on those features that were most vulnerable to climate change, together with features most likely to be resilient to climate



Examples of how the programme of work on protected areas can be used to tackle climate change adaptation and mitigation

Programme of work element and goal	Possible use for climate change issues
Assessing and improving the protected area network	
Ecological gaps	Gap analyses contain useful information for REDD-plus projects. Areas of high carbon storage and potential can be overlaid with high biodiversity to determine options for increasing co-benefits. Appropriate areas for adaptation can also be identified.
Integration into landscape, seascape and sectors	Connecting protected areas though buffer zones and corridors allows species to shift ranges and improves resilience, enhancing climate change adaptation responses.
Transboundary protected areas	Climate change effects are felt across ecosystems regardless of borders. Transboundary protected areas under the programme of work encourage a cooperative arrangement.
Restoration	Improving degraded areas contributes to climate change mitigation by reducing emissions and by storing or sequestering more carbon through regeneration of vegetation. Climate change adaption is also improved as the variety of species in these areas increases, thereby augmenting resilience.
Assessing and improving protected area management	
Threat management	Climate change poses many threats to protected areas and should be considered in the context of threat management. Other threats, such as invasive alien species and increasingly frequent wildfires, are also exacerbated by climate change.
Management planning	Protected area planning should include climate change issues, generally aiming to "protect the strongest of the weak and the weakest of the strong".
Monitoring and adapting management	Monitoring protected areas and adapting management will become increasingly important as climate change alters ecosystems over time. Staff on the ground should be trained in the use of measurable, reportable and verifiable indicators for REDD-plus activities.
Management effectiveness	Carbon stored in protected areas is not always secure. Effective management is essential to maintain and enhance carbon stocks and provides co-benefits for biodiversity.
Capacity development	With improved tools and training, countries can better plan and manage their protected areas and include climate change issues in the process. Staff on the ground should be trained in techniques for improved measurement, reporting and verification to support REDD-plus activities.
Participatory planning	The effectiveness of protected areas, including the security of carbon stocks and biodiversity co-benefits, is improved by involving all stakeholders in the protected area planning and implementation process.
Communication and education	Integrating climate change into protected area communication strategies raises awareness at the local level, leading to greater understanding and acceptance of the value and role of protected areas, thereby fostering their sustainable use.
Assessing and improving the protected area enabling environment	
Protected area system master planning	Climate change should be integrated into master planning to increase the effectiveness of mitigation and adaptation responses.
Policy environment	Legislation related to the designation of areas to be protected, the regulation of human influence in such areas and the enforcement of protection should be revised to take into account measures necessary to respond to climate change.
Sustainable finance	Appropriate and timely use of money allocated for biodiversity and climate change under the fifth replenishment of the Global Environment Facility trust fund, in addition to support from other sources, including those related to REDD-plus, is a crucial component of any sustainable financing strategy.
Protected area governance	Diversified governance types have been shown to strengthen the long-term effectiveness and stability of protected areas.
Protected area benefits	Climate change benefits should be included in communication strategies on protected areas.

change, as part of a strategy that aimed to "protect the strongest of the weak, and the weakest of the strong".

2. Adopting adaptive management

Forest loss within protected areas between 2000 and 2005 resulted in an estimated 822 to 990 metric tonnes of CO2 equivalent emissions (Campbell, 2008b). Better management could reduce that loss, improving the protection of both biodiversity and carbon while delivering benefits to local communities. Potential REDD-plus projects could be targeted to improve the effectiveness of protected area management in respect of carbon storage where it is most needed and where it can be readily integrated into an adopted framework. As uncertainties increase with climate change, it is important that

management practices adapt accordingly. Resource assessment and monitoring will become increasingly important.

3. Improving and diversifying governance

Protected areas are more effective when they are created and supported by all stakeholders. Indigenous and local community participation will be key to enhancing, expanding and connecting protected area networks to confront climate change. In the United Republic of Tanzania, for example, there has been greater improvement in forest condition in forest reserves managed using participatory forest management approaches than in areas where such approaches were not employed (Dudley et al., 2010).

4. Integration of protected areas into the wider landscape and seascape

Protected areas that constitute isolated units surrounded by altered habitat generally face serious long term viability problems. In addition to causing fragmentation of the physical landscape, the policies and programmes of economic sectors, particularly those directly related to natural resource use and management such as agriculture, forestry, fisheries, wildlife, mining and tourism, can impinge on protected areas and biodiversity conservation, resulting in the loss of ecosystem services and of security for carbon stocks and sequestration.

Establishing or strengthening corridors between protected areas will become increasingly important in promoting climate change adaptation and securing the ecosystem services that protected areas currently provide. Larger tracts of connected lands with buffer zones can improve resilience by increasing the redundancy of protected species while allowing species to shift within ranges. National activities towards achieving goal 1.2 of the programme of work, on integrating protected areas into wider landscapes, seascapes and sectoral plans and strategies, should be prioritized to improve climate change preparedness. In the 2010 Muskoka Declaration, leaders from the Group of Eight countries stated that "biologically diverse and resilient ecosystems are critical to human well being, sustainable development and poverty eradication." From this statement of political will, action must follow. The Convention on Biological Diversity's programme of work on protected areas represents a framework for practical action whose accelerated national implementation would respond to climate change and contribute to the achievement of the Millennium Development Goals.

Box 3:Examples of cooperation to achieve connectivity

In mountain ecosystems, the landscape approach and connectivity corridors are viable means of achieving climate change adaptation and mitigation. The International Centre for Integrated Mountain Development regional cooperative framework, which is being implemented in eight Hindu Kush Himalayan countries, is a prime example. Some 39 per cent of the region is protected, with 488 protected areas falling within the International Union for Conservation of Nature's categories I–VI. Regional cooperation is promoted through conservation corridors that aim to restore disturbed connectivity between existing mountain protected areas that cross political boundaries. In Europe, a number of governmental and non governmental organizations are cooperating to develop a corridor between the Alps and the Carpathians and to foster exchange on ecological networks. The Yellowstone-to-Yukon Conservation Initiative, covering more than 3,000 km stretching north from the United States of America to Canada, is probably the most highly developed continental-scale connectivity initiative.

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[1] REDD-plus, which is discussed below, is a component of the Bali Action Plan that aims to enhance national and international action to mitigate climate change, including through policy approaches and positive incentives, conservation, the sustainable management of forests and the enhancement of forest carbon stocks in developing countries.

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