

CLIMATE CHANGE & PROTECTED AREA MANAGERS

SOME CONTRIBUTIONS THAT CAN BE MADE TO REDUCING THE EFFECTS OF CLIMATE CHANGE

The following notes have been prepared to assist protected area managers provide a positive response to forecast climate change effects. The notes have been put together for a new book being prepared by IUCN (Lockwood *et al.* 2006). The book is the official source and reference citation for this work. The notes have been inspired and assisted by the excellent paper on the subject prepared by Dr David Welch of Parks Canada and published in the George Wright Forum (Welch 2005). Additional sources for these notes are recognised here. (Noss 2001; Hannah *et al.* 2002; Low 2005; Welch 2005; Worboys *et al.* 2005; Lockwood, M. *et al.* in press).

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Initiative	Notes
Reduce greenhouse gas emissions	<p>Leadership by example Protected area organisations need to exhibit leadership by minimising greenhouse gases they generate. This includes direct and indirect energy use. It would be best approached as a whole of organisational response to the issue of global warming. This would require an internal campaign of staff awareness and major changes to purchasing and design policies. Opportunities for reducing greenhouse gas emissions include:</p> <ul style="list-style-type: none">• Changing the vehicle transport fleet to fuel efficient vehicles.• If technology permits, utilise alternative, pollution free energy sources such as electric or hydrogen based energy for vehicles sourced from sustainable sources• Encouragement of personal action plans for employees including actions such as the greater use of public transport• Use of natural heating, natural cooling, and energy efficiency in the design of structures and the supporting facilities they use• Use of alternative energy sources such as solar and wind power• Use of purchasing policies which help achieve energy efficiency following life cycle assessment of products prior to purchase.• Reduction in the generation of waste through purchasing policies, reuse, and recycling, and the consequent reduction in energy consumption• Reduction in the use of water, and the consequent reduction in energy used.• Undertaking fire management fuel reduction burning after estimating the emissions arising and planning and dealing with potential alternatives

<p>Protected area systems design</p>	<p>Strategic protected area systems planning</p> <p>“A good network of large protected areas at the core of biosphere reserves may be wild nature’s best climate change shock absorber” (Welch 2005)</p> <p>Protected area systems level planning is needed. Shifts in biomes at a regional scale need to be understood and factored into the management of the protected area system. The changing nature of flora and fauna at an individual protected area level needs to be understood, just as the capacity to conserve a representative sample of a nation’s fauna and flora needs to be estimated. There will be changes, and the future characteristics of protected areas and their (changed) contribution to biodiversity conservation need to be understood. The existing protected area system will be just as important in the future as it is in the beginning of the 21st Century, and no lands or waters should change their protected area status due to climate change. Rather, there will be a redefinition of the biodiversity conservation contribution individual protected areas will play within the bigger protected area system. Indeed, the contribution the system will make will change also. What is very clear though, protected areas will be even more important in the future than ever before as changes happen to all lands. A number of key actions have been suggested (Welch 2005; and, Noss 2001; Hannah et al. 2002 cited in Welch 2005):</p> <ul style="list-style-type: none"> • Undertake regional level climate change modeling and biome shift forecasting • Identify biomes that are at risk and practical response planning • Assess the boundaries of some protected areas and determine if they can be improved • If possible, select and reserve new protected areas which can assist in maintaining based on forecast changes • Maximise opportunities for the regional biodiversity conservation and landscape connectivity. Avoid fragmentation. • Protect climate refugia at all scales if possible
<p>Climate change adaptation planning</p>	<p>Planning</p> <p>Climate change may introduce drier conditions, more frequent fires, new environments for weeds and pest animals, new patterns of visitor use and other changes. Climate change, and forecast changes to biomes need to be accounted for in plans of management. Managers may also need to plan specifically for:</p> <ul style="list-style-type: none"> • A purpose for protected areas which are more focused on natural processes and biodiversity rather than specific biomes or species (Welch 2005). • A purpose for protected areas that is more tolerant of biotic changes resulting from natural and anthropogenic changes (Welch 2005). • More focused research on ecosystem changes (Welch 2005). • Drier conditions and changes to the availability of traditional grazing lands • Drier conditions and lower carrying capacities of grazing lands (Welch 2005) • A higher fire frequency, with hotter and more volatile fire weather conditions (Lowe 2005)

