



Wilderness Protected Areas:

Management guidelines for IUCN Category 1b protected areas

Prepared by the IUCN WCPA Wilderness Specialist Group

Sarah A. Casson, Vance G. Martin, Alan Watson, Angie Stringer, and Cyril F. Kormos, Volume Editors

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Craig Groves, Series Editor



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IUCN WCPA's BEST PRACTICE PROTECTED AREA GUIDELINES SERIES

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IUCN PROTECTED AREA DEFINITION, MANAGEMENT CATEGORIES AND GOVERNANCE TYPES

IUCN defines a protected area as:

A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

The definition is expanded by six management categories (one with a sub-division), summarized below.

Ia Strict nature reserve: Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values

Ib Wilderness area: Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition

II National park: Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities

III Natural monument or feature: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove

IV Habitat/species management area: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category

V Protected landscape or seascape: Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value; and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values

VI Protected areas with sustainable use of natural resources: Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims

The category should be based around the primary management objective(s), which should apply to at least three-quarters of the protected area – the 75 per cent rule.

The management categories are applied with a typology of governance types – a description of who holds authority and responsibility for the protected area. IUCN defines four governance types.

Type A. Governance by government: Federal or national ministry/agency in charge; Sub-national ministry or agency in charge (e.g. at regional, provincial, municipal level); Government-delegated management (e.g. to NGO)

Type B. Shared governance: Transboundary governance (formal and informal arrangements between two or more countries); Collaborative governance (through various ways in which diverse actors and institutions work together); Joint governance (pluralist board or other multi-party governing body)

Type C. Private governance: Conserved areas established and run by individual landowners; non-profit organizations (e.g. NGOs, universities) and for-profit organizations (e.g. corporate landowners)

Type D. Governance by Indigenous Peoples and local communities: Indigenous Peoples' conserved areas and territories – established and run by Indigenous Peoples; Community conserved areas – established and run by local communities.

For more information on the IUCN definition, categories and governance types see Dudley (2008). *Guidelines for applying protected area management categories* which can be downloaded at: www.iucn.org/pa_categories

For more on governance types see Borrini-Feyerabend et al. (2013). *Governance of Protected Areas—from understanding to action*, which can be downloaded at www.iucn.org/library/sites/library/files/documents/PAG-020.pdf

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IUCN (International Union for Conservation of Nature)

IUCN helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN works on biodiversity, climate change, energy, human livelihoods and greening the world economy by supporting scientific research, managing field projects all over the world, and bringing governments, non-governmental organizations, the United Nations and companies together to develop policy, laws and best practice. IUCN is the world's oldest and largest global environmental organization, with more than 1,200 members from government and non-governmental organizations and almost 11,000 volunteer experts in some 160 countries. IUCN's work is supported by over 1,000 staff in 45 offices and hundreds of partners in public, non-governmental organizations and private sectors around the world.

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IUCN WCPA is the world's premier network of protected area expertise. It is administered by IUCN's Programme on Protected Areas and has over 1,400 members, spanning 140 countries. IUCN WCPA works by helping governments and others plan protected areas and integrate them into all sectors; by providing strategic advice to policymakers; by strengthening capacity and investment in protected areas; and by convening the diverse constituency of protected area stakeholders to address challenging issues. For more than 50 years, IUCN and WCPA have been at the forefront of global action on protected areas.

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WILD's work advances a reciprocal, balanced relationship between people and nature—our Nature Needs Half vision. Its aim is to ensure that enough wild land and seascapes are protected and interconnected (scientifically estimated to be at least half of any given ecoregion) to maintain nature's life-supporting systems and the diversity of life on earth. The vision supports human health and prosperity and secures a bountiful, beautiful legacy of resilient, wild nature. Nature Needs Half recognizes that we are part of nature, not separate from it.

www.wild.org



Wilderness Specialist Group of IUCN WCPA

Working within the IUCN World Commission on Protected Areas (WCPA) and the World Wilderness Congress, the Wilderness Specialist Group establishes linkages between the World Wilderness Congresses and IUCN's World Parks Congresses and World Conservation Congresses. The Wilderness Specialist Group also provides coordination and a connecting point within IUCN for wilderness-related issues including the strengthening of Category 1b.

Originally initiated as a task force at the Jordan IUCN General Assembly (2000), the Wilderness Specialist Group was formally instituted in 2003 and convened its first formal meeting at the World Parks Congress in Durban, South Africa, in 2003. The objectives of the Wilderness Specialist Group include promoting research and discussion on the importance and role of wilderness, helping integrate wilderness-related issues into WCPA publications, proceedings and meetings, and providing expert referral service to the WCPA for wilderness-related issues.

www.wild.org/how-we-work/policy-mgmt/wilderness-specialist

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Contents

Foreword	vii
Acknowledgments	viii
Executive summary	xi
1. Introduction	1
1.1 What is wilderness?	2
1.2 What is a Category 1b protected area?	4
1.3 History of the IUCN protected area management Category 1b	6
1.4 Objective of the IUCN protected area management Category 1b	7
1.5 Extent of Category 1b sites	8
1.6 Inclusion of Indigenous Peoples and local communities	8
1.7 Application of Category 1b: assignment and reporting	11
2. Management Principles	13
2.1 Manage wilderness comprehensively through large-scale, intact wilderness protected areas and connectivity among wilderness protected areas	14
2.2 Manage wilderness to maintain the highest integrity of ecosystems, wildlife, and sacred and traditional cultural-use sites	16
2.3 Engagement of stakeholders and non-tribal government with Indigenous Peoples, Tribes and local communities in management and designation of wilderness in true partnership relations	18
2.4 Manage wilderness both to preserve intrinsic wilderness values and to sustain human values	21
2.5 Prioritize wilderness-dependent and wilderness-relevant activities	24
2.6 Guide wilderness management using written plans that are culturally appropriate	25
2.7 Manage carrying capacities through indicator-based planning systems	26
2.8 Focus management on threatened sites and damaging activities	27
2.9 Apply only the minimum tools, regulations, and force to achieve wilderness protected area objectives	28
2.10 Monitor wilderness conditions and experience opportunities to guide long-term wilderness stewardship	30
2.11 Manage wilderness in relation to its adjacent lands	31
3. Governance and Authority	35
3.1 Introduction: Governance and authority in wilderness protected areas	36
3.2 Governance and authority of wilderness protected areas by government	37
3.3 Governance and authority of wilderness protected areas by Indigenous Peoples and local communities	39
3.4 Private ownership and governance of wilderness protected areas	40
3.5 Shared governance and authority of wilderness protected areas	43
3.6 Multilateral governance and authority of wilderness protected areas	46
3.7 Variances in jurisdiction and diversity of governance and authority	47
4. Management Tools and Issues	49
4.1 Planning systems and management frameworks	50
4.2 Transparency in decision-making	51
4.3 Infrastructure and technology in wilderness protected areas	54
4.4 Changing demographics and relevance of wilderness	55
4.5 Emerging recreation management issues	57
4.6 Managing for marine wilderness values	59
4.7 Management decisions about rewilding, restoration, passive management, and climate change intervention	62
4.8 Subsistence use and relationship values of wilderness	67
4.9 Managing wilderness for sacred values	69
4.10 Variance	71
4.11 Incorporating science into management decisions	72
5. Evaluating Effectiveness of IUCN Protected Area Management Category 1b Sites	75
5.1 Evaluating effectiveness of IUCN protected area management Category 1b sites	76
References and further reading	77

Case studies

Case study 1	Khan Khentii Strictly Protected Area, Mongolia.	14
Case study 2	California Desert Protection Act, United States.	17
Case study 3	Kayapo homeland in the Xingu River Basin, Brazil	19
Case study 4	Fish River Station, Australia	22
Case study 5	El Toro Wilderness, Puerto Rico	23
Case study 6	Shirakami Sanchi Nature Conservation Area, Japan.	24
Case study 7	Nahanni National Park Reserve, Canada	26
Case study 8	Use of the Minimum Requirements Decision Guide	29
Case study 9	Central Catchment Nature Reserve, Singapore	31
Case study 10	Mission Mountains Tribal Wilderness, United States.	33
Case study 11	The Natura 2000 Network of Europe	38
Case study 12	Shamwari Game Reserve, South Africa	40
Case study 13	Wilderness in Eastern and Southern Africa.	41
Case study 14	Wilderness in India.	41
Case study 15	The Devil's Canyon 'El Carmen' Wilderness Area (Tierra Silvestre Cañón Del Diablo)	42
Case study 16	Tenkile Conservation Alliance, Papua New Guinea	45
Case study 17	Maloti-Drakensberg Park World Heritage Site of South Africa and Lesotho	47
Case study 18	Boundary Waters Canoe Area Wilderness, United States.	56
Case study 19	North American Marine Wilderness	60
Case study 20	Liskär Nature Reserve, Sweden	61
Case study 21	Sundarbans East Wildlife Sanctuary, Bangladesh.	61
Case study 22	Kepulauan Karimata, Indonesia	61
Case study 23	Wilderness Act of Finland.	68
Case study 24	Arctic National Wildlife Refuge, United States.	69
Case study 25	Kachina Wilderness Area, United States	69
Case study 26	Peak Wilderness Park, Sri Lanka	70
Case study 27	Alaska National Interest Lands Conservation Act, United States.	72

Figures

Figure 1	Map of protected areas within Amazonia. A very important precedent is the Redparques Declaration signed in Peru in 2015, in which 18 Latin American nations formalized a commitment to integrate their protected areas, including Category 1b, in climate change strategies and asked for the official inclusion of protected areas in the United Nations Framework Convention on Climate Change global discussions (World Wildlife Fund, 2015). Protection of large-scale, intact wilderness areas and of connectivity between wilderness areas are important aspects of climate change mitigation.	15
Figure 2	The Mission Mountain Tribal Wilderness is bordered to the west by the Tribal Buffer Zone.	33

Foreword

Dear Reader,

Thank you for your interest in and commitment to wilderness stewardship through designation and protection. The IUCN protected area management category of wilderness allows us to understand nature *on its own terms* and maintain those terms while allowing (and even encouraging) humans to experience wild nature. No other category of protected area management allows for such a relationship between humans and nature. As a manager of wilderness, you are the guardian of this relationship. Remember that, while the work you do now is very important, it will be even more important in the future. It is our job to protect wilderness for future generations.

These Guidelines apply to Category 1b (wilderness) within the Best Practice Guidelines for Protected Area Managers Series published by the IUCN World Commission on Protected Areas. The Wilderness Specialist Group of the World Commission on Protected Areas comprises international, professional volunteers coordinated by the WILD Foundation. These Guidelines were produced and reviewed by an independent, international team of experts (Indigenous Peoples and non-indigenous peoples) who are field managers, academic researchers, and policymakers from governments and non-governmental organizations. The product created and reviewed by this team is the first-ever international guidelines produced for wilderness managers. Your feedback is welcome. These Guidelines will evolve, just as the wilderness we love and manage evolves.

There has never been a time when a unified code for wilderness management is needed more than it is now. It is necessary to manage wilderness to protect thriving wilderness and healthy human relationships with wild nature against the threats posed by human growth and inappropriate development, climate change and other environmental degradations. The rapidly increasing rate and scale of these negative impacts on wilderness add additional issues and complexities to wilderness management not

faced by previous generations. We urge you to view these challenges as prospects, not problems. Challenges bring new opportunities upon which wilderness managers and policymakers can capitalize: the negative impacts that threaten wilderness areas also create a social, political and economic imperative for wilderness protection and management, with important benefits of doing so. Healthy wilderness is a cost-effective, highly functioning, natural solution that builds planetary resilience.

Wilderness decision makers navigate a plethora of diverse issues when creating and implementing management plans. The management of wilderness areas requires addressing both the ecological and cultural tenets of the area. The production of a good management plan necessitates understanding the ecology and the people in relationship with the wilderness area, and considering human needs, histories, and expectations as well as the requirements of wild nature itself.

Management plans cannot be created in isolation. They are as much of a social construct as they are the ecological objectives for a wilderness area. An effective plan is the result of a process that should include some partners, many stakeholders, and multiple professional disciplines. There will be challenges. Difficulties in creating management plans generally arise through five variables: lack of correct information, miscommunication, poor procedures, negotiations in bad faith (including politics, local or otherwise), and/or unrealistic appraisal of the financial and human resources available to do the management. Attention to these five variables is essential to the quality and effectiveness of the final management plan.

As you face the challenges, you should bear in mind that wilderness designation and management is beneficial to all people now and in the future, no matter their cosmopolitan, ethnic origins, or level of economic development. Always remember that you are on the front lines of conservation, working now to secure a future for all life on earth.

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Executive summary

A wilderness manager has a task unlike that of the manager of any other type of protected area: using the minimum tool methodology to solve practical issues and embodying an inclusive, multicultural partnership mentality that embraces the relevant social and governance issues, while simultaneously working to allow wild nature to evolve on its own terms and conditions. There's a management challenge for you!

The purpose of these first-ever international Guidelines for managing wilderness (Category 1b) has been to impress upon you the challenges involved in managing wilderness, while also clarifying the essential techniques, protocols, and mindset required of a good, efficient, adaptable, and visionary manager. Below is a quick review of the key considerations when managing a wilderness area.

Management principles

Manage wilderness comprehensively through large-scale, intact wilderness protected areas and connectivity between wilderness protected areas. The issues of scale are no more important than are those of ecological connectivity. Manage wilderness accordingly and so that it is part of a comprehensive, protected area programme.

Manage wilderness to maintain the highest integrity of ecosystems, wildlife, and sacred and traditional cultural use sites. Wilderness sites, and the cultural sites within, should be managed to maintain the highest integrity of all components of ecosystems, wildlife and cultural meaning through an explicit focus on non-degradation.

Create true partnership among stakeholders and non-tribal government entities and indigenous, tribal and local communities in management and designation of wilderness. True partnerships require redefining the processes that are used to determine management and stewardship practices, priorities and strategic plans.

Manage wilderness both to preserve intrinsic wilderness values and to sustain human values. Wilderness should be managed in an approach that understands a holistic view of the world in which humans and non-humans are respected.

Prioritize wilderness-dependent and wilderness-relevant activities. All activities within the wilderness area should be consistent with the overarching wilderness values and feature non-motorized equipment, the least invasive tools, and a 'leave no trace' mentality.

Guide wilderness management using written plans that are culturally appropriate. Wilderness management actions are guided by formal plans that state specific area objectives and explain how they will be achieved, consistent with all applicable legal authority for the area. The entire planning process must include, in all its stages, the involvement of area stakeholders such as user groups and core partners such as Indigenous Peoples and use whatever variety of methods is needed to acquire their input, secure their commitment to

the plan, and enlist their continuing involvement in resolving issues that are encountered during plan implementation.

Manage carrying capacities through indicator-based planning systems. Management should determine the limits of acceptable change in wilderness conditions by setting standards through indicator-based planning systems to protect the area and uphold wilderness values.

Focus management on threatened sites and damaging activities. Management should focus on threatened sites and activities that damage wilderness areas. Such a focus is more effective than applying unnecessary management actions to areas not under threat.

Apply only the minimum tools, regulations, or force to achieve wilderness protected area objectives. A systematic decision process for determining appropriateness of administrative actions in wilderness is important and necessary and can offer many options; for example, the use of education, regulations, applications of force, and more.

Monitor wilderness conditions and experience opportunities to guide long-term wilderness stewardship. Monitoring is essential to guiding long-term plans and identifying any revisions to the plan that may be required in the face of changing circumstances and feedback from actions carried out.

Manage wilderness in relation to its adjacent lands. It is important, wise, and necessary to manage the wilderness area not in isolation but in coordination with its adjacent lands.

Governance and authority

Governance and authority of wilderness protected areas by government. Most areas declared as Category 1b are subject to governance at the national or sub-national (provincial, state, local) level, often with overlapping jurisdictions and agencies.

Governance and authority of wilderness protected areas by Indigenous Peoples and local communities. If Indigenous Peoples or local communities choose to have their self-governed and managed territories designated as a wilderness protected area, those sites can be categorized in numerous ways. Sensitive consultations are often required to ensure that sites under Category 1b are locally managed in accordance with best practices.

Private ownership and governance of wilderness protected areas. The authority and responsibility to make conservation decisions rests solely with the private institutional owners, individuals or trusts that own the land. While desirable, these are often short-term and consultations with the owners can focus on how to make such declarations more time-permanent.

Shared governance and authority of wilderness protected areas. A shared governance structure that can balance diverse political actors with (sometimes vastly) differing

capacities and interests will be a much stronger long-term governance system than one that ignores these complexities to focus only on the expedient or politically powerful.

Multilateral governance and authority of wilderness protected areas. Multilateral governance structures can be used to protect wilderness areas through treaties agreed to by three or more sovereign states. These treaties involve many stakeholders and are often concerned with the conservation of wildlands that are transboundary, are of global importance, and represent areas such as Antarctica and the High Seas that are not administered by specific countries.

Variations in jurisdiction and diversity of governance and authority. Variations are specifically allowed activities that may not always be consistent with commonly accepted wilderness management principles. As wilderness law and policy continue to evolve, so will the nuances of variations permitted within wilderness areas.

Management tools and issues

Planning systems and management frameworks. Useful indicator-based planning systems and management frameworks are those that help decision makers ‘work through’ choices in a manner that allows technical expertise, knowledge (of various forms) and public values and interests to be incorporated, assessed and used. These systems and frameworks clarify what social and biological conditions are appropriate or acceptable in wilderness and ask how much change from the ideal is acceptable.

Transparency in decision-making. Wilderness managers have a large responsibility for stewardship of both the resource and the relationship between people and the wilderness resource. Transparency in decision-making can improve a manager’s ability to make informed, consistent and defensible decisions that help achieve wilderness protection objectives.

Infrastructure and technology in wilderness protected areas. The use of emerging technologies (such as drones, mobile phones and rock-climbing accessories) has the potential for serious negative impacts to a wilderness area and must therefore be monitored closely by wilderness decision makers.

Changing demographics and relevance of wilderness. As society changes, and as new information and knowledge about the benefits of wilderness are accumulated, our approach to educating managers, policymakers, and the general public about the importance of wilderness protection will also change.

Emerging recreation management issues. Finding solutions to future unknown (or repeated) recreation conflicts requires that wilderness decision makers ensure that emerging issues adhere to the central mandates of wilderness values.

Managing for marine wilderness values. The places most often identified and designated as ‘wilderness’ are on land, yet many places in the oceans and coastal waters possess wilderness qualities and values worthy of preservation. The management framework for marine wilderness areas can appropriately be captured from the overarching IUCN management guidelines for Category 1b.

Management decisions about rewilding, restoration, passive management, and climate change intervention.

Resilience to climate change or large-scale environmental degradation may best come from the rewilding, restoration or passive management of wilderness areas. In certain circumstances where these management decisions do not adequately address the threats posed by climate change, managers may need to intervene and assist adaptation processes within the wilderness area.

Subsistence use and relationship values of wilderness. Subsistence users are a powerful and necessary partner for the protection and stewardship of large wilderness areas. These constituencies, who are often but not always Indigenous Peoples, can have deep cultural and traditional connections to the landscape.

Managing wilderness for sacred values. As many areas considered sacred—for various reasons—are located in wild lands and seascapes, managers and all wilderness lovers need to be aware of the areas’ metaphysical nature and value to some faiths or traditional cultures, and not only refrain from damaging behaviour but also be supportive of any efforts to protect them from sacrilegious development.

Variance. Variations occur for practical reasons, for political expediency, for the rights of Indigenous Peoples, for competing legislative mandates, and for many other reasons. Permitting variations requires a well-thought-through approach to appropriately manage them, while still meeting the purposes of protecting wilderness values.

Incorporating science into management decisions. Wilderness is a place where baseline ecological processes and human impacts can be established and monitored to lend value to local, regional, and global research. Therefore, the systematic study of testable hypotheses—science—is a necessary tenet of all wilderness management decisions.

Evaluating effectiveness of IUCN protected area management Category 1b sites

Evaluating effectiveness of IUCN protected area management Category 1b sites. Wilderness decision makers must evaluate the ability of a wilderness protected area to conserve the site’s wilderness attributes and values. It is crucial to know if a site can meet its ecological and social objectives.

Please accept a few concluding thoughts from the IUCN WCPA Wilderness Specialist Group as a means for us to recognize and appreciate your personal commitment to wild nature. You are no doubt aware that wild nature, per se, is not just another natural resource. As author Rod Nash (1982) pointed out many years ago in *Wilderness and the American Mind*, ‘...wilderness is not a resource, it is the source.’ Humankind and all life on earth evolved in wild conditions over countless millions of years. Our job as managers and policymakers is that of a steward, charged with taking care of that age-old, dynamically changing, valuable, and intricate network of natural relationships—and its precious force that defies complete description—which must continue to evolve in its own inimitable way to assure a healthy, vibrant, and diverse planet earth. As you contemplate and act upon this reality, and the complications inherent in managing it, please know that the foundation of these Guidelines is simple: a wilder world is a better world for all life, all people, now and in the future.

Sincerely,
The IUCN WCPA Wilderness Specialist Group

Introduction

1



1.1 What is wilderness?

Three meanings of wilderness

The term “wilderness” is used in a variety of ways. It is a biological descriptor, referring to places that are mainly ecologically intact. It is a type of protected-area classification, referring to a category of protected areas that seek to maintain wilderness quality over time, while still allowing for human uses that are compatible with those wilderness qualities. It is also used to describe an essential dimension of human culture, which is that humans, like all other species, were born in the wilderness: they evolved for millions of years in caves, trees and open savannahs (Martin & Robles Gil, 2009). To complicate matters further, the term wilderness is often used colloquially to describe a wide range of environments—from an overgrown urban park to a truly wild landscape—depending on the viewer’s personal experience and perspective.

These three meanings of wilderness are described further below. While the focus of these Guidelines is on wilderness protected areas, it is important to keep the other two definitions of the term in mind. Both are important for their own sake, and also in guiding wilderness protected area management. It is also worth noting that while the term wilderness is used in a number of different contexts, this multilayered diversity indicates a depth of meaning to and association with the human experience, and reflects its continuing strength and resonance.

Wilderness as a biological descriptor

In Old Norse, the term wilderness refers to land that is not under human control and where wild animals roam freely (Nash, 1982). The biological meaning of wilderness essentially follows this etymology. In a biological context,



Endangered species, like the Patagonian Huemul (*Hippocamelus bisulcus*) in the Torres del Paine National Park of Chile, are protected by wilderness designations. © Thomas Kramer Hepp

wilderness can be defined broadly as a landscape that is biologically and ecologically largely intact (that is, with respect to their ecosystems, species assemblages and ecosystem processes), mostly free of industrial infrastructure, and without significant human interference (Kormos, 2008; Watson, et al., 2009). While these qualities clearly exist on a spectrum, it is nonetheless possible to identify wild places around the world where human disturbance remains at a minimum. To map wilderness areas of global significance, Mittermeier, et al. (2003), specified three wilderness criteria and thresholds for measuring them: (1) size, such as a minimum area of 1 million hectares, (2) low population density, such as fewer than five people per square kilometre, and (3) intactness, such as at least 70 per cent of primary habitat remaining on an ecoregion basis. This analysis indicated roughly 44 per cent of the planet remained in a wilderness condition.

Wilderness as a protected area classification

The World Commission on Protected Areas (IUCN) Guidelines for Protected Area Management Categories include wilderness as Category 1b and define wilderness protected areas (see Section 1.2 for more discussion on the IUCN definition). These Guidelines recognize that political complexities and management challenges may sometimes require an incremental approach to establishing wilderness protected areas. This can involve starting with smaller and/or less intact protected areas that may require restoration and building up to larger, more intact areas over time. Thus, Category 1b sites may include large, highly intact areas as well as smaller areas whose wilderness qualities can be improved or whose boundaries may be expanded. Many wilderness laws and policies at national or subnational levels recognize that there are areas worth protecting under Category 1b, which may not fully meet a wilderness standard immediately, but have good potential to achieve wilderness qualities in the future.

Another important aspect of wilderness protected areas is that they do not exclude people (see Section 1.6). Rather, they exclude certain human uses that are not compatible with maintaining an area’s wilderness qualities. IUCN protected area management Category 1b recognizes a wide range of compatible uses in wilderness protected areas, as do many wilderness laws and policies (see Section 1.4).

Wilderness and human society

The fact that humans evolved in wild nature is fundamental to understanding the term wilderness. Wilderness refers to wild, biologically intact places, but the term also implies the presence of a human relationship with wild nature. That relationship can take many forms. For example, many Indigenous Peoples living near or within wilderness areas may not even have a word that equates to wilderness because they do not view wilderness as something distinct from themselves: they are culturally and personally integrated with the wild land and/or seascape, and have no experience of these being separate from their everyday lives or remote from their community (see Section 1.6 and Section 2.3) (Survival International, 2014). A wilderness area can also be a sacred landscape or a sacred natural site, visited by certain peoples or followers of a particular religion or spirituality (see Section 4.9). To an urban resident, a wilderness area may be a place for recreation, spiritual renewal, or both. Wilderness areas are also vital for the ecosystem services that are of value to humans and the environment through the four categories of



Hikers enjoying wilderness recreation in Skeleton Coast National Park, Namibia. (Tracks of Giants Expedition) © Vance G. Martin

services: support, provisioning, cultural and regulating. The human relationship with wild nature is an essential component of the term wilderness. Wilderness does not exclude people. On the contrary, wilderness implies a fundamental human relationship.

Critiques of wilderness

A discussion of the term wilderness is incomplete without acknowledging that the term attracts controversy and criticism. Some of these threads of criticism are summarized briefly below.

Critique 1: Some Indigenous Peoples resist using the term wilderness because of the cultural divide between their nature-based cultures and those of ‘westernized’, developed and time-driven cultures and because the wilderness concept was used to describe lands that were free of human habitation only because the indigenous inhabitants had been driven out. One essential goal of these Guidelines is to establish clearly and unequivocally that wilderness is not intended to exclude human use (see Section 1.4) and in particular use by Indigenous Peoples (see Section 1.6).

Critique 2: ‘Neo-greens’ bring together a number of related critiques of wilderness (Karieva & Marvier, 2012). Weurthner, et al., (2014) present both a good description of the various criticisms of wilderness promulgated by this neo-green movement and a series of essays from noted conservationists and academics in spirited and cogent defense.

The first criticism from the neo-green movement is the post-modern, de-constructionist suggestion that there is

no such thing as wilderness. This suggestion states that the wilderness concept is now a discredited 19th-century romantic ideal that ignored Indigenous Peoples and is no longer relevant because human impact on the planet is now so pervasive (as a result of pollution, climate change, rampant industrial infrastructure, and other factors) that there is nothing that remains on earth that is truly pristine. Although it is true that there are few places on the planet that can be considered untouched by human influence, pristine is not now and has never been used as a qualifying or defining criteria in any protected area or wilderness system in the world, although one sees use of the word on occasion as a general descriptor or as evocative language. Moreover, it is entirely possible to identify large areas on the planet that are predominantly in a wilderness condition—and many more that could be restored or rewilded—even if it is undoubtedly true that the human footprint is expanding very rapidly globally (see Section 4.7). Indigenous Peoples are important conservation partners in the wilderness movement and are not—and should not be—ignored by any definition of wilderness.

A related critique from the neo-green movement is that wilderness and other protected areas are failed experiments in conservation. This line of argument points to the continued decline of biodiversity and increasing species extinctions globally as prima facie evidence that wilderness protection and other protected areas have failed. This ignores a substantial and growing body of literature pointing to the success of protected areas where they have adequate budgets and professional staff, are designed and implemented in a participatory manner in concert with local communities and fully implementing rights-based approaches, and where they are not completely undermined by severe corruption and illegal use.

Critique 3: Finally, a third and also closely related critique is that wilderness is simply a ‘lost cause’. This argument suggests that our planet’s remaining wild places are doomed because expanding global populations and increasing resource use will overwhelm protected areas, ultimately leaving only a few remaining patches of wild nature on the planet. A corollary to this argument is that our entry into a new geological epoch of environmental degradation, the Anthropocene, is in fact a benign development: advances in technology will allow us to manage the planet in a garden-like state for the benefit of humanity (Marris, 2011). While human ingenuity and new technology will undoubtedly be critical on a more crowded planet, this technocratic suggestion that we can safely do away with the biosphere in which we evolved and which has nurtured us for millions of years is dangerously unrealistic.

Importance of wilderness

Far from being marginalized as some critics have suggested, wilderness and wilderness protected areas are more relevant than ever. First, because there is a growing appreciation of the intrinsic value of nature—those values unique to wilderness itself and beyond any human evaluation or connection, e.g., wilderness for wilderness’s sake—and the importance of respecting and protecting the diversity of life on earth. Second, because there is increasing understanding that the ecosystem services we all depend on, such as freshwater quality and carbon sequestration, are closely linked to and dependent on biodiversity and ecological integrity. Third, because of the realization that destroying wilderness areas in many cases means losing the incredible cultural and linguistic diversity these areas sustain. Thus, wilderness conservation, whether through government protected areas or initiatives led by communities, Indigenous Peoples or the private sector, is growing in importance. This fact is clearly reflected in the call to protect and ecologically interconnect half the planet, from the World Wilderness Congresses; the IUCN World Parks Congress 2014; the Biodiversity Leadership Forum; a growing number of non-governmental organizations, such as the WILD Foundation, Canadian Parks and Wilderness Society; and the world’s foremost conservation biologist E.O. Wilson (Wilson, 2016). For wilderness conservation to reach its full potential, however, we will need to generate a new view of the human relationship to nature: one of respect, reciprocity, and partnership, a philosophy and practice far more familiar to most Indigenous Peoples than to other cultures.



Wilderness areas protect flora and fauna biodiversity at the landscape level.
© Erin Saupe

1.2 What is a Category 1b protected area?

IUCN protected area management Category 1b (wilderness) areas are large-scale sites in which ecological processes can function with minimal human disturbance. These sites are defined as ‘Protected areas that are usually large, unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition’ (Dudley, 2013, p. 14).

Wilderness areas do not exclude people. Rather, they exclude certain human uses, in particular industrial uses, which are inconsistent with maintaining wilderness values. In fact, wilderness protected areas can be defined as places that are biologically intact, or largely intact, with which humans have a relationship (Kormos, 2008). That relationship can include the many Indigenous Peoples and Tribes live in these areas. It can also include rural or urban residents seeking solitude, recreation or other human benefits in wilderness protected areas.

Unprecedented levels of industrial activity, such as roads, mining, oil and gas development, logging, and hydropower projects, as well as climate change threaten the planet’s remaining wilderness areas. Such threats endanger the ability of Category 1b protected areas to conserve wilderness resources and to enable Indigenous Peoples to maintain traditional wilderness-based ways of life and customs, if desired. Approaches for combating and managing these severe threats can be found in Section 4 (Current Management Issues).

It is crucial to ensure the legal protection of enough wilderness areas of sufficient size. Wilderness protected areas are relevant and critical to many diverse aspects of human society. For example, because of their size and intactness, wilderness areas are essential to climate change mitigation and adaptation (Hilty, et al., 2012; Watson, et al., 2013). Wilderness areas are generally more resilient to climate change than smaller, less biologically intact areas. They are also critical to ensuring biodiversity conservation, especially for wide-ranging species, and for a wide range of other essential ecosystem services, from freshwater quality to maintaining the wild relatives of commercial crops (MEA, 2005; Mittermeier, et al., 2003). Wilderness areas are important biological benchmarks that provide examples of what intact or largely intact ecosystems contain. They are also very often homes, ‘to thousands of indigenous cultures living at low densities and provide livelihoods to local communities around the world (Sobrevilla, 2008) (Kormos, et al., 2015, p. 5).

A growing consensus has emerged that we need to protect a much larger percentage of the planet than called for under current multilateral agreements (Watson, et al., 2016). The science-based global vision of Nature Needs Half—protection of at least half of the world’s terrestrial and marine ecosystems—is supported by prominent scientists like Dr. Sylvia Earle and Dr. E.O. Wilson (whose similar work is referred to as “Half Earth”) (<http://www.natureneedshalf.org>; Locke, 2013; Wilson, 2016). The ‘Promise of Sydney’ document created at the IUCN World Parks Congress 2014 calls for a vision of the future in which the balance between human society and nature is restored (IUCN World Parks Congress 2014). Protecting new wilderness areas and enhancing the current protection of wilderness is vital to both



Category 1b protected areas, such as the Deosai Plateau Wilderness Park in Pakistan, are largely intact ecosystems essential to conservation efforts. © Mumtaz Haider

the Nature Needs Half vision and the vision outlined within the 'Promise of Sydney'. The number of designated Category 1b sites is increasing with time and will likely grow much larger and more diverse in the future (Kormos, 2008).

IUCN protected area management Category 1b has a core set of wilderness attributes and values. These include biological intactness, sacred areas, traditional use, absence of significant permanent infrastructure or commercial resource extraction, and opportunities for experiencing solitude, uncertainty and challenge. Wilderness areas should be evaluated for their ecological and social effectiveness in protecting these attributes and values (see Section 5).

While the concept of designating areas of minimal human use is old, and while the term wilderness is also old, use of the term wilderness within protected area nomenclature is relatively recent. The United States Forest Service first used the term in 1924 in the administrative designation of the Gila Wilderness in New Mexico. Forty years later, the United States Congress passed the Wilderness Act, which

globally was the first-ever national legislation of wilderness. As detailed in Section 1.3, the term wilderness was officially adopted into the IUCN Guidelines for Protected Area Management Categories in 1994.

Unlike other protected area categories, wilderness protected areas are the subject of national legislation in only 11 countries (Kormos, 2008). Wilderness as a category is more often the subject of provincial and state legislation or unit zoning. This category is often used as an administrative designation applied by managers or supervisors of protected areas. Thus, wilderness standards will vary between countries depending on circumstances ranging from geographical size, biographical context, and social-cultural histories and national relationship with the wilderness concept. These Guidelines provide the implementation tools to best protect wilderness attributes and values.

As is mentioned in numerous areas throughout these Guidelines, the number of wilderness areas and the use of non-intervention management characteristic of these areas is much more extensive than the actual use of the Category 1b designation (see Sections 1.5 and 4.7). National governments may change how they regard their protected areas and the IUCN classification system may evolve. A good example of this is Russia's system of Zapovedniki: 101 protected areas covering about 330,000 square kilometers—about 1.4 per cent of the country's total area—that includes a variety of ecosystems from isolated patches of steppe to large tracts of Siberia and the Arctic. The scale and diversity of the Zapovednik system clearly make it globally significant yet, on numerous occasions, it has been subjected to reductions in size or even degazettment of many specific sites, largely due to prevailing communist party ideology that regarded as elitist its prohibition of functional use of natural resources.

In the 21st century this attitude has waned, the system is viewed with renewed favor, and a new discussion has emerged regarding the appropriate use of Zapovedniki beyond pure scientific research. While international experts regard this system as an example of nationally legislated



The Wilderness Act of the United States protects wilderness areas such as the Popo Agie Wilderness in Wyoming. United States federal agencies are in the process of classifying their wilderness areas as Category 1b. © Danielle Lehle

wilderness (Kormos 2008), the Zapovednik system was originally established as category 1a (strictly for scientific research). As a result of this new thinking, some of these protected areas now allow wilderness-appropriate tourism in up to 5% of the specific zapovednik, but are still classified as Category 1a, igniting further discussion on if or how a zonation system would be used to use the 1b classification. An example is the world-famous Kronotsky Zapovednik, a World Heritage Area, with its wild landscapes and coastlines, extensive thermal features, classic volcanoes, Russian brown bears (*Ursus arctos beringianus*), and Steller's Sea Eagle (*Haliaeetus pelagicus*).



A red fox (*Vulpes vulpes*) in the Kronotsky Zapovednik, Kamchatka, Russia.
© Igor Shpilenok

IUCN's protected area categories classify protected areas according to their management objectives. While these categories are merely intended as guidelines, international bodies, such as the United Nations, and many national governments recognize them as the global standard for defining and recording protected areas and, as such, they are increasingly being incorporated into government legislation.

While the concept of wilderness is invariably applied in different ways according to cultures, languages, conservation perspectives and worldviews, these Guidelines suggest a baseline standard for wilderness management decisions. The IUCN protected area management Category 1b definition and management guidelines strive to integrate many and diverse views while still being consistent with core wilderness values.

1.3 History of the IUCN protected area management Category 1b

The concept of wilderness was not included in the 1978 publication that established the original set of IUCN categories (IUCN, 1978). The IUCN introduced protected area management Category 1b in 1994 because of growing demand and necessity for this category.

IUCN Senior Ecologist Raymond Dasmann suggested in 1972 at the Second World Parks Congress that a protected area management category system be adopted and explicitly used the term wilderness as one of the examples of what he referred to as 'Strict Nature Reserves' (Phillips, 2008, p. 14). Kenton Miller, who served both as IUCN Director General and Chairman of IUCN's Commission on National Parks and Protected Areas, led an international team that investigated the usefulness of protected area categories and in 1978

published a table that used the term 'wildlands' as a major protected area classification (Miller, 2008).

The World Wilderness Congress played a decisive role in developing the wilderness concept for consideration as an IUCN category and advocating for its adoption (Eidsvik, 1990). At the 1st World Wilderness Congress (Johannesburg, South Africa, 1977), the lack of an international definition for wilderness was noted. At the 2nd World Wilderness Congress (Queensland, Australia, 1980), a committee headed by Dr. George Stankey, United States Forest Service, reported on various ways to approach and shape such a definition, given the diverse views and uses of the term (Martin, 1982).

At the 3rd World Wilderness Congress (Inverness and Findhorn, Scotland, 1983) an informal caucus was formed around the commitment to advocate within the IUCN for official adoption of a wilderness category (Martin & Inglis, 1984). Coordinated by the 3rd World Wilderness Congress Executive Director, Vance G. Martin, this caucus was energized and informed by Ian Player (Founder, World Wilderness Congress), Sierra Club leaders Dr. Ed Wayburn (President) and Mike McCloskey (Executive Director and, later, Chairman). Also in this caucus and especially helpful because of their positions and long experience within IUCN were Dr. Kenton Miller (Chairman, IUCN Commission on National Parks and Protected Areas, and subsequently the Director-General) and Harold Eidsvik (Parks Canada and subsequently Chairman, IUCN Commission on National Parks and Protected Areas).

In 1984, subsequent to IUCN General Assembly resolutions calling for more recognition of wilderness and for inclusion of Indigenous Peoples in protected areas, members of this caucus and others within the Commission on National Parks and Protected Areas created a task force to review and update the categories. In 1994 at the IUCN General Assembly in Buenos Aires, the current protected area categories, including Category 1b, were adopted and wilderness was officially recognized for the first time within the IUCN (Dudley, et al., 2012).

At the IUCN World Commission on Protected Areas meeting during the World Conservation Congress in Amman, Jordan, in 2000, Vance G. Martin (President, WILD Foundation) proposed that a Wilderness Task Force be established. Terms of Reference were adopted in 2002 that, among other things, created the first official linkage between the World Wilderness Congress and the IUCN. The Wilderness Task Force was upgraded to a Wilderness Specialist Group in 2009.

In 2004 at the IUCN World Conservation Congress in Bangkok, a resolution was adopted requesting the IUCN World Commission on Protected Areas to review and revise its guidelines for protected areas. Three years of intensive debate (coordinated by Nigel Dudley and Sue Stolton) produced over 50 papers containing many suggestions (one of which proposed that descriptive nouns such as wilderness and national parks should be dropped in favour of using only category numbers). Then, a Protected Area Summit convened 100 invited protected area experts in Almeria, Spain, in 2007 (Dudley & Stolton, 2008). Core members of the Wilderness Task Force (Cyril F. Kormos, Harvey Locke, and Vance G. Martin) and others presented formal and adjunct arguments promoting nature conservation as the highest value of protected areas, and the key role of wilderness in fulfilling this objective.

Thoroughly debated and ultimately adopted, the primacy of nature conservation was one of the central outcomes of the Almeria Summit. This rigorous three-year process and its outcomes subsequently informed the IUCN World Commission on Protected Areas 2008 Guidelines on Protected Area Categories, which were approved at the World Conservation Congress in Barcelona, Spain (Dudley, et al., 2012). In these revised guidelines, both Category 1b and the term wilderness were retained.

The IUCN categories are meant to be voluntary, helpful guidelines that are not mandatory. Many, but not all, nations use the IUCN protected area management category system as a reference, supported also by decision of the Convention on Biological Diversity. Some IUCN member nations do not yet choose to use these categories, often because they feel that their own protected area system is well-established and independent. Another example is the United States federal land management agencies that have only recently considered assigning IUCN categories to their protected areas. This change was influenced by the first international agreement on wilderness: the North American Intergovernmental Committee on Cooperation for Wilderness and Protected Area Conservation (NAWPA) (<http://www.nawpacommittee.org>).



Rio San Pedro Mizquitl, the last free-flowing and undammed river in Mexico's Western Sierra Madre. © Jaime Rojo

Representatives of the governments of Canada, Mexico and the United States collaboratively designed NAWPA, which was facilitated by the WILD Foundation and government partners as part of WILD9, the 9th World Wilderness Congress in Mérida, Mexico, in 2009. Leaders of all North American national land management agencies signed NAWPA during WILD9. The NAWPA committee continues today with an agenda to create a track record of practical outcomes for wilderness and other protected areas (see Marine Wilderness, Section 4.6). As of publication of this document, the United States' agencies are beginning the process of assigning the IUCN categories to their existing protected area system and will, therefore, complement their NAWPA partners in Mexico and Canada in this regard.

The IUCN Wilderness Specialist Group is facilitated by the WILD Foundation (<http://www.wild.org>) and associates. The IUCN Wilderness Specialist Group remains the coordinating hub for protected area management Category 1b within the WCPA and IUCN.

1.4 Objective of the IUCN protected area management Category 1b

Objective

Consistent with the 2008 Almeria Summit's results, the primary management objective of Category 1b is nature conservation: management that will protect the long-term ecological integrity of natural areas that are undisturbed by significant human activity, have no modern infrastructure, and are characterized by freely occurring and reasonably intact natural processes. An important aspect of this objective is the emphasis on biological health and intactness.



Category 1b objectives help protect biodiversity, including vulnerable species such as the Shoebill stork (*Balaeniceps rex*) that ranges from South Sudan to Zambia. © Daniel Field

Compatible objectives

Where the biological integrity of a wilderness protected area can be secured and the primary objective of nature conservation is met, the management focus of the wilderness area may include other objectives such as recreation or other human uses, but only if the primary objective is maintained securely. Traditional ways of life and cultural and spiritual uses are commonly considered compatible with wilderness management and, as noted throughout these Guidelines, rights-based approaches should be fully implemented at all times. Specific important objectives include:

1. Recreation and access

In contrast to Category 1a, which in most cases disallows public access, Category 1b encourages such public experience but only if it will maintain the wilderness qualities of the area for present and future generations. Mechanical and motorized access is uniformly not allowed, but with

notable exceptions, sometimes made for subsistence ways of life in very remote areas. Examples of this include the use of snowmobiles by Alaska (ANILCA 3121b, 1980), or for pre-existing uses, such as occasional access to cemeteries (Wadzinski, 2007) or to maintain pre-existing dams (Gunderson & Cook, 2007).

2. Traditional ways of life

Category 1b exists to enable Indigenous Peoples, Tribes, and local communities to maintain their traditional wilderness-based ways of life and customs, living at low density and using the available resources in ways compatible with conservation objectives. For example, the ability of Saami people in Northern Fennoscandia to continue their reindeer herding.

3. Cultural and spiritual uses

Category 1b promotes the protection of relevant non-material benefits, such as solitude, respect for sacred sites, and respect for ancestors. While this has always been evident for Indigenous Peoples' communities, the concept of wilderness as a place of worship for many non-traditional people is gaining currency as public participation wanes in institutionalized religion (Van Wieren & Kellert, 2013; Ashley, et al., 2015; Heintzman, 2015). The types of experiences most associated with this are 'awe, wonder, transformation, connection' (Ashley, 2012).

4. Education and science

Category 1b allows for low-impact educational and scientific research activities. Often, such undertakings require being within wilderness areas and cannot be conducted outside the wilderness.

Exceptions to objectives

Although we have referred thus far entirely to large, intact areas of land and sea, the objectives above are equally important when applied to (a) somewhat disturbed areas that are capable of restoration to a wilderness state—a process commonly referred to as 'rewilding' (Johns, 2016)—and (b) smaller areas that might be expanded over time. Both of these types of areas could play an important role in a larger wilderness protection strategy to form linkages or as part of a system of protected areas that includes wilderness, if the management objectives for those somewhat disturbed or smaller areas are otherwise consistent with the objectives set out above.

1.5 Extent of Category 1b sites

Forty-eight countries have wilderness areas established via legislative designation as IUCN protected area management Category 1b sites that do not overlap with any other IUCN designation. They are: Australia, Austria, Bahamas, Bangladesh, Bermuda, Bosnia and Herzegovina, Botswana, Canada, Cayman Islands, Costa Rica, Croatia, Cuba, Czech Republic, Democratic Republic of Congo, Denmark, Dominican Republic, Equatorial Guinea, Estonia, Finland, French Guyana, Greenland, Iceland, India, Indonesia, Japan, Latvia, Liechtenstein, Luxembourg, Malta, Marshall Islands, Mexico, Mongolia, Nepal, New Zealand, Norway, Northern Mariana Islands, Portugal, Seychelles, Serbia, Singapore,

Slovakia, Slovenia, Spain, Sri Lanka, Sweden, Tanzania, United States of America, and Zimbabwe.

At publication, there are 2,992 marine and terrestrial wilderness areas registered with the IUCN as solely Category 1b sites (IUCN & UNEP-WCMC, 2016).

Twenty-three other countries have wilderness areas. These wilderness areas are established via administrative designation or wilderness zones within protected areas. Whereas the above listing contains countries with wilderness exclusively designated as Category 1b sites, some of the below-listed countries contain protected areas with multiple management categories including Category 1b. They are: Argentina, Bhutan, Brazil, Chile, Honduras, Germany, Italy, Kenya, Malaysia, Namibia, Nepal, Pakistan, Panama, Peru, Philippines, the Russian Federation, South Africa, Switzerland, Uganda, Ukraine, the United Kingdom of Great Britain and Northern Ireland, Venezuela, and Zambia.

In 1989, 44 wilderness areas were registered within the IUCN system (Eidsvik, 1989), indicating a dramatic increase in both global efforts in wilderness protection and cohesive reporting processes. The most up-to-date information regarding Category 1b-designated sites can be accessed through the World Database on Protected Areas: <http://www.protectedplanet.net>.

The practice of non-intervention management of biologically intact wild areas with wilderness qualities is more widespread and growing more quickly than the actual assignment of areas to Category 1b. This difference is largely due to the fact that decisions on management zoning of protected areas are often made at a managerial level without a formal designation process beyond management plans. Examples can be found in many countries (see Section 4.7), such as the Krkonoše National Park in the Czech Republic in which a core zone of some 10,000 hectares (almost 30 per cent of the park) is managed strictly with non-intervention principles and is signposted to inform visitors of the wilderness qualities. Despite these adherences to Category 1b designation, Krkonoše National Park only uses one overall classification, Category V, because other zones in the park have numerous pre-existing villages, ski hills, and other tourist developments. For this reason, these Guidelines emphasize the management principles necessary both to address areas already designated and to assist towards eventual designation of such areas as Category 1b.

The governance structures of wilderness protected areas vary across and within countries. For more detail on wilderness governance, see Section 3. Wilderness protected areas have a critical role to play as the world works to stop biodiversity loss and safeguard ecosystem services.

1.6 Inclusion of Indigenous Peoples and local communities

In many cases, Indigenous Peoples' traditional knowledge systems, customary rights, governance and cultural practices sustained wilderness before there was a 'wilderness' concept (Cajune, et al., 2008; Martin & Sloan, 2012). In the majority of cases, conservation schemes were developed and superimposed on Indigenous Peoples' and local communities' territories without adequate consultation or inclusion. This process resulted in gross violations of rights and has been

a detriment to both conservation and Indigenous Peoples (Stevens & DeLacy, 1997; Stevens, 2014).

In a growing number of cases around the world, Indigenous Peoples and local communities have regained management and/or governance control of resources through self-determination, legal advances, and negotiated partnerships with non-tribal governments and national agencies. There are also an increasing number of cases in which Indigenous Peoples have been able to preserve or regain complete territorial control of their land, including environmental protection and wildlife management (Confederated Salish & Kootenai Tribes, 2005; Martin, et al., 2011), and notably through negotiations between local communities and national governments in Brazil and Australia.

It should be noted that the majority of wilderness conservation priorities for this century are on Indigenous Peoples' lands and seas. These natural areas and ancestral homelands are the location of multi-stakeholder conservation accomplishments, integrating the management and governance approaches of Indigenous Peoples, local communities and institutional conservation (Stevens, 2014). These same areas are also sometimes the site of continued violations of human rights, treaties and cultural values. Ongoing, these abuses undermine Indigenous Peoples' well-being, ways of life, cultural practices, and economic stability, and result in the inability of Indigenous Peoples to continue cultural practices that include stewardship and protection for the earth. This is a detriment to both Indigenous Peoples and these natural areas and is counterproductive to global conservation goals to protect and sustain wild nature. Current trends suggest that conservation schemes that may have been adequate historically, including those applied by Indigenous Peoples and local communities and institutional and contemporary conservation, are often not sufficient in the face of mounting pressures of climate change, industrial impacts, and increased environmental degradation. New approaches are needed, including strengthened partnerships between Indigenous Peoples and local communities and non-indigenous governments and agencies. As stated in the 2014 'Promise of Sydney':

[By] working in partnership with and recognizing the long traditions and knowledge, collective rights and responsibilities of Indigenous Peoples and local communities to land, water, natural resource and culture, we will seek to redress and remedy past and continuing injustices in accord with international agreements (Promise of Sydney, IUCN World Parks Congress, November 2014).

The true partnership between Indigenous Peoples' governments and non-indigenous governments within wilderness areas is one of the most important and challenging areas of work. Extra attention is both required and deserved. This is emphasized by the fact that two of the four compatible objectives for Category 1b relate specifically (though not entirely) to Indigenous Peoples and non-indigenous local communities:

- To enable Indigenous Peoples to maintain their traditional wilderness-based ways of life and customs, living at low density and using the available resources in ways compatible with the conservation objectives; and
- To protect the relevant cultural and spiritual values and non-material benefits to Indigenous Peoples or non-

indigenous populations, such as solitude, respect for sacred sites, and respect for ancestors.

The ultimate best-practice approach to wilderness management with Indigenous Peoples and non-indigenous governments is to collaborate from the beginning. Work together to first identify the areas for wilderness designation. Cooperatively design appropriate, ecologically sensitive and culturally relevant management plans that protect wilderness values while allowing Indigenous Peoples and local communities to maintain their relationship with the wilderness area for customs, ceremonies, ancestral respect, and subsistence uses. Too often, especially in the 20th century, this was not the case and central governments declared wilderness areas with little or no local consultation. Though lack of consultation still occurs in some countries, the accepted international standard is free, prior, and informed consent (FPIC) (United Nations Declaration on the Rights of Indigenous Peoples, 2007, article 10). Extensive consultation is now the norm but not yet universally practiced. A free, prior and informed consent process should be used through all planning, policymaking and policy implementation in wilderness protected areas.

The Akwé: Kon guidelines provide a collaborative framework for the conduct of cultural, environmental and social impact assessment regarding developments proposed to take place on, or which are likely to impact, sacred sites and lands and waters traditionally occupied or used by indigenous and local communities (Secretariat of the Convention on Biological Diversity, 2004). At the 7th CBD Conference of Parties, the Akwé: Kon guidelines were adopted. The Guidelines suggest a 10-step process for impact assessment of proposed developments taking place on or impacting traditional lands (Secretariat of the Convention on Biological Diversity, 2004). The Akwé: Kon guidelines can be found in seven different languages on the CBD website: <https://www.cbd.int/traditional/guidelines.shtml>.

In Alaska and throughout the North, most of the elders say that knowledge without the wisdom to guide application of knowledge is useless and may be harmful.

The best wilderness management is a composite of science and culture, and this is nowhere more important than when considering wilderness areas either inhabited by Indigenous Peoples or areas that have active land claims. Some central and guiding realities that Category 1b decision makers need to use when considering such areas are:

1. **Partnership**—Indigenous Peoples are not just another group in a diverse range of stakeholders to be consulted as management plans are developed. Indigenous Peoples are partners: Category 1b lands or seas under consideration have been their physical and cultural home for centuries, if not millennia, prior to colonization. In most cases, except for the very few instances where local communities have jurisdiction over land declared as wilderness with management authority vested in the Tribe or community, the authority of the current governing institution arose far later than that of the resident Indigenous Peoples.
2. **Reciprocity**—Indigenous Peoples' culture, by definition, is fully integrated with the entirety of nature (landscape and seascape, flora, fauna, sky, and soil), and the people are in relationship with nature. Therefore, even

aboriginal land practices such as fire management and subsistence harvesting (hunting, gathering) are viewed through the perspective of ‘reciprocity’ rather than ‘best-practice management’. In this case, ‘reciprocity’ can be defined as the quality that informs a partnership, whereby the partners share equally with each other all aspects of the partners’ lives and reality. This is also demonstrated through the way that most Indigenous cultures understand the world and build knowledge and wisdom. Indigenous science is assembled and deployed subjectively, compared to the objective nature of contemporary scientific and management inquiry (Berkes, 2012; Watson, et al., 2003; Watson, et al., 2011). Subjective knowledge derives from and drives towards holistic understanding, whereas objective knowledge is reductionist, tending to narrow information to the smallest parts in order to understand (Berkes, 2012).

Few human communities are homogeneous. This is as true of Indigenous Peoples and local communities as it is of non-indigenous communities. Internal factors and externalities are always at work: level of education and economic development, religion, rivalries, greed, outside influences and other factors are common in all communities. In many ways, when working with Indigenous Peoples’ communities—or any local community—the non-indigenous government wilderness manager is almost always regarded by local people as another outside, often intrusive, and complicating influence.

In such cases, the manager needs to be mindful of and practice five important behavioural tools:

1. **Time**—Significant time should be spent within these communities or with their representatives. Relationships, built over extended periods, should be formed before questions are asked and answers expected.
2. **Solutions**—Understand that non-indigenous, western-style education teaches people to prioritize the creation and deployment of solutions. This needs to be somewhat reversed when working with local communities. Assume that they already have the answers to the management issue(s) and do your best to reaffirm that, work with it, and slowly interject your own ideas. Effective management plans empower people to understand their important role in the situation being managed.
3. **Sociability**—Sociability or mutual social interaction is key when working with people. For example, humour is generally an intrinsic part of conversations, of sharing knowledge and building relationships.
4. **Knowledge**—Indigenous Peoples have repeatedly had their traditional knowledge, customs, ceremonies, images, and cultural artefacts stolen, used without permission, and/or otherwise abused. Justifiable sensitivities abound around this issue. Asking permission is both polite and necessary, as is giving attribution to any contributions.
5. **Flexibility**—Inevitable changes in ideas, objectives, timelines and processes will occur. A successful wilderness decision maker will navigate these changes with grace and goodwill. Adapting to changes does not necessarily require abandonment of original ideas, but rather patience, persistence, and perseverance towards the overarching goals.

Consultative management and co-management

As national governments increasingly and appropriately recognize Indigenous Peoples’ land claims, numerous innovations have been devised to accommodate wilderness management. At a minimum, wilderness decision makers should incorporate consultative management strategies within their management plans to ensure Indigenous Peoples’ ability to partner in all decisions.

Co-management between indigenous governments and non-indigenous governments should be sought for wilderness areas (Stevenson, 2006). Such co-management structures should be based upon respect of Indigenous Peoples and of their rights (Carlsson & Berkes, 2005; Casson, 2015; Nie, 2008). Within the United States, the Native Environmental Sovereignty Project at the University of Oregon is an important resource (<https://law.uoregon.edu/explore/ENR-nesp>). Canada is very advanced in this regard, as they work with their First Nations to increase and manage wilderness areas. An example of this is the large expansion of the Nahanni National Park, with the Dene leaders and people playing a primary role in the negotiations that extended for many years (The Deh Cho First Nations, The Government of Canada, and The Government of the Northwest Territories, 2001a; The Deh Cho First Nations, The Government of Canada, and The Government of the Northwest Territories, 2001b; Parks Canada, 2010; UNESCO World Heritage Committee, 2011).

Australia has developed excellent policy and practice in this regard, with some of the best and varied examples of consultative management and co-management (Ens, et al., 2012). The Australian government’s practices include a range of approaches (Hill, et al., 2011; Hill, et al., 2012). In some instances, Indigenous Peoples have formally ceded management responsibilities to state or national government. In other instances, indigenous governments and non-indigenous governments establish co-management regimes in which responsibilities are shared and overseen by a committee representing both local and governmental interests. In all cases, Indigenous Peoples are assured rights of access and ‘appropriate’ mechanized transport to assure noninterference with their customs and traditions while still assuring protection of wild processes and systems. A policy statement by the Australian Conservation Foundation (1999) remains one of the best outlines of management approaches in regard to Wilderness and Indigenous Cultural Landscapes.

Variance within Category 1b for Indigenous Peoples and local communities

Management plans for wilderness that has Indigenous Peoples and local communities living in and around it may require variance or management exceptions. See sections 3.7 and 4.10 for more information.

1.7 Application of Category 1b: assignment and reporting

Once wilderness decision makers select Category 1b as the appropriate IUCN protected area management category, the site's decision makers should follow IUCN protocol for the assignment and reporting process to properly categorize a wilderness area as an IUCN protected area management Category 1b site. The governance body that oversees the site is responsible for the process of assignment. As is detailed in Section 3, governance of a wilderness area can be varied. The assignment principles for an IUCN category apply to all governance types of wilderness areas. As outlined by Dudley (2013, p. 39), there are five principles for assignment:

1. **Responsibility**—The ability to assign protected area management category type lies within the governing body responsible for the uses of the land and water within the wilderness area.
2. **Democracy**—All partners and stakeholders related to the wilderness area should be consulted prior to the final assignment.
3. **Grievance procedure**—Those opposed to the proposed assigned wilderness category should have the ability to challenge the decision in due process.
4. **Data management**—Data collected within the wilderness area should be reported to the United Nations Environment Programme (UNEP) World Conservation Monitoring Centre, and through the Convention on Biological Diversity (CBD) Focal Points as part of the National Reports to the CBD.
5. **Verification**—IUCN may soon institute a verification system through which all protected areas can choose to have their site verified as complying with protected area management category objectives.

To assign wilderness status and report on that status, follow these seven steps (modified from Dudley, 2013, p. 40):

1. Identify the management objectives of the site.
2. Assess whether the site meets the IUCN definition of a wilderness protected area.
3. Document the wilderness characteristics (such as wilderness values, management objectives and governing bodies) and the justification for wilderness protected area status.
4. Consult with relevant partners and stakeholders to agree on wilderness category designation.
5. Propose that the area be designated as protected area management Category 1b.
6. Have the governing body of the site make the final decision of assigning protected area management Category 1b designation to the site.
7. Report the wilderness category assignment to UNEP World Conservation Monitoring Centre for site inclusion in the World Database on Protected Areas.

Whenever possible, communicate updates to the UNEP World Conservation Monitoring Centre. At a minimum, communicate annually to UNEP and the international conservation community. Communicate important ongoing work, challenges and successes of the wilderness site through publication in academic peer-reviewed journals, such as the *International Journal of Wilderness*, in conference presentations, and in publicly accessible documents and newspapers. Publications, whenever possible, should be written by a multitude of wilderness partners and stakeholders. When possible, all documents should be translated into the languages used by the wilderness partners and stakeholders.



Management Principles

2



2.1 Manage wilderness comprehensively through large-scale, intact wilderness protected areas and connectivity among wilderness protected areas

Guiding principles

Wilderness areas and other forms of protected areas are the foundation of nature conservation. Alone, a single protected area is rarely big enough to secure the perpetuation of the species and ecological processes they are meant to protect. Scientific studies of species extinction patterns, natural processes and climate-change adaptation have established the need to move from managing exclusively at the level of individual protected areas to working across entire landscapes (Locke, 2012).

Key considerations

Ecosystem viability

Conservation biology recognizes four goals that must be met to ensure the long-term viability of an ecoregion. (1) All native ecosystem types must be represented in protected areas; (2) populations of all native species must be maintained in natural patterns of abundance and distribution; (3) ecological processes such as hydrological processes and fire regimes must be maintained; and (4) the resilience to short-term and long-term environmental change must be ensured (Schmiegelow, et al., 2006). Achieving these objectives requires an extensive interconnected network of protected areas and sustainable management of the surrounding areas (Borealbirds, 2007).

Wilderness protected areas support these goals. In general, the species most difficult to protect are the apex predators that compete with humans for prey or forage or can threaten humans or their property. Animals such as elephants, lions, tigers, and grizzly bears need large ranges to meet their life



The Jeddediah Smith Wilderness in the United States is managed in coordination with other protected areas to ensure ecosystem viability. © Danielle Lehle

needs and to raise their young in security. They also occur at relatively low densities, which means that these species require safe access to large landscapes to maintain viable populations. Interconnected wilderness areas and protected areas with movement corridors or linkage zones can achieve this. Protecting wilderness habitat across a broader range of ecological, geographical and geophysical occurrence of species provides the greatest opportunity for evolutionary processes to persist regardless of imminent changes in the future (Aycrigg, 2013).

Ecological processes such as flooding, fires and windstorms are essential to the life cycles of many organisms and to nutrient cycling. Large, intact, connected areas are required to sustain these ecological processes. In the Amazon Basin, where the forest itself generates the process of rainfall, maintaining an enormous amount of forest cover is necessary to ensure the perpetuation of conditions conducive to the survival of the forest (Pöschl, et al., 2010). See Figure 1 for a map of protected areas within Amazonia.

Implementation

Unfragmented landscapes

In unfragmented landscapes, it is better to have as large a wilderness protected area as is possible (Hodgson, et

Case study 1

Khan Khentii Strictly Protected Area, Mongolia

At three times the size of Yellowstone National Park in the United States, Khan Khentii Strictly Protected Area of Mongolia is 12,270 square kilometers (IUCN & UNEP-WCMC, 2016). The Mongolian government designated it as an IUCN protected area management Category 1b in 2012. Khan Khentii Strictly Protected Area's large size encompasses space necessary to protect endangered species, such as Siberian taimen (*Hucho taimen*), a large fish in the salmon family. While quite large, the site requires expansion to adequately protect the Siberian taimen's migration routes and spawning grounds. Further expansions proposed have been blocked because of mineral extraction in the surrounding areas (Harrington, 2005) (see Section 2.11). Connectivity among wilderness protected areas or an expansion of this important protected area may prove essential in ensuring this protected area continues to uphold its wilderness values. Beyond the site's important ecological contributions, Khan Khentii also protects the sacred Burkan Khaldun Mountains, the birthplace of Genghis Khan, an important religious site, and a designated UNESCO World Heritage Site (UNESCO, 2015).

al., 2009). Very large wilderness areas can provide all of the requirements of the four goals of conservation biology. Representation can be achieved by including a diverse range of ecoregions and spots of endemism; native species can be protected by protecting most of their range and allowing for migration; ecological processes can operate without interference and create habitat that encompasses several ecological stages; and resilience to stressors such as climate change can be provided by protecting landscapes or seascapes that cross several degrees of latitude, large elevational gradients and poleward-facing aspects.

This level of conservation has largely been achieved in the Serengeti-Mara Ecosystem through a variety of designations, including transboundary governance (Thirgood, et al., 2004). Large size can also be achieved by combining wilderness areas with protected areas in large nodes connected to each other across a very large landscape, as is being done with national parks in the Yellowstone to Yukon Region of North America (Locke & Heuer, 2015).

Fragmented landscapes

In fragmented landscapes, connectivity among wilderness areas will be required to maintain resilience (Heller & Zavaleta, 2009). Wilderness managers should work with a wide variety of actors to achieve effective large-landscape conservation (Locke, 2012). Species populations require connectivity among protected areas to maintain genetic

diversity. Connectivity will usually be achieved by designations other than wilderness, such as the wide variety of protected area mechanisms IUCN recognizes through its Guidelines for Protected Areas (Dudley, 2013) and across a diversity of governance arrangements, including privately conserved areas and Indigenous and Community Conserved Areas and Territories. Roughly half of any given ecoregion will need to be protected in an interconnected way to achieve the four goals of conservation biology and to achieve the Nature Needs Half concept (<http://www.natureneedshalf.org>; Locke, 2013; Wilson, 2016).

Recommended reading

- Worboys, G., Francis, W., and Lockwood, M. (eds.) (2010). *Connectivity Conservation Management: A Global Guide*. Earthscan, London.
- Worboys, G.L., Ament, R., Day, J.C., Locke, H., McClure, M., Tabor, G., and Woodley, S. (eds.) (2015a). *Consultation Draft, Guidelines for Connectivity Conservation: Part One, Definition: Connectivity Conservation Area*. IUCN, Gland, Switzerland.
- Worboys, G.L., Ament, R., Day, J.C., McClure, M., Pittock, J., Tabor, G., and Woodley, S. (eds.) (2015b). *Consultation Draft, Guidelines for Connectivity Conservation: Part Two, Connectivity Conservation Area Types; Criteria for Establishment; And, Governance*. IUCN, Gland, Switzerland.

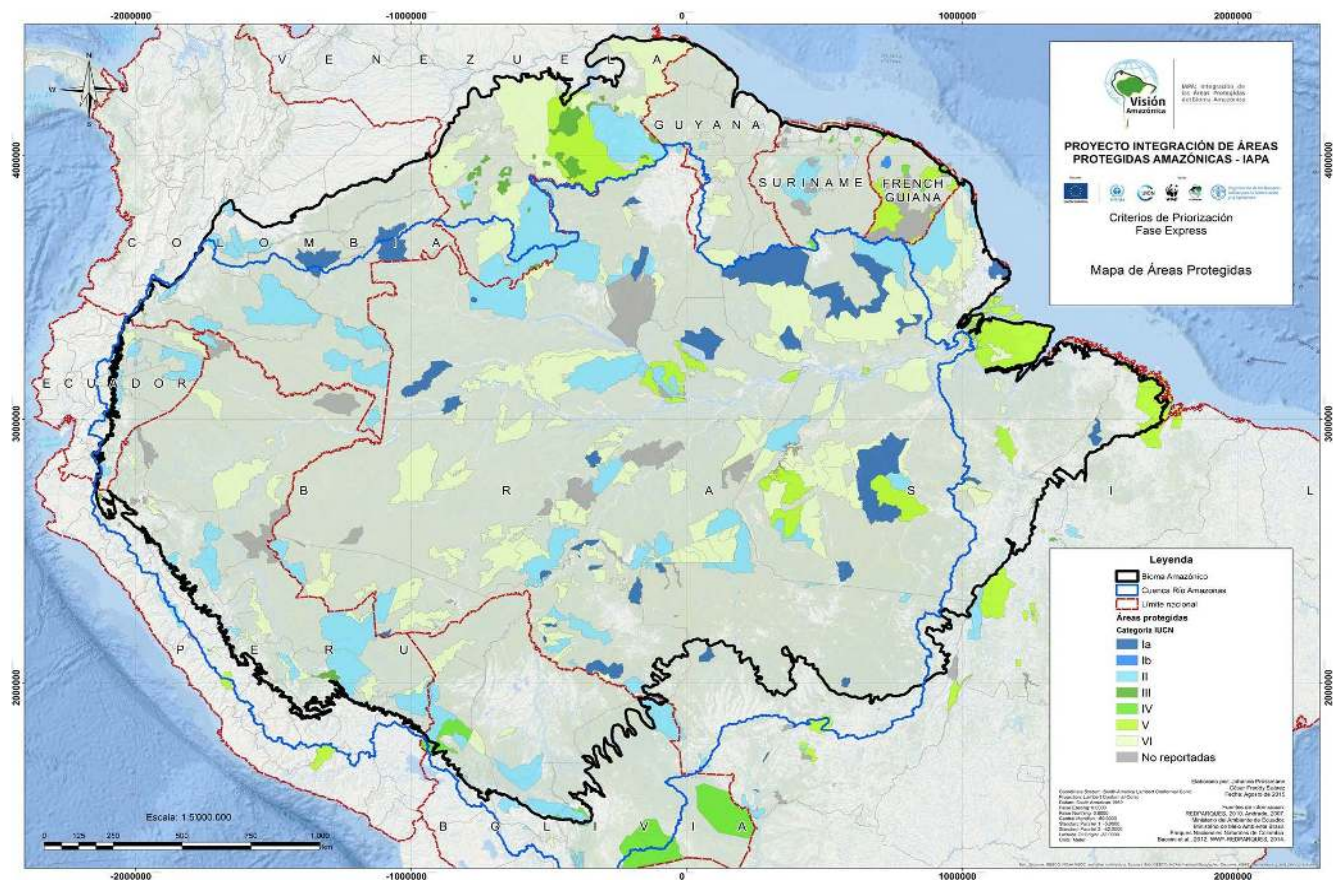


Figure 1. Map of protected areas within Amazonia. A very important precedent is the Redparques Declaration signed in Peru in 2015, in which 18 Latin American nations formalized a commitment to integrate their protected areas, including Category 1b, in climate change strategies and asked for the official inclusion of protected areas in the United Nations Framework Convention on Climate Change global discussions (World Wildlife Fund, 2015). Protection of large-scale, intact wilderness areas and of connectivity between wilderness areas are important aspects of climate change mitigation. © World Wildlife Fund

2.2 Manage wilderness to maintain the highest integrity of ecosystems, wildlife, and sacred and traditional cultural-use sites

Guiding principles

Once the wilderness environmental or cultural resources areas are degraded by human activity and exploited for non-wilderness land uses such as forestry or mineral extraction, they cannot easily be restored. Sometimes restoration actions can be taken before designation, but after designation an important protection priority is to adopt a non-degradation concept (Dawson & Hendee, 2009). Non-degradation is defined as the maintenance of existing environmental conditions where they meet or exceed minimum standards of wilderness and cultural values. The concept is best applied when the ecological integrity of an area is maintained as far as possible, free from human impact, interference and influence (Dawson & Hendee, 2009). Wilderness sites, and the cultural sites within, should be managed to maintain the highest integrity of all components of ecosystems, wildlife and cultural meaning through an explicit focus on non-degradation. When necessary, the concept of managing for non-degradation provides an opportunity to also upgrade or restore wilderness quality.

Key considerations

Managing for non-degradation requires the maintenance of wilderness conditions to prevent undue deterioration. It is necessary that wilderness decision makers ensure the non-degradation of all sacred and traditional use sites within wilderness areas.

Though there are other areas that require management decisions to limit degradation, three areas in need of particular management consideration are: establishing baselines, compiling inventories of cultural sites, and monitoring visitation.

Baselines

To ensure non-degradation, management must define a baseline against which degradation can be measured. This baseline will influence how priorities are set for restoration and monitoring and future goal planning. An understanding of baseline conditions is essential to measure the pre-existing impacts and influences of human activity. Degradation of a wilderness area is assessed against this quantitative baseline.

To prevent a shifting baseline—in which target conditions are based on living memory that slowly degrades from one generation to the next—management should rely upon and document as many data sources as possible to inform the baseline to which degradation is measured (Papworth, et al., 2009). Evidence from a single source may not represent the true ecological conditions for natural ecosystems. Not accounting for shifting baselines in historic accounts can have a marked effect on what is and is not considered natural, even among trained ecologists (Pauly, 1995).

Cultural sites

Management under the non-degradation concept is not limited to the biophysical characteristics of wilderness areas, but applies equally to sacred and traditional cultural-use components. This type of management is essential to protect the special qualities of these sites. Management practices should be adjusted to allow sacred and traditional practices to be observed wherever appropriate (Shultis & Heffner, 2016). Examples include sacred pools and rivers, religious sites, and archaeological sites such as prehistoric petroglyphs, rock art, and historic markers. Cultural sites may be discrete locations or, as in many cases, entire landscapes. For example, the designated wilderness area landscape of Mount Yengo in New South Wales, Australia, is of great cultural and spiritual significance to the Wonnarua, Awabakal, Worimi, and Darkinjung aboriginal groups (Clark, 2003). As with many sacred places, only certain aspects of the area's spiritual values can be discussed publicly (see Section 4.9). Sacred sites should not be depicted on maps available to the public.

Monitor visitation

It should be recognized that any kind of visitation to a wilderness area involves some level of impact both on the area itself and the experience of other visitors; therefore, impacts cannot be avoided if human visitation occurs. In some cases, however, such as small island wilderness, or extremely fragile ecosystems, visitation may not be allowed. Certain types of visitation impact are also in direct conflict with the non-degradation concept. For instance, heavy horse and



Overcrowded boat launches harm the wilderness qualities of a site. © Aldo Leopold Wilderness Research Institute

mule traffic in sensitive environments can cause irreparable impacts. Such visitation-induced degradation must be avoided.

Examples of unacceptable degradation through visitation include:

- Crowding of popular trails, destinations and campsites leading to loss of solitude, often operationalized by frequency of encounters with other people.
- Noticeable signs of overuse, including extreme trail erosion, trail braiding (e.g. multiple trails in one spot), campsite impacts, water pollution as a result of inappropriate sanitation practices, and streambank erosion resulting from foot or pack-stock traffic.
- Visual and audible impacts from other users within the wilderness.

It is important to protect wilderness areas against degradation and promote the special qualities that make experiencing wild nature and landscapes in wilderness areas valued and highly rewarding. Access to cultural sites may be restricted from public access and open only to specific individuals or people with cultural and spiritual ties to the site.

Implementation

According to Hendee, et al. (1990), a non-degradation philosophy should underlie all management decisions in a wilderness area. If possible, management should act to improve wilderness conditions through careful application of management principles that adhere to a non-degradation purpose. These include:

- Manage human influences on wilderness (e.g. recreation pressure) and not the wilderness itself.

- Favour wilderness-dependent activities and experiences.
- Guide management with written plans and objectives.
- Set carrying capacities as necessary to prevent unnatural change.
- Focus management on threatened sites and damaging activities.
- Apply the minimum necessary tools or regulations to achieve desired outcomes.
- Involve stakeholders in developing acceptable management plans.
- Monitor wilderness conditions and experiences and modify management plans accordingly.
- Work closely with Indigenous Peoples, Tribes and local communities who identify important cultural sites within a wilderness area to maintain cultural practices and non-degradation.

Aspects of these basic principles are considered in the following sections. An explicit focus on maintaining non-degradation will help combat a potential shifting baseline situation and subtle degradation of wilderness components within an area.

Recommended reading

- Cohen, M.P. (1984). *The Pathless Way: John Muir and the American Wilderness*. Madison: University of Wisconsin Press
- Ezemvelo KZN Wildlife (2011). *Wilderness Management Plan: uKhahlamba Drakensberg Park World Heritage Site*. Ezemvelo KZN Wildlife, Pietermaritzburg, South Africa.
- Graber, D.M. (2003). 'Ecological Restoration in Wilderness: Natural versus Wild in National Park Service Wilderness'. *The George Wright Forum* 30(3).
- Martin, V. and Sarathy, P. (eds.) (2001). *Wilderness and Humanity—The Global Issue: Proceedings of the 6th World Wilderness Congress*. Fulcrum Publishing, Golden, Colorado.

Case study 2

California Desert Protection Act, United States

The California Desert Protection Act of 1994 (Public Law 103-433) in the United States created 69 new wilderness areas in and near the southern California desert region. The United States Department of the Interior Bureau of Land Management (BLM) developed one plan to guide the management of these five areas: Chimney Peak Wilderness, Domelands Wilderness, Kiavah Wilderness, Owens Peak Wilderness, and Sacatar Trail Wilderness (<http://www.blm.gov/ca/st/en/fo/bakersfield/Programs/wilderness.html>). The management plan specifies a non-degradation approach through each of the following management goals:

1. To provide for the long-term protection and preservation of the area's wilderness character under a principle of non-degradation. The area's natural condition, opportunities for solitude, opportunities for recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value will be managed so that they will remain unimpaired.
2. To manage the wilderness area for the use and enjoyment of visitors in a manner that will leave the area unimpaired for future use and enjoyment as wilderness. The wilderness resource will be dominant in all management decisions where a choice must be made between preservation of wilderness and visitor use.
3. To manage the area using the minimum tools, equipment, or structure necessary to successfully, safely, and economically accomplish the objective, the chosen tool, equipment, or structure should be the one that least degrades wilderness values temporarily or permanently. Management will seek to preserve spontaneity of use and as much freedom from regulation as possible.
4. To manage non-conforming but accepted uses permitted by the Wilderness Act and subsequent laws in a manner that will prevent unnecessary or undue degradation of the area's wilderness character. Non-conforming uses are the exception rather than the rule; therefore, emphasis is placed on maintaining wilderness character.



San rock art dated to be between 120 to 3,000 years old found in the Kramberg Nature Reserve, South Africa. © John Waugh

- Martin, V. and Watson, A. (2009). 'International Wilderness'. In *Wilderness Management: Stewardship and Protection of Resources and Values*. pp. 50-88. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Shultis, J. and Heffner, S. (2016). 'Hegemonic and Emerging Concepts of Conservation: A Critical Examination of Barriers to Incorporating Indigenous Perspectives in Protected Area Conservation Policies and Practice'. *Journal of Sustainable Tourism* 1: 1–16.
- Sylven, M., Martin, V., and Schenck, C. (2014). 'A Vision for a Wilder Europe'. *International Journal of Wilderness* 20(1).
- Tarlock, A.D. (2003). 'Slouching Toward Eden: The Eco-Pragmatic Challenges of Ecosystem Revival'. in *Symposium, The Pragmatic Ecologist: Environmental Protection as Jurisdynamic Experience*. 97. Minn. L. Rev. 1173.
- Watson, A., Martin, V., and Lin, C.C. (2009.) 'Wilderness: An International Community Knocking on Asia's Door'. *Journal of National Park* 19(4): 1–9.
- Watson, A., Matt, R., Knotek, K., Williams, D.R., and Yung, L. (2011). 'Traditional Wisdom: Protecting Relationships with Wilderness as a Cultural Landscape'. *Ecology and Society* 16(1): 36.
- Wilderness Watch (2009). *Wilderness Stewardship Concepts & Principles*. Available online from <http://wildernesswatch.org/stewardship-concepts>

2.3 Engagement of stakeholders and non-tribal government with Indigenous Peoples, Tribes and local communities in management and designation of wilderness in true partnership relations

Guiding principles

For Indigenous Peoples and local communities, the need for reconciliation and building mutual trust are paramount to building true partnership relations. Reconciliation and collaboration begin with the affirmation of Indigenous Peoples' sovereignty and all internationally recognized protocols for protecting Indigenous Peoples' and local communities' rights. This is the basis for establishing trust. Without this integration, conservation advances can be seen as taking a step backwards for Indigenous Peoples and local communities. True partnership relations require that historical methods of 'inclusion' expand from attempts to integrate Indigenous Peoples and local communities into non-traditional government and agency processes, towards mutually determined processes in which power is equitably distributed. True partnership means redefining the processes that are used to determine management and stewardship practices, priorities and strategic plans.

Key considerations

Indigenous Peoples and cross-cultural notions of nature and wilderness

Most Indigenous Peoples' languages do not have a word for wilderness. Rather, many Indigenous Peoples have had intimate, sustained relationships with what is commonly referred to as nature for thousands of years, relating to wilderness as homeland and ancestral domain. Further, the notion of wilderness as pristine, uninhabited, and/or 'untrammelled by man, where man himself is a visitor who does not remain' is not compatible with most Indigenous Peoples' belief systems.

More compatible is the scenario where wilderness is a place that protects '...traditional relationships with these relatively intact, extensive ecosystems that are kept that way through wilderness classification' (Alessa & Watson, 2002, p. 136). Indigenous Peoples do not regard their territories as natural, but created and/or transformed by past interactions between their ancestors and the ancestors of other species (Reichel-

Dolmatoff, 1976; Berkes, 2012). Thus, while many Indigenous Peoples celebrate the care for and protection of a place that implies wilderness, many have rejected protection efforts that interfere with the way they have traditionally interacted with nature. Non-tribal governments must avoid protection efforts that interfere with Indigenous Peoples' traditional relationship to nature. Some Indigenous Peoples have simply sidestepped this issue by recognizing and/or establishing Indigenous Peoples' and Community Conserved Territories and Areas (ICCAs), which can have many names, including Indigenous Protected Areas, Tribal Parks, nature reserves, and biocultural reserves, and may or may not support wilderness characteristics. To partner with Indigenous Peoples and local communities in wilderness designations and management, the institutionalized commitment to 'no-use' must be abandoned to, at minimum, support non-industrial, customary use for subsistence and traditional purposes.

Reciprocity, stewardship and management principles

Traditionally, Indigenous Peoples depended entirely on local fish, wildlife and habitat, and needed creative ways to avoid

Case study 3

Kayapo homeland in the Xingu River Basin, Brazil

Spanning 110,000 square kilometres in the Xingu river basin of the Brazilian Amazon, the legally ratified indigenous territories controlled by the Kayapo people form a contiguous block of intact primary forest larger than almost half of the world's countries (Schwartzman, et al., 2013). Indigenous lands are protected under Brazilian law but the Kayapo are located in the midst of active agriculture frontiers in the highest-deforestation regions of the Amazon. Legal protected status is necessary but alone is insufficient to ensure the survival of the great forests of the Xingu and the traditional cultures that depend on them. The region lacks governance, and enforcement of territorial protected status by the government is weak. Although indigenous historical occupation of Xingu forests enabled their protection for a time, by the end of the 20th century the intensification of deforestation processes sweeping the region led the Kayapo and other Indigenous Peoples to seek support from non-governmental organizations to help them defend their lands.

Outside pressure on the ecological and sociocultural integrity of the indigenous territories of the Xingu continues to build. If borders are not constantly monitored in this lawless region, ranchers, colonists, fraudulent land developers, commercial fishermen, loggers, and gold miners inevitably invade protected areas including Indigenous Peoples' areas and territories. However, long-term non-governmental organization alliances with the Kayapo and other groups are proving that strategic investment in their communities empowers Indigenous Peoples to hold the line against invasion.

International and national non-governmental organization partners of the alliance seek to build capacity of the Kayapo to protect their territories and the ecological integrity of the primary forests upon which their culture and livelihoods are based. Specific objectives and program strategies are:

- Build administrative and management capacity of the local Kayapo indigenous non-governmental organizations 'Associação Floresta Protegida', 'Instituto Kabu' and 'Instituto Raoni', which together represent 80 per cent of the Kayapo population (approximately 8,000 people) living in over 40 Kayapo communities.
- Strengthen territorial monitoring/surveillance and control by the Kayapo in collaboration with federal authorities to deter invasion of Kayapo territories by loggers, gold miners, commercial fishermen and ranchers.
- Continue to develop and diversify sustainable economic enterprises in Kayapo communities that are based on non-timber forest products and services (e.g. brazil nut, cumaru nut, tree seeds, handicrafts, international field courses, sport fishing, and garden produce).

Implementation of these long-term strategies for the social, environmental and economic sustainability of the Kayapo territories is ongoing and has made significant measurable progress. At the start of the 21st century, a strong correlation has emerged between the successful defense of Indigenous Peoples' territories and non-governmental organization support for capacity-building and sustainable development by Kayapo communities. Kayapo lands play a particularly important role in preservation of the highly threatened southeastern Amazon because of their huge extent under the control of a single, historically well-organized society at low population density that is already on its way to acquiring the new skills needed for continuing effective conservation management in the 21st Century.

over utilization of these resources. To achieve this, by western standards, one could say that Indigenous Peoples traditionally were stewards of their resources: they not only *used* what was physically available to them, but made social choices about the *rate* of use, within sustainable limits, and *modified* ecosystems, in selective and sustainable ways to increase the availability of useful resources (International Indigenous Commission, 1991). However, Indigenous Peoples do not typically use the term ‘management’ to describe their relationship with an ecosystem, because it implies human domination. Rather, they are more likely to speak in terms of reciprocity, a relationship of give and take aimed at harmonizing the human and non-human worlds, based on mutual accommodation or adaptation aimed at bringing people and the land into balance. Thus, for many Indigenous Peoples, true partnership requires expanding management definitions to include the principles of reciprocity and respect.

The reported instances in which Indigenous Peoples appear to have been using their fish, wildlife and habitat non-sustainably can be traced to losses of land or depletion of natural abundance resulting from settlements, removal, or state administration and exploitation of their territory (International Indigenous Commission, 1991). Thus, the right to the traditional territories is the key to continued protection of Indigenous Peoples’ lands and seas, which include a significant number of potential future wilderness areas.

In some cases, wilderness designation has allowed pre-existing activities, uses and means of access to continue after designation to accommodate local or indigenous means of livelihood and lifeways. A combination of special provisions and good research to help understand the underlying meanings or values of activities occurring on the land, instead of simply accommodating efficiency introduced by innovation, can ensure protection of these relationships local or Indigenous Peoples have with wild places into the future.

True partnership relations

Early concepts and applications of wilderness did not acknowledge the inseparability of culture and nature, and Indigenous Peoples and local communities have suffered the consequences disproportionately. Further, in the majority of cases, Indigenous Peoples and local communities were not adequately consulted in the decisions to create protected areas, including wilderness areas. This has resulted in gross violations of rights, disruption of cultures, and in some cases extinction of peoples and lifeways (Stevens, 2014). At the 5th IUCN World Parks Congress in Durban, South Africa, in 2003, Indigenous Peoples delegates stated the following, calling for a radical shift in the historic approach to conservation: ‘First we were dispossessed in the name of kings and emperors, later in the name of state development, and now in the name of conservation’. In addition to eviction from their traditional lands, dispossession has also included the denial of access to traditional lands, waters and wildlife by communities residing outside official protected areas, and progressive restrictions upon communities allowed to remain inside (Scott, 1998; Nelson, 2004; Poole, 2011). Given this history, power asymmetries between Indigenous Peoples and conservation agencies must be recognized and addressed (Secretariat of the Convention on Biological Diversity, 2004).

Supporting Indigenous Peoples is necessarily part of true partnership. This should include: sustaining and supporting networks of sacred natural sites, cultural practices, traditional

languages, and methods of teaching traditional cultural values; respecting and upholding Natural Law; engaging multigenerational timeframes in planning schemes; eliminating economic incentives that undermine traditional values and endanger cultures and peoples; and supporting governance systems that align with Indigenous Peoples’ and local communities’ values.

Wilderness designation and free prior and informed consent

Currently, Indigenous Peoples total 5 per cent of the world’s population, have traditional land claims to 22 per cent of earth’s lands and seas—containing 80 per cent of the planet’s biodiversity—and inhabit 80 per cent of protected areas. Indigenous Peoples are currently the stewards of at least the same extent of wild nature as all regional and national governments and conservation organizations combined (11 per cent) (Sobrevilla, 2008). Most of the world’s remaining ecosystems that may be suitable for wilderness designation are actually human-modified environments, and their current levels of biodiversity are in part the result of niche modifications by Indigenous Peoples and local communities’ inhabitants. “Thus, most – if not all – future wilderness designations necessarily include Indigenous Peoples and local communities.

Historically, such designations were made either without regard to Indigenous Peoples and local communities, or by attempting inclusion by presenting a projected management plan to Indigenous Peoples and local communities for their input under the terms set by the author. Though there is often discrepancy of jurisdiction according to customary, traditional, local, national and international law, engaging Free Prior and Informed Consent (FPIC) is the international norm and increasingly so (Hanna & Vanclay, 2013). FPIC requires inclusion in the design and implementation of a management plan, as well as the governance structure for a designated wilderness area. Moreover, if not done correctly, where a wilderness designation undermines or otherwise determines Indigenous Peoples’ and local communities’ relationships with a place, the designation may be deemed invalid if Indigenous Peoples and local communities have not been adequately involved in the planning and determination of the designation.

Implementation

When partnering with Indigenous Peoples’ governments, non-indigenous governments should:

- Expand definitions of wilderness to incorporate concepts of homeland and ancestral domain.
- Implement FPIC, e.g. co-determine wilderness designations and management schemes with Indigenous Peoples and local communities from the beginning of the design process and establish and work towards common goals.
- Adopt provisions addressing Indigenous Peoples’ and local communities’ leadership and active participation in the governance, development and management of terrestrial, marine and estuarine wilderness areas.
- Honour customary use for subsistence and other traditional activities within and surrounding wilderness areas.

- Adopt language to honour the rights and roles of Indigenous Peoples and local communities throughout policy and legal documents.
- Incorporate sacred natural sites and networks, biocultural systems and cultural keystone species in management and governance plans.
- Redress past and current injustices.
- Recognize and affirm Indigenous Peoples' rights and customary and legal jurisdiction in accordance with all recognized international instruments, including the United Nations Declaration on the Rights of Indigenous Peoples and the Convention on Biodiversity Article 10(c) Sustainable Use and Article 8(j) Protection and Recognition of Traditional Knowledge.
- Engage processes of dialogue, reconciliation and trust building.

Recommended reading

- Borrini-Feyerabend, G., Kothari, A., Oviedo, G., and Bassi, M. (2004). *Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation*. vol. 11. IUCN, Gland, Switzerland.
- Dove, M.R. (2006). 'Indigenous People and Environmental Politics'. *Annual Review of Anthropology* 35(1): 191–208.
- Dunbar-Ortiz, R. (2014). *An Indigenous Peoples' History of the United States*. Beacon Press, Boston.
- Kothari, A., Corrigan, C., Jonas, H., Neumann, A., Shrumm, H., and Secretariat of the Convention on Biological Diversity (2012). *Recognising and Supporting Territories and Areas Conserved by Indigenous Peoples and Local Communities: Global Overview and National Case Studies*.
- Li, T.M. (2001). 'Masyarakat Adat, Difference, and the Limits of Recognition in Indonesia's Forest Zone'. *Modern Asian Studies* 35(3): 645–676.
- Salmón, E. (2000). 'Kincentric Ecology: Indigenous Perceptions of the Human-Nature Relationship'. *Ecological Applications* 10(5): 1327–1332.
- Watson, A., Matt, R. Knotek, K., Williams, D.R., and Yung, L. (2011). *Traditional Wisdom: Protecting Relationships with Wilderness as a Cultural Landscape*. *Ecology and Society* 16(1): 36.

2.4 Manage wilderness both to preserve intrinsic wilderness values and to sustain human values

Guiding principles

Wilderness should be managed in an approach that understands a holistic view of the world in which humans and non-humans are respected (Berkes, 2012; Folke, 2004; Savory & Butterfield, 1999; Watson, et al., 2003). Humans should be understood as part of nature and as performing complex interactions with non-humans in ways that can 'enhance and improve the ecosystem' (Watson, et al., 2003, p. 3). Management should both preserve intrinsic wilderness values and sustain human values. This kin-centric approach is grounded in a state of reciprocity between humans and nature (Salmón, 2000). Such management permits natural ecological processes to operate as freely as possible because, ultimately, wilderness values for society depend on retention of naturalness (Hendee & Stankey, 1973). Such

benefits and values derived from kin-centric management apply to both Indigenous Peoples engaged in the wilderness area and visitors who use the area for recreation, research and other reasons.

Key considerations

Different approaches to knowledge

Management should be informed by the knowledge systems of all partners involved in the conservation of the area. The concept of knowledge can vary greatly between those using indigenous science and those informed by modern science (Babidge, et al., 2007; Berkes, 2012; Dove, 2005; Menzies, 2006). Modern science often views knowledge as static, whereas indigenous science understands knowledge as an ongoing process (Berkes, 2012, p. 8). A kin-centric management approach must employ both forms in a manner that does not subjugate indigenous science to modern science (Salmón 2000). Indigenous science should be understood by managers as a nested system of processes that produce a way of knowing the world. Indigenous science is not a body of knowledge but rather how a life is lived (Berkes, 2012). As argued by Watson, et al. (2003, p. 3), '[Indigenous science] assumes that humans are, and always will be, connected to the natural world, and that there is no such thing as nature that exists independent of humans and their activities (Pierotti & Wildcat, 1997)'. One cannot separate indigenous science into discrete items to be integrated into modern science or selectively employ local knowledge without the repercussion of tokenizing indigenous science (Nadasdy, 1999). Indigenous science can only be approached as a nested system of local knowledge, land and management systems, social institutions, and worldview constantly in interaction with one another (Berkes, 2012).

Precautionary principle

Management should follow the Precautionary Principle, which is the anticipation of harm before it occurs in order to protect humans and the environment against uncertain risks of human action (Deville & Harding, 1997; UNESCO, 2005). This principle, as it relates to wilderness, assumes that when an area's wilderness is reduced or distorted, then human values including experiential, spiritual, scientific and educational will be lessened. Management of wilderness areas should follow the Precautionary Principle.



A Wilderness Leadership School "trail" (multiple day hiking safari) in Hluhluwe-Imfolozi Park, South Africa (formerly Hluhluwe-Umfolozi Game Reserve, the first nature reserve established in Africa, in 1895). Managed by Ezemvelo KZN Wildlife, a provincial authority, this park also contains the first wilderness area designated in Africa. © Vance G. Martin

Examples

Ways in which wilderness can be managed both to preserve intrinsic wilderness values and to produce human value include:

- Experiential values such as self-reliance, physical and mental challenge, companionship, solitude, freedom, and expressions of humility are enhanced by a wilderness setting and are clearly impacted by the presence of human development, which reduces risk and effort while providing easier access to supporting infrastructure.
- Spiritual values such as aesthetic beauty, awe, connectedness, and religious and philosophical freedom associated with being in an environment that is separate or apart from everyday society's rules, regulations and mental pressures are enhanced in a wilderness setting. While the label wilderness might not be significant, wilderness areas are often areas of immense cultural and spiritual significance to Indigenous Peoples.
- Wilderness has particular scientific value including provision of sites and subjects for data collection, experimentation and general study because of the minimal human influence on natural processes and ecosystems. For this reason, wilderness areas are often used as control sites for studies on human impacts on global ecosystems. Human impact in wilderness areas reduces the usefulness of such studies, as varied and sometimes unknown human influences will be exerted on the results of these scientific studies and controls.
- Educational values of wilderness areas are many and varied, but include sites and case studies for the study of natural ecosystems and processes and outdoor skills and ethics. The wilderness condition allows students to study natural ecosystems, wildlife and processes without needing to allow for possible human influences, which would otherwise detract from the value of such studies. Wilderness areas additionally provide ideal training grounds for outdoor education in wilderness survival skills, navigation, and minimum-impact camping and ethics (see Section 2.8).

Case study 4

Fish River Station, Australia

The Fish River Station in Australia's Northern Territory is 178,000 hectares of savannah woodlands, rainforests and floodplain wetlands (<http://www.environment.gov.au/land/nrs/case-studies/nt/fish-river>). Although it is managed for conservation purposes as a Category II protected area, the property is an example of wilderness values being protected under a different protected areas management category. Fish River Station is an example of a type of ICCA as described above.

Fish River Station is a nationally significant conservation area. The management is guided by a comprehensive plan of management and an indigenous advisory group representative of the four Traditional Owner (Indigenous) Groups: the Labarganyan, Wagiman, Malak Malak and Kamu peoples.

The wilderness values of Fish River Station include its large size, adherence to wilderness values, and its biodiversity, which include species such as sugar gliders, wallabies, kingfishers, as well as many rare and threatened species. The land was purchased in 2010 through a collaborative partnership between the Australian Government, the Indigenous Land Corporation, The Nature Conservancy, the Pew Environment Group and Greening Australia (<http://www.ilc.gov.au/Home/Our-Land-Projects/Fish-River-Fire-Project>; <http://www.nature.org/ourinitiatives/regions/australia/explore/fish-river-station.xml>). The property also has significant cultural and economic values for the indigenous communities associated with the area. Much of the ecological integrity of this part of Australia is under threat from inappropriate fire management and pastoral development for cattle, and Fish River provides a refuge for its plant and animal species. The plan of management for Fish River combines traditional knowledge, technology and science to inform best-practice conservation management. This is evident in the successful Fish River Fire Project (<http://www.fishriver.com.au>). Indigenous rangers are employed to undertake this carbon abatement programme that contributes to maintaining cultural and biodiversity values of the property.

The success of the savannah-burning program has meant that Fish River is now part of the carbon economy and has sold carbon credits. Profits from sales go back into the management of the protected area. The establishment and management of Fish River Station is not only having positive global impacts by reducing carbon emissions, but also it has benefits for biodiversity conservation and benefits for Australian indigenous culture by improving livelihoods through employment and training, and access by elders and youth to collect bush foods and pass on knowledge, and by maintaining cultural connection to "country".

The carbon abatement programme contributes income towards land management activities. Fire plays a significant role in traditional aboriginal land management and is an important part of the ecological evolution and ongoing survival of many Australian species. The re-establishment of a traditional fire regime based on pattern or mosaic burning has seen Fish River's late-season wildfires reduced from 66 per cent to approximately 2 per cent of the area per year (The Nature Conservancy 2014).

Planned burning earlier in the dry season and the production of a mosaic of fire breaks in the landscape reduces fuel load and the severity of wildfires that can occur later in the dry season. This also has significant benefits in relation to climate change mitigation, as fewer intense fires produce lower carbon emissions. The North Australian Indigenous Land and Sea Management Alliance Ltd. was responsible for developing the carbon farming methodology used on Fish River (<http://www.nailsma.org.au/hub/media/press-release/media-release-indigenous-fire-management-leading-way-2012>).

Case Study 5

El Toro Wilderness, Puerto Rico

The El Toro Wilderness protected area is in the El Yunque National Forest of Puerto Rico (Weaver, 2011). Consisting of 40.5 square kilometres, it is managed as a Category 1b site by the United States Forest Service and remains the only tropical wilderness managed by this agency (United States Forest Service, 2006). El Toro Wilderness is also a designated UNESCO Biosphere Reserve. This additional designation emphasizes the site's importance in the global protection of biodiversity through conservation action. El Toro Wilderness protects endangered species, such as the Puerto Rican parrot, the elfin woods warbler, and the palo de jasmín flower.

El Toro Wilderness preserves both biodiversity and human values (Billmire, et al., 2008). Many recreationists visit this wilderness area each year. El Toro Wilderness is managed both to conserve the vast biodiversity of the site and to allow visitors to enjoy the wild nature through activities that adhere to wilderness values (see Section 2.5 and Section 4.5). The site contains and protects important cultural sites of the Taíno people. Petroglyphs and other archaeological evidence can be found within this 1b site and are protected by the management of El Toro Wilderness (Congressional Record, 2005).

Implementation

To implement management both to preserve intrinsic wilderness values and to produce human values, a fair and equal treatment of both indigenous science and modern science should be employed in all management decisions. Ways to do this include:

- Establishing the capacities, mandates and motivations of the management partners and assessing the compatibility (and non-compatibility) between the partners in terms of power, interest and access to resources;
- Assessing the wilderness area's distribution of burden and benefits;
- Understanding the historical legacy of the wilderness area and respecting existing legal and customary rights to land and resources within the wilderness area;
- Incorporating indigenous science and modern science as equally legitimate processes and contributions to management decisions;
- Recognizing the ecosystem services provided by wilderness protected areas;
- Ensuring future adaptability and flexibility for the management relationships to continually evolve;
- Assuming a long-term view of management plans that allow for proper consultation of all partners and stakeholders and ongoing involvement in the management process.

Political actors involved in the management of a wilderness area should constantly work to ensure that conservation practices reflect a holistic approach to wilderness. Such an approach is not quickly or easily done but when done correctly can create strong management of wilderness areas that uphold human rights and wilderness values.

Recommended reading

- Bohensky, E.L. and Maru, Y. (2011). 'Indigenous Knowledge, Science, and Resilience: What Have We Learned from a Decade of International Literature on "integration"'. *Ecology and Society* 16(4): 6.
- Borrini-Feyerabend, G., Kothari, A., Oviedo, G., and Bassi, M. (2004). *Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation*. vol. 11. IUCN, Gland, Switzerland.
- Hathaway, M.J. (2013). 'Making an Indigenous Space'. In *Environmental Winds*. pp. 116–151. University of California Press, Berkeley.
- Nadasdy, P. (2003). *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal-State Relations in the Southwest Yukon*. University of British Columbia Press, Vancouver, BC.
- Nadasdy, P., Goldman, M., and Turner, M. (eds.) (2011). *Knowing Nature: Conversations at the Intersection of Political Ecology and Science Studies*. University of Chicago Press, Chicago.
- Tsing, A. (2005). 'This Earth, This Island Borneo'. In *Friction*. pp. 155-170. Princeton University Press, Princeton, N.J.
- Watson, A., Stumpff, L.M., and Meidinger, J. (2012). 'Traditional Wisdom and Climate Change: Contribution of Wilderness Stories to Adaptation and Survival'. *International Journal of Wilderness* 18(2): 21–25.
- West, P. (2006). 'Articulations, Histories, Development'. In *Conservation Is Our Government Now*. pp. 52-124. New ecologies for the twenty-first century. Duke University Press, Durham.
- Whiting, A. (2004). 'The Relationship between Qikiktagrugmiut (Kotzebue Tribal Members) and the Western Arctic Parklands, Alaska, United States'. *International Journal of Wilderness* 10(2): 28–31.
- Babidge, S., Greer, S., Henry, R., and Pam, C. (2007). 'Management Speak: Indigenous Knowledge and Bureaucratic Engagement'. *Social Analysis* 51(3): 148–164.

2.5 Prioritize wilderness-dependent and wilderness-relevant activities

Guiding principles

When making decisions about conflicting activities, wilderness decision makers should favour activities within the protected area that are wilderness-dependent and wilderness-relevant. Such activities may include scientific research, traditional means of livelihood, traditional cultural activities, and low-impact recreational activities. All activities should be consistent with the overarching wilderness purpose.

Key considerations

Defining wilderness-dependent

Wilderness-dependent activities are those that can only be done within a setting that upholds wilderness attributes, as introduced earlier: biological intactness, sacred areas, traditional use, absence of significant permanent infrastructure and commercial resource extraction, and opportunities for experiencing solitude. Declaring activities as wilderness-dependent may vary between protected areas. Wilderness decision makers must use their best judgement. As Dawson and Hendee (2009, p. 186) state, 'Defining an activity as wilderness-dependent can be difficult. Often, it is not the activity itself that is dependent, but the particular style in which it is pursued. For example, hunting is not necessarily wilderness-dependent. However, certain styles of hunting, such as pursuing game under the most natural conditions away from roads or stalking a bighorn sheep among high peaks, are highly dependent on wilderness settings. The importance of naturalness and solitude to the experience, and the methods employed in the hunt, not the mere quest

for game, defines certain kinds of hunting as wilderness-dependent'.

Implementation

When use conflicts arise within a wilderness protected area, the activity defined as most wilderness-dependent should be favoured to prevent overuse and to adhere to wilderness values. Implementing this may prove challenging but, ultimately, more beneficial to the wilderness area as demonstrated within the case study. If there is any zoning of locations with minimal or no recreation within the protected area, all wilderness decision makers should uphold this zoning regulation in everyday practice, in educational outreach and in management plans.

Recommended reading

- Confederated Salish and Kootenai Tribes (2005). *Mission Mountains Tribal Wilderness: A Case Study*. Native Lands and Wilderness Council.
- Dawson, C.P. and Hendee, J.C. (2009). 'Chapter 7: Principles of Wilderness Management'. In *Wilderness Management: Stewardship and Protection of Resources and Values*. pp.179-194. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Fox, S., Phillippe, C., Hoover, V., and Lambert, L. (2015). *Celebrating the 50th Anniversary of the Wilderness Act. October 15-19. Albuquerque, NM. Proceedings of the National Wilderness Conference*.
- Krahe, D. (2005). *Last Refuge: The Uneasy Embrace of Indian Lands by the National Wilderness Movement, 1937-1965*. Washington State University.

Case study 6

Shirakami Sanchi Nature Conservation Area, Japan

Prioritizing wilderness-dependent activities and designating areas of minimal recreational use can often prove difficult for wilderness decision makers. The wilderness decision makers of the Shirakami Sanchi Nature Conservation Area in Japan work hard to balance ecological protection and civic engagement (Mason, 2015). The Ministry of the Environment of the Government of Japan oversees the management of the Shirakami Sanchi Nature Conservation Area as a Category 1b site. This nature conservation area covers a mountainous landscape of over 140 square kilometres in the Aomori and Akita prefectures of Honshu, Japan (IUCN & UNEP-WCMC, 2016).

Shirakami Sanchi Nature Conservation Area was also declared an UNESCO World Heritage Site in 1993 because of the site's global importance as one of the last intact beech forests, the presence of many endangered wildlife species such as the Japanese serow (*Capricornis crispus*), the golden eagle (*Aquila chrysaetos*), and the mountain hawk-eagle (*Nisaetus nipalensis*), and the intangible cultural heritage of the site (UNESCO World Heritage Committee, 1993). The management of the Shirakami Sanchi Nature Conservation Area restricts recreation activities to specific, designated locations within the site, such as mountain paths. The site is governed by the Japanese national government and managed by three government agencies: the Ministry of the Environment, the Forestry Agency, and the Agency for Cultural Affairs. These government agencies make their management decisions based on scientific studies to prioritize wilderness-dependent activities and restrict tourism locations, while also respecting the site's cultural heritage (Kato, 2006; UNESCO World Heritage Committee, 1993).

2.6 Guide wilderness management using written plans that are culturally appropriate

Guiding principles

Wilderness management actions should be guided by formal plans that state specific objectives and explain how they will be achieved consistent with all applicable legal authorities for the area. The plan guides individual area stewardship with increasingly refined legislative, policy and local management directions, strategies and actions towards specific area objectives. These objectives, by providing clear descriptions of the desired conditions to be achieved, serve as benchmarks for periodic evaluation of stewardship progress and subsequent adjustments or revision. The entire planning process must include, in all its stages, the involvement of stakeholders, using whatever variety of methods is needed to acquire their input and enlist their continuing involvement in resolving issues that are encountered during plan implementation (Dudley, 2013; Dawson & Hendee, 2009; IUCN, 2016). The plan should include the cultural norms of Indigenous Peoples, where relevant and appropriate, and form true partnerships in the establishment and the implementation of the management plan.

Key considerations

Management plan as a written document

A wilderness management plan is a written document stating the authority and policies under which a designated area is managed; the goals and objectives for management; the management direction and actions necessary to achieve the stated goals and objectives; and the monitoring programme to ensure that the goals and objectives are being met following management activities (Dawson & Hendee, 2009). A management plan should strive to address all wilderness area partners' histories, needs and cultures. Extra care should be taken if some wilderness decision-making partners do not come from cultures where writing and objective-planning are commonplace. In such cases, a mediator, such as a cultural anthropologist, should work closely with all decision makers in creating the objectives. Such mediation works to prevent the stagnate subjugation of Indigenous Peoples' relationship to nature and adaptive knowledge systems to static scientific knowledge paradigms (Simpson, 2005).

The internal logic of a written plan is expressed in an orderly manner that establishes clear, attainable, measurable and acceptable objectives that allow for flexibility and consistency in purpose across time to guide management activities towards desired outcomes and conditions (Dawson & Hendee, 2009). Change is inevitable both within an area and in the adjoining landscape and good planning requires anticipating trends, changes and problems so that management direction and actions can proceed logically. Without a written document to guide decision making, managers could too quickly react to problems or outside pressures and arrive at a cumulative undesirable result based on subjective and incremental decisions that were not focused on the goals and objectives.

Components of management plans

The framework for a written management plan (Dawson & Hendee, 2009) includes five types of components:

1. **Goals** are the broad statements of intent, direction, vision, mission statement, and purpose based on national policy and the specific authority that designated a local area as wilderness. The goals stated for designation as a protected area under IUCN Category 1b should be considered in this statement (IUCN, 2016).
2. **Objectives** are hierarchical statements under each goal that describe the specific and attainable conditions sought for a particular wilderness area, serve as criteria for deciding which management actions are needed and appropriate, and can be used as a basis for later monitoring and evaluating the effectiveness of management actions and activities. The objectives stated for IUCN Category 1b should be considered in this statement (IUCN, 2016).
3. **Current situation and assumptions** are statements that set the context for developing a set of management actions for an area by summarizing local conditions and situations, predicting likely changes to wilderness conditions and uses, and focusing the overall direction for management actions.
4. **Management direction and actions** are statements of programme direction to guide managers towards achieving each stated objective within the plan.
5. **Monitoring programme** is a statement of which specific measurable standards can be used to evaluate the effectiveness of management actions and activities to attain each stated objective.

Implementation

Good planning is essential to support good management and stewardship of a wilderness area (Dawson & Hendee, 2009). The intent of writing wilderness management plans is to organize the best thinking about which objectives to achieve and the management direction necessary to be successful. Goals and objectives stated in a wilderness management plan serve as guiding statements for deciding which management actions are necessary and appropriate and provide targets against which the effectiveness of management actions and activities can be judged towards achieving the desired objectives. Furthermore, by stating the situation and assumptions at the time the plan was written, the written document allows future decision makers to decide whether those conditions still exist, or if the plan needs to be revised in view of changing conditions. All wilderness area decision makers from relevant Indigenous Peoples' governments and non-indigenous governments should be part of the management planning process.

Examples of wilderness management planning approaches and sample plans for the four United States federal agencies that manage areas of the 44 million hectares in the National Wilderness Preservation System can be found through the Wilderness Management Planning Toolbox (<http://www.wilderness.net/planning>) (Arthur Carhart National Wilderness Training Center and others, 2016).

Recommended reading

- Berkes, F. (2012). *Sacred Ecology*. 3rd edition. Routledge, New York.
- Borrini-Feyerabend, G., Dudley, N., Jaeger, T., Lassen, B., Broome, N.P., Phillips, A., and Sandwith, T. (2013). *Governance of Protected Areas: From Understanding to Action*. IUCN, Gland, Switzerland.
- Dawson, C.P. and Hendee, J.C. (2009). *Wilderness Management: Stewardship and Protection of Resources and Values*. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Thomas, L. and Middleton, J. (2003). *Guidelines for Management Planning of Protected Areas*. IUCN, Gland, Switzerland.
- Worboys, G.L., Lockwood, M., Kothari, A., Feary, S., and Pulsford, I. (eds.) (2015). *Protected Area Governance and Management*. ANU press, Canberra.

Case study 7

Nahanni National Park Reserve, Canada

Nahanni National Park Reserve is a wilderness protected area located in the southwest corner of the Northwest Territories of Canada. The South Nahanni River is the main feature of the park and is an important ecological and cultural homeland area for the Dehcho First Nations who use the traditional name for the park: Naha Dehé. The park was established in 1976 and expanded in 2009 to 30,000 square kilometres, making it the third-largest park in Canada. The park includes a Canadian National Heritage river and a World Heritage Site.

In 2000, Dehcho First Nations and Parks Canada jointly created the Naha Dehé Consensus Team to engage in cooperative planning and management for the Nahanni National Park Reserve (The Deh Cho First Nations, Government of Canada & Government of the Northwest Territories, 2001a; Deh Cho First Nations, Government of Canada & Government of the Northwest Territories, 2001b). Some of the principles expressed in cooperative management by the Naha Dehé Consensus Team included recognizing and respecting traditional use; sharing the stories and traditions of the Naha Dehé; using traditional knowledge in park management; supporting cultural learning; managing in partnership; and looking to the future (Parks Canada, 2010). The Canada National Parks Act requires all national parks to develop a park management plan that guides management and operation decisions and actions. The most recent management plan for the Nahanni National Park Reserve was revised and completed in 2009 and 2010. The planning team included the Naha Dehé Consensus Team, Parks Canada staff, community and local stakeholders, and the public. The plan provides a long-term vision and strategic direction for the park and is reviewed every five years to ensure that the plan remains valid and effective. This park plan is a good example of cooperative management and the inclusion of the cultural norms of Indigenous Peoples.

2.7 Manage carrying capacities through indicator-based planning systems

Guiding principles

Management should determine the limits of acceptable change in wilderness conditions by setting standards to protect the area and uphold wilderness values. Setting such standards allows use within carrying capacity through the management of human activities, behaviour and distribution. While limits on use are sometimes established in cases where impacts are solely related to user numbers, indicators have become the more desirable focus to protect wilderness attributes. Indicator-based planning systems take a threat-oriented approach to protect both experiences and resources. It is important to obtain partner and stakeholder input when defining major threats to address and management solutions to pursue if standards are exceeded.

Key considerations

Visitor-use indicator-based frameworks

A popular visitor-use indicator-based framework is the Limits of Acceptable Change (LAC) framework (Frissell & Stankey, 1972; Cole & Stankey, 1997). This framework asks the questions, 'How much change is acceptable?' and 'What are the desired conditions?' rather than asking, 'How much use is too much?' (Watson, et al., 2003; McCool, et al., 2007; Newsome, et al., 2013). The LAC framework defines the amount of degradation in biophysical and/or social conditions permitted in a wilderness area's management objectives (McCool, et al., 2007).

Another framework, Visitor Experience and Resource Protection (VERP), is useful to wilderness managers (U.S. Department of the Interior, 1993; U.S. Department of the Interior, 1997; Manning, 2001). VERP is largely an adaptation of the earlier LAC model. While LAC applications almost always engaged the public in the nine-step planning process (Stankey, et al., 1985), the method of public engagement is not specifically prescribed within the LAC literature. VERP, however, crucially includes additional elements concerned with developing a public involvement strategy from the outset and is explicit about defining different zones within the park where different desired visitor experiences and

resource conditions might apply, mapping these and selecting indicators and standards for each zone that can then be used in development of appropriate management actions and monitoring of their efficacy (Bacon, et al., 2006). Other useful frameworks exist and can be found in *Recommended reading* below.

Indicators

Useful indicators are ones that can be measured in cost-effective ways at acceptable levels of accuracy and precision; are related to the type, level and location of use; reflect changes in conditions due to visitor use; respond to and help determine management effectiveness; help report on the quality of visitor experiences; and are meaningful to stakeholders, including senior managers (Moore, et al., 2003). Such indicators are needed to report on the objectives that ideally make explicit the desired conditions. Often, to select indicators that meet these criteria, visitor surveys, baseline inventories and public involvement meetings will be used to provide crucial input. Frequently, however, indicators are selected based upon perceptions of useful applications at other areas (Watson & Cole, 1992).

Examples of biophysical indicators include the percentage of vegetation cover around a campsite or extent of trail erosion or 'braiding'. A social indicator in widespread use in wilderness areas is the number of trail encounters with other parties and the number of parties camped within sight or sound, as an indicator of crowding, a threat to solitude (Manning, 1997). See Section 2.10 for more information on selecting indicators to monitor wilderness conditions and experience opportunities.

Implementation

Using indicators to define and protect carrying capacity provides a means by which the acceptability of inevitable impact can be determined and managed. Desired conditions must be explicitly detailed in the management objectives for the wilderness area. These objectives should be sufficiently specific and provide clear guidance for wilderness decision makers. Using planning systems and management to develop such objectives is detailed in Section 4.1.

Recommended reading

- Blaikie, P. (1985). *The Political Economy of Soil Erosion in Developing Countries*. John Wiley and Sons, Inc., New York.
- Brown, G., Koth, B., Kreag, G., and Weber, D. (2006). *Managing Australia's Protected Areas: A Review of Visitor Management Models, Frameworks and Processes (Technical Report)*. Cooperative Research Centre for Sustainable Tourism, Griffith University, Gold Coast, Queensland.
- Cole, D. (2009). 'Ecological Impacts of Wilderness Recreation and Their Management'. in *Wilderness Management: Stewardship and Protection of Resources and Values*. pp. 395–436. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Cole, D.N. and McCool, S.F. (1998). 'Limits of Acceptable Change and Natural Resources Planning: When Is LAC Useful, When Is It Not?' in *Proceedings—limits of Acceptable Change and Related Planning Processes: Progress and Future Directions. Gen. Tech. Rep. INT-GTR-371*. pp. 69–71. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.

- Dawson, C. and Hendee, J. (2009). 'Managing for Appropriate Wilderness Conditions: The Limits of Acceptable Change Process'. In *Wilderness Management: Stewardship and Protection of Resources and Values*. pp. 218–249. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Lindberg, K., McCool, S., and Stankey, G. (1997). 'Rethinking Carrying Capacity'. *Annals of Tourism Research* 24(2): 461–465.
- McCool, S.F. and Cole, D.N. (eds.) (1998). *Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions: Proceedings of a Workshop May 20–22 1997, Missoula, MT. Gen. Tech. Rep. INT-GTR-371*. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- McCool, S.F. and Lime, D.W. (2001). 'Tourism Carrying Capacity: Tempting Fantasy or Useful Reality?' *Journal of Sustainable Tourism* 9(5): 372–388.
- Nilsen, P. and Tayler, G. (1997). 'A Comparative Analysis of Protected Area Planning and Management Frameworks'. in *Proceedings – Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions (General Technical Report INT-GTR-371)*. pp. 49–57. Rocky Mountain Research Station, USDA Forest Service, Ogden, Utah.
- Salerno, F., Viviano, G., Manfredi, E.C., Caroli, P., Thakuri, S., and Tartari, G. (2013). 'Multiple Carrying Capacities from a Management-Oriented Perspective to Operationalize Sustainable Tourism in Protected Areas'. *Journal of Environmental Management* 128: 116–125.
- Stankey, G.H. (1984). 'Limits of Acceptable Change: A New Framework for Managing the Bob Marshall Wilderness Complex'. *Western Wildlands* 10(3): 33–37.

2.8 Focus management on threatened sites and damaging activities

Guiding principles

A threatened site can be defined as any site or location where a wilderness area's physical attributes and/or social conditions are at risk or are undergoing change or degradation as a result of non-natural forces, such as impacts from recreation. Wilderness areas by their very nature tend to be large and can encompass varied and complex landscapes. Following the IUCN 75 per cent rule, the protected area must have at least three-fourths that adheres strictly to the Category 1b designation and one-fourth that at least is compatible with wilderness values. Management should be designed to the individual circumstances of the wilderness area. Management should focus on threatened sites and activities that damage wilderness areas. Such a focus is more effective than applying unnecessary management actions to areas not under threat.

Key considerations

Activity outside the defined wilderness area

Difficulties arise for the manager when sites are threatened by the impacts of activities taking place outside of the wilderness area (Cole & Landres, 1996; Landres, et al., 1998). These might include air and water pollution from agriculture, forest operations, and industry. The establishment of buffer zones,

policy, and/or legislation and incorporation, when applicable, of World Heritage or UNESCO Biosphere Reserves are critical in ensuring the integrity of core wilderness. Further discussion on management in relationship to adjacent lands can be found in Section 2.11.

Special provisions

Stipulations exist within individual countries' legislation to protect or allow non-compliant or non-conforming—but legal—activities under special provisions (Nickas & Proescholdt, 2005; Watson, et al., 2004). An example can be found within the United States: limited commercial use is a special provision within the Wilderness Act. These special provisions are sometimes the most threatening human uses within a wilderness area and cannot always be contained by managers (Natural Resources Law Center, 2004).

Implementation

To focus on threatened sites and damaging activities, management must be selective and site-specific (Cole, 1994; Franklin & Aplet, 2009). This approach allows managers to address and solve problems that occur only locally or are temporary in nature.

Examples of this focused style of management include:

- Temporary trail closure during the wet season to prevent excessive erosion from foot traffic;
- Closure and vegetative restoration of popular campsites to allow renewal;
- Segregation of hikers and horse riders on different trails to minimize possible inter-user conflicts;



Horses, like this one in the Bob Marshall Wilderness of the United States, can be used in everyday management practices. If the recreational use of horses is not well regulated, they can contribute to damaging a wilderness area. © Aldo Leopold Wilderness Research Institute

- Closure of sensitive areas during critical breeding seasons for certain species;
- Quota impositions on user numbers in heavily used areas to maintain use within specified limits to protect user experiences;
- Management of visitors' behaviours, group sizes, and distribution;
- Implementation of visitor restrictions to mitigate damage to threatened sites with directional flow, assigned campsites and designated routes through the area.

Many of these restrictions apply to recreation use (Cole, et al., 1997; Cole & Wright, 2003). When considering which recreational activities to focus on, managers often face difficult decisions regarding fairness. Careful thought should be given to who should be restricted, under what conditions and criteria, and how these restrictions should be implemented, placing minimum burden on those facing some sort of restrictions, if necessary. Management should first focus on the most damaging activities at the most threatened sites and then address wider issues arising from other uses. It is often the case that the greatest total impact arises from high frequency, low impact uses (e.g. hiking) whereas highly localized yet damaging impacts come from low frequency, high-impact uses (e.g. horse riding). Impacts can also arise from managers' efforts to fix the problem. It is incumbent on the manager to make decisions about which impacts to focus on and which users and uses to target, bearing in mind that the high-frequency, low-impact uses might be the most difficult to manage with these being dispersed and often having multiple entry points (Leung & Marion, 2000).

For example, management actions and policies focused on reducing trampling of vegetation and disturbance of wildlife along busy trails by imposing trail quotas, restrictions or even closures will adversely impact visitor experiences by restricting choice and accessibility to key destinations. Another example might be how a ban on firewood collection at a popular campsite to protect populations of saprophytic insects and the species that depend on them for food will impact user enjoyment by removing the option of having a campfire.

Recommended reading

- Blaikie, P. (1985). *The Political Economy of Soil Erosion in Developing Countries*. John Wiley and Sons, Inc., New York.
- Conover, M.R. (2002). *Resolving Human-Wildlife Conflicts: The Science of Wildlife Damage Management*. Lewis Publishers, New York.

2.9 Apply only the minimum tools, regulations, and force to achieve wilderness protected area objectives

Guiding principles

Decisions about wilderness administrative actions and how they both protect and can threaten the wilderness resource and visitor experiences are very important. Many characteristics of wilderness are fragile and irreplaceable. If decisions are made without systematic analysis and

without forethought for protecting key benefits of wilderness designation, a great deal could be lost through the wrong, or at least not the most appropriate, administrative actions. Fair and equal treatment of all forms of knowledge are needed. A systematic decision process should be used for determining appropriateness of administrative actions in wilderness.

This can include the use of tools (such as methods used to control invasive plants, suppress fires, and conduct scientific research), regulations (such as weighing user restrictions that impact experiences but protect the resource against educational approaches), and applications of force (citations, warnings, education and arrests). A firm, systematic process for making decisions is recommended.

Key considerations

The Minimum Requirements Decision Guide (MRDG, 2014) developed by the Arthur Carhart Wilderness Training Center in the United States suggests a simple principle: 'use the minimum tool' that is necessary to accomplish the task. The tool that is least obtrusive to the wilderness environment and visitor experiences and addresses the issue will be the best tool, regulation or amount of force to use.

The MRDG describes two steps to this decision process:

1. Determine if any administrative action is really necessary. The absence of visible presence of humans is highly desirable in wilderness, and opportunities for spontaneity, exercising freedom in decision making, and lack of heavy-handed, authoritarian management presence is highly compatible with the wilderness ideal. Describe the situation that requires action and why it is a problem. Determine if any actions outside of wilderness that be taken to adequately addresses the situation. If action is necessary, move to step 2 to determine the minimum requirement to address the issue. In the United States,

the MRDG limits this analysis to actions that '...include, but are not limited to, scientific monitoring, research, recreational developments (trails, bridges, signs, etc.), and activities related to special provisions mandated by the Wilderness Act or subsequent legislation (such as grazing, exercising mineral rights, access to inholdings, maintenance of water developments, and commercial services)'.

2. Determine the minimum required activity. Identify a selected alternative after identifying and evaluating all reasonable alternatives. Describe the rationale for selecting this alternative, referencing law and policy criteria, and describe any monitoring and reporting requirements. The MRDG suggests a worksheet to work through a series of questions in describing each alternative solution and helps to document why an alternative was selected.



Responsible management requires good measures of baseline conditions and consistent monitoring. © Aldo Leopold Wilderness Research Institute

Case study 8

Use of the Minimum Requirements Decision Guide

On the MRDG website (<http://www.wilderness.net/MRA>), there are case studies for such issues as livestock grazing management, historic cabin management, insects and disease control, native fish restoration, non-native invasive plants management and wildlife surveys. A key example found in the MRDG is that of non-native invasive plants management. This work resulted in a solution that is highly driven by protection of the wilderness character of the place and the symbolic values of wilderness protected at this place. In this example, after learning from monitoring activities that non-native invasive plants were increasing at one location in a wilderness in the United States, a minimum requirement analysis was conducted.

This prescription was adopted: treatment of non-native invasive plants infestations would occur within the wilderness and continue on national forest and private lands adjacent to the wilderness. All treatment actions in this case study follow the recommendations of an Integrated Weed Management Plan (see Colorado Natural Areas Program 2000 for more details on such planning). These treatment actions are to be adjusted annually as needed. Hand-pulling and grazing, using domestic goats controlled by a herder, will be used for knapweed and herbicides will be applied to treat leafy spurge, toadflax and Canada thistle. Only non-motorized spray equipment will be used and all transportation of personnel and equipment will be on foot or pack string. All personnel will camp in existing campsites and use Leave No Trace techniques to minimize impacts. Temporary area closures will be used during herbicide application operations. Monitoring of existing infestations and inventory of new outbreaks would continue as required. A public information programme will be implemented outside wilderness (e.g. trailhead information boards, forest offices, and forest website) to inform wilderness visitors and others about the threat of non-native invasive plants infestations and to promote prevention measures to minimize introduction and spread. The public and adjacent landowners would be informed of treatment actions and temporary area closures during herbicide application operations.

Implementation

The MRDG suggests development of specific criteria for determining necessity. Such decisions must be made in a consistent manner. As issues, budgets, and personnel changes arise, wilderness managers should strive to apply the same criteria in action planning and decision making. The MRDG suggests making decisions of necessity minimally based on these five criteria:

1. **Valid existing rights or special provisions of wilderness legislation:** Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation that requires action?
2. **Requirements of other legislation:** Is action necessary to meet the requirements of other laws?
3. **Wilderness character:** Is action necessary to preserve one or more of the important qualities of wilderness that were behind formal protection of this area as wilderness?
4. **Legislation language:** Is there 'special provisions' language in legislation (or other legislative direction) that explicitly allows consideration of a use otherwise prohibited? Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?
5. **Time constraints:** What, if any, are the time constraints that may affect the action?

For each decision made, managers should describe what possible methods and techniques could be used, when the action would take place, where the action would take place and what mitigation measures would be necessary. Wilderness managers should select the method or technique that causes minimum impact to the resource and visitor experiences while solving the issue.

Recommended reading

- Minimum Requirement Decision Guide (MRDG) (2014). *Online Instructions for Minimum Requirement Analysis*. Available online from the Arthur Carhart National Wilderness Training Center <<http://www.wilderness.net/MRA>>.

2.10 Monitor wilderness conditions and experience opportunities to guide long-term wilderness stewardship

Guiding principles

To monitor wilderness conditions is to observe and measure the quality of the area over time through the systematic review of specific metrics, indicators and measurements. Any management plan requires effective monitoring systems and protocols to evaluate progress towards its stated objectives. Monitoring is essential to guide planning and identify any revisions that may be required to the management plan or actions. It is also essential to understand any changing circumstances and to be able to assess management actions already undertaken. Only through monitoring can it be determined if the objectives in a wilderness area management plan have been accomplished or not.

Key considerations

Long-term perspective

Monitoring, when employed correctly, allows for the possibility of a wilderness area's long-term stewardship for future generations' use (Cole, 2010). Wilderness management takes a long-term view. Monitoring is a key factor in ensuring the continued ecological and cultural intactness of a wilderness area. The use of an indicator-based planning system is essential for long-term monitoring (see Sections 2.7 and 4.1).

Adaptive management

Wilderness areas are subject to human-induced change that can be addressed by wilderness managers (e.g. soil erosion) and other human-induced changes that cannot (e.g. climate change and air pollution). Management needs to be able to deal flexibly with both these endogenous and exogenous influences, with flexibility particularly important with respect to the latter where uncertainty is an inherent trait. Flexibility in management is also needed to respond to changing visitor and visit characteristics over time and associated changes in impacts, as what is societally acceptable over time is going to keep changing. Also adding uncertainty is whether a particular management strategy for visitors is going to work and needing to adjust it accordingly. For all these reasons, adaptive, flexible management is necessarily central to successful management. Indicator-based management systems, such as the LAC framework, can work well with adaptive management (Moore & Hockings, 2013).



Monitoring a wilderness area, such as in the Skeleton Coast National Park in Namibia, allows a manager to know if the management objectives of a site are accomplished. Long-term stewardship of wilderness areas often includes monitoring recreational experiences. © Vance G. Martin

Importance of collaboration among all stakeholders

Managing for desired conditions or acceptable levels of change suggests value judgements are integral to decision making (McCool, et al., 2007). Managers could make these judgements, but they are unlikely to reflect the full suite of values held regarding a wilderness area; values held by Indigenous Peoples, visitors, commercial operators (concessionaires), neighbours, environmental organizations, and others. Where appropriate, indicators should be decided upon in discussion with conservation stakeholders (Dudley, et al., 2006). Collaboration is needed throughout the planning cycle in determining desirable conditions and encapsulating them in the objectives, through to indicator and site selection and the review of results (Newsome, et al., 2013).

Case study 9

Central Catchment Nature Reserve, Singapore

The Central Catchment Nature Reserve in Singapore is a designated as an IUCN protected area management Category 1b site (IUCN & UNEP-WCMC, 2016). It covers over 30 square kilometres of wilderness in one of the most urbanized countries in the world. The site is governed by the Singapore national government and managed by the National Parks Board of Singapore. The site protects a multitude of species, including critically endangered ones (Tan, et al., 2014), and provides the city of Singapore with essential ecosystem services. The Singapore government carefully monitors the recreation opportunities within the Central Catchment Nature Reserve to ensure many occasions for residents to experience the wilderness, such as the HSBC TreeTop Walk, which is a series of suspension bridges on which recreationists can explore the forest canopy (National Parks Board of Singapore, 2016). The HSBC TreeTop Walk also gives research scientists the opportunity to monitor the canopy's conditions, further their knowledge of forest ecosystems, and contribute long-term science monitoring of wilderness conditions to help create informed management decisions.

Implementation

Devising effective monitoring for wilderness management plans can be a major challenge. Good monitoring systems involve the careful and systematic collection of data followed by careful analysis and evaluation. Monitoring of the quality of wilderness areas should include baseline documentation of the influence of external forces from adjacent lands (see Section 2.11). Analysis should focus on the assessment of non-degradation of an area (see Section 2.2), the wilderness experiences of recreational users, and the cultural needs of the Indigenous Peoples and local communities associated with the area (see Section 2.3).

Data should be collected on biological, physical, social, psychological and cultural metrics for the wilderness area in question and for the adjacent lands (Merigliano & Krumpel, 1986; Landres, et al., 2005). It should be recognized that most of these indicators will vary both spatially and temporally across the wilderness area and will require appropriate tools and systems to assist in data collection, management and subsequent analyses. In some instances, a Geographical Information System (GIS) populated with appropriate datasets, supported by the necessary hardware and software, and personnel within an appropriate organizational setting, will be used to handle the data management and analysis (Carver & Fritz, 2016). In all instances, working closely with natural and social scientists will be extremely useful.



Wilderness area managers must systematically monitor the site's conditions and health of the flora and fauna that reside within the site.

© Stephanie Stefanski

Recommended reading

- Landres, P., Boutcher, S., Merigliano, L., Barns, C., Davis, D., Hall, T., Henry, S., Hunter, B., Janiga, P., Laker, M., McPherson, A., Powell, D., Rowan, M., and Sater, S. (2005). *Monitoring Selected Conditions Related to Wilderness Character: A National Framework. General Technical Report RMRS-GTR-151*. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

2.11 Manage wilderness in relation to its adjacent lands

Guiding principles

It is often necessary to manage the wilderness area not in isolation but in coordination with its adjacent lands. Adjacent lands are the areas surrounding the demarcated protected area and are outside the limits of the core wilderness area. Discrete legal and practical protected area boundaries do not necessarily reflect boundaries followed by natural processes, such as wildlife migration and wildfires. Threats to core wilderness can come from human activities outside the protected area.

Key considerations

Do not manage wilderness in isolation

In a recent survey of wilderness managers in the United States (Dawson, et al., 2015) one of the most serious threats to wilderness conditions identified by these managers was the threat posed from adjacent lands. All of the natural processes, and many of the human ones, do not respect the judicial and administrative boundaries placed around designated wilderness and other protected areas. Boundaries cannot always be established in a way that limits exchange of organisms, sounds, water and human uses across landscapes. Wilderness cannot be managed in isolation from the physical, ecological and human context of its surroundings. Managers should manage wilderness in relation to its adjacent lands. In some countries, buffer

zones can be implemented to protect the core wilderness area from activities outside the protected area. However, in some countries or at specific sites, buffer zones cannot be established.

Legal and administrative involvement

Wilderness can be regarded as one side of the environmental modification spectrum (or wilderness continuum). It is difficult to draw the boundary between legally protected (e.g. *de jure*) wilderness and non-wilderness (Nash, 1982). Boundaries are usually decided through a process of legal and administrative decision making. Boundaries can often cross, divide or intersect natural biophysical zones or ecosystems, making the manager's task all the more difficult. Wilderness managers should involve themselves with the management of land uses outside of their immediate area of jurisdiction. Careful planning and coordination with decision makers, landowners and wilderness area partners is essential.



Many of the species protected by a designated Category 1b site do not necessarily always remain within the strict boundaries of the wilderness area, necessitating that sites are not managed in isolation from other protected areas. The Tui (*Prosthemadera novaeseelandiae*) pictured here is one of the many such examples when considering the wilderness protected areas of New Zealand. © Daniel Field

Influence of and on adjacent lands

There are many ways in which adjacent lands influence (and are influenced by) wilderness areas. These can be summarized as follows:

- Air pollution from nearby urban areas (e.g. emissions from cars, power stations and industry) can negatively affect air quality inside wilderness areas, leading to impacts on wildlife and vegetation health.
- Dust and smoke from agriculture and forestry (e.g. wind-blown soil from ploughed fields and smoke from deliberate burning of crops and forestry residues) can also impact air quality within wilderness areas and adversely affect visibility. Within the United States' categorization of air quality, wilderness areas should be ranked as cleanest. Monitoring of air quality within a wilderness area affects a local industry's ability to increase air pollutants.
- Water quality within wilderness areas can be affected either by wet/dry fallout of atmospheric pollutants or by direct runoff where a wilderness area boundary does not encompass the whole of a catchment, watershed or drainage basin. It is usual for wilderness areas to be regarded as highly beneficial water supply zones and have often been preserved as wilderness for just this

purpose (e.g. the Catskill Mountains supply drinking water for New York City).

- External influences may come from the presence of resource-dependent communities who may derive their livelihoods from a wilderness area or, at the extreme, who may enter the area to harvest resources illegally or engage in poaching and other harmful activities.
- Wildfires are a particular concern in regard to the management of wilderness in relation to adjacent lands. Wildfires originating from natural ignitions (e.g. lightning strikes) in wilderness areas and allowed to burn as part of the ecological management plan can cross the boundary and pose a threat to lives, property and economic land use outside of the wilderness. Similarly, fires started by human action (either accidentally or deliberately) outside of wilderness areas can burn into the wilderness and cause unnatural damage.
- Access and recreation also need to be considered. Roads, trails and trailheads at the wilderness boundary create localized areas of higher accessibility within the wilderness with associated impacts from higher recreational use. Trespass into wilderness from adjacent lands by violators using motorized or mechanized methods of conveyance can severely threaten wilderness resources.
- Disease is often a key concern in regard to adjacent land use. While natural pests and diseases are often not controlled within a wilderness area (e.g. pine and spruce bark beetle in Europe and North America) and are perhaps considered a natural process, they can cause problems from economic damage and losses once they cross the boundary.
- Wildlife is generally highly mobile, sometimes with large home ranges or territories that extend well beyond the wilderness boundary. Movement and migration of wilderness-dependent and wilderness-associated species beyond the wilderness protected area can bring it into conflict with economic land uses such as farming and ranching as a result of livestock predation, genetic dilution from interbreeding and transmission of disease. Thus, ranching and farming landowners may sometimes view wildlife as threats to their livelihoods.

Implementation

Wilderness is often managed in relation to adjacent lands through zoning and coordinated planning. Zoning can be applied both inside and outside of wilderness areas. Inside the wilderness area, zones describing levels of use based on landscape indices and accessibility can be used to manage use based on remoteness from the wilderness boundary and access points. The establishment of buffer zones should be encouraged outside of the wilderness boundary. Buffer zones are usually zones of limited economic activity (e.g. extensive grazing and light forestry) and developed recreation (e.g. serviced campgrounds) that act as a buffer or separation between the wilderness and intensive land uses beyond. Buffer zones act in both directions depending on the threats and influences under consideration. For example, a wilderness buffer can protect wilderness from intensive land use via legal planning restrictions within the buffer zone. It can also protect economic land use from wildlife and diseases originating inside the wilderness (Cole & Hall, 2006) or restoration fires from moving outside the wilderness boundary to valuable cultural forest or homes (Watson, et al., 2013).

Case study 10

Mission Mountains Tribal Wilderness, United States

On Montana's Flathead Indian Reservation, the tribal council designated the 37,230 hectares Mission Mountains Tribal Wilderness in 1982 at the urging of many tribal members. (See Figure 2) The wilderness is a symbol of the overarching relationship the Confederated Salish and Kootenai Tribes once had with the northern Rocky Mountains. The Tribes also established protection in 1987 for an additional 8,900 hectares west of the wilderness to serve as a buffer zone against unwanted human activities. The wilderness buffer zone essentially established a checks-and-balances system that assured deliberation and conscious decision-making to ensure that trust is protected and wilderness values do not deteriorate. This parcel of land—half of which is owned by the Tribe, half by tribal and non-tribal individuals—contains some homes and roads and remains a working landscape within the community. Both the wilderness and the buffer zone are considered protected cultural as well as natural landscapes; thus, major decisions about the management of these areas are subject to review by the Tribal Cultural Committee, the Tribal Council and other tribal members (Watson, et al., 2013).

To improve forest health within the wilderness buffer zone and increase opportunities to restore fire in the wilderness, the Tribal Forestry Department and the public are working together to find solutions to increasingly threatening fuel buildups. Decades of fire suppression within the wilderness buffer zone have resulted in heavy accumulations of dead wood on the forest floor, a dense understory of brush and young trees, and closed forest canopy. This accumulation renders the forest highly susceptible to destructive wildfires, disease, and infestations of pine bark beetle and other harmful insects. Yet, at the same time, improving forest health demands the use of fire to restore a structure that makes it more fire-resilient over the long term. Although the Tribe and their governing agencies are committed to seeing fire restored in the wilderness, the situation of fuel abundance in the buffer zone has been a serious obstacle.

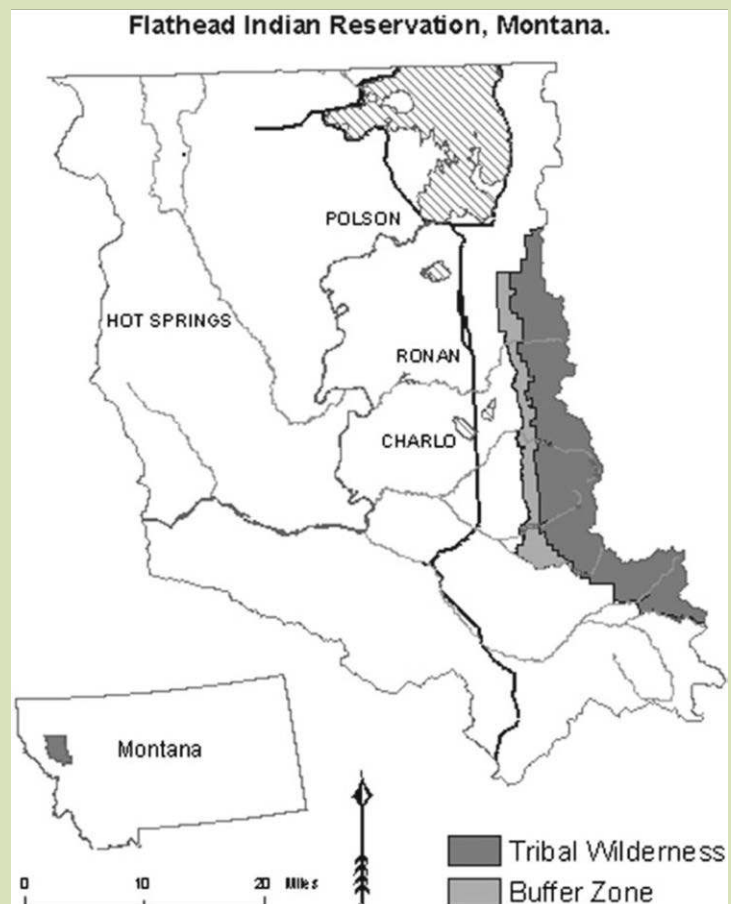


Figure 2. The Mission Mountain Tribal Wilderness is bordered to the west by the Tribal Buffer Zone. © Confederated Salish & Kootenai Tribes

Buffer zones are not the sole answer to managing wilderness in relation to its adjacent lands. It is essential to work with law enforcement agencies, to get local community support, and to implement legal restrictions. Careful coordination of management actions both within and outside the wilderness areas between reserve managers and local planning authorities is necessary to protect wilderness areas from external forces and incompatible development.

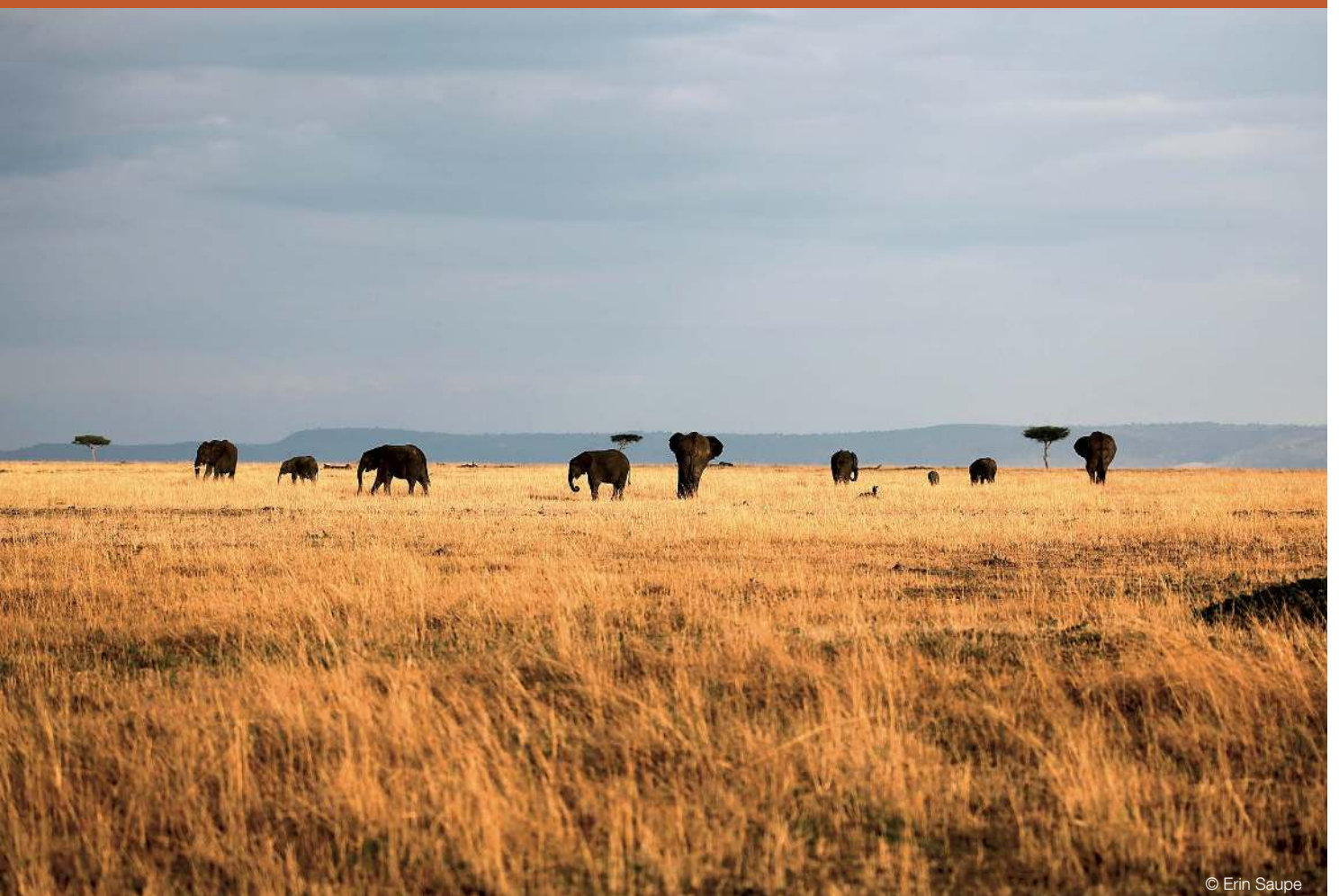
Recommended reading

- Cole, D.N. and Hall, T.E. (2006). 'Wilderness Zoning: Should We Purposely Manage to Different Standards'. In *People, Places, and Parks: Proceedings of the 2005 George Wright Society Conference on Parks, Protected Areas, and Cultural Sites*. pp. 33–38.
- Dawson, C., Cordell, K., Watson, A.E., Ghimire, R., and Green, G.T. (2015). 'The US Wilderness Managers Survey: Charting a Path for the Future'. *Journal of Forestry* 114.
- Watson, A., Carver, S., Matt, R., Gunderson, K., and Davis, B. (2013). 'Place Mapping to Protect Cultural Landscapes on Tribal Lands'. In *Place-Based Conservation*. pp. 211–222. Springer, Netherlands.



Governance and Authority

3



3.1 Introduction: Governance and authority in wilderness protected areas

Governance refers to the interactions among institutional structures, processes and traditions through which political actors can enact legislation, delegate power and responsibility, and determine the appropriateness and equity of management objectives (Graham, et al., 2003; Borrini-Feyerabend, et al., 2013). Governance is intimately related to management but ultimately separate (Borrini-Feyerabend & Hill, 2015). Management determines the actions that are undertaken in pursuit of wilderness area protection, whereas governance dictates which political actors have the power and responsibility to make those management decisions (Lockwood, et al., 2006). Management focuses on the 'what' of wilderness protection and governance focuses on the 'who' and 'how' (Graham, et al., 2003).



Proper governance of a wilderness area ensures the site can be protected. Governance models vary and should be assessed on an individual basis. The Serengeti National Park of Tanzania (Category II) is governed by the national government through the authority of the Tanzania National Parks Authority (TANAPA). © Erin Saupe

Those charged with the task of wilderness area governance should strive to uphold a set of governance quality principles customized to a particular area's specific biodiversity value, cultural concerns, historical land use, and geography. Borrini-Feyerabend, et al. (2013, p. xii), argue, 'These principles provide insights about how a specific governance setting will advance or hinder conservation, sustainable livelihoods and the rights and values of the people and country concerned'. Strong adherence to governance principles within wilderness law is required to ensure proper protection. There are five main principles of good governance quality agreed by the IUCN: Legitimacy and Voice, Equity, Fairness and Rights, Performance, and Accountability. These principles of governance quality should be upheld by all political actors involved at all scales of wilderness protected areas.

No single governance model can be used as the ideal across all wilderness areas. Wilderness areas are intrinsically different and require different governance approaches. Section 3 recognizes four principle governance types: by government, by Indigenous Peoples and local communities, by private governance, and by shared governance. Shared governance can incorporate any of the three other governance types and also applies in transboundary contexts. Section 3 also provides guidelines for wilderness governance through multilateral treaties (see Section 3.6).

As stated in the 2014 'Promise of Sydney' (see Introduction for more detail on the 2014 'Promise of Sydney' document), quality