	<ul style="list-style-type: none"> • More frequent storm events which may introduce more lightning caused fires • Warmer conditions which may increase the potential for the spread of existing and new weed species. • The predicted loss of species (forecast complete loss of biomes) and actions needed to record and preserve genetic information • Warmer conditions which may reduce the length of the snow season and increase the threat of construction of ski developments at higher altitudes, (This is a temporary advantage if there are physical limits to the higher altitudes available).
Monitor climate change effects	<p>Protected areas as benchmarks of change for the community</p> <p>Global warming research and monitoring within protected areas can be used as an indicator for local communities for the nature and extent of climate change. Specifically these could include:</p> <ul style="list-style-type: none"> • Providing a baseline condition from which change can be measured from • Providing indicators of climate change for a protected area and its natural region, the protocols for measurement and providing regular and consistent reporting of ecological impacts, including reporting for local communities, authorities and governments (Welch 2005). • Undertaking long-term monitoring to seek causality between climate and biodiversity responses at several levels of biological organisation (Noss 2001 cited in Welch 2005).
Minimise in-situ threats	<p>Minimising existing threats</p> <p>This is an investment. By minimising existing threats such as weeds or pest animals, it reduces the potential for a more rapid spread of such threats in warmer conditions.</p>
Adaptive management	<p>Responsive and flexible management</p> <p>Implementing science based adaptive management will be an important skill for managers of the future. Adaptive management will need to be understood, and implemented properly. Reactive decision making is highly likely to be a threat for protected areas. Responsive strategic management will be needed however. Managers may be required to:</p> <ul style="list-style-type: none"> • Introduce new measures to stabilise catchments which are impacted by higher fire frequencies and more severe temperature regimes • Translocate animal species from lower altitudes to higher altitudes as biome shifts occur and where natural connectivity opportunities are unavailable • Introduce new approaches for managing visitors given changes in the nature of biomes. • Deal with the marine flooding of many lowland areas • Deal with the loss of perennial flows in mountain streams
Research	<p>Investments in research</p> <p>Understanding the nature of changes to protected areas is critical for adaptive management. Managers should be at the forefront of introducing ways in which researchers from different scientific organisations can be helped to conduct applied research in protected areas. Major changes in the condition of protected areas need to be</p>

	tracked.
Managing commercial agreements	Commercial agreements Managers need to ensure when entering into legal and commercial agreements for sites that the ramifications of climate change are anticipated and are built into the agreement including the need for managers for adaptive management. Low lying areas in coastal zones may be inundated. Long term leases which supply recreation services based on snow or ice may need to be very carefully written. Such changes need to be forecast as part of an agreement.
Managing cooperative agreements	Co-operative agreements Cooperative agreements between organisations may change. The inability for catchments to supply historic water volumes in new, hotter, drier climates and the higher fire frequency for example may result in changes to the nature of cooperative water supply agreements between a protected area authority and water supply organisations.

References

Hannah, K., Midgley, G.F., Lovejoy, T., Bond, W.J., Bush, M., Lovett, J.C., Scott, D., & Woodward, F.I. (2002). *Conservation Biology* 16: 264-268

Lockwood, M., Worboys, G.L., Kothari, A., De Lacey, T. (in press) *Managing the World's Protected Areas*. Earthscan London. (To be published in 2006).

Lowe, I. (2005). *Living in the Hothouse. How global warming affects Australia*. Script Publications, Melbourne.

Noss, R.F. 2001. Beyond Kyoto: forest management in a time of rapid climate change. *Conservation Biology* 15: 578-590

Welch, D. (2005). What should protected area managers do in the face of climate change? *The George Wright Forum*, Vol 22, No 1, 2005

Worboys, G.L., Lockwood, M., De Lacy, T. (2005). *Protected Area Management Principles and Practice (Second Edition)*. Oxford University Press, Melbourne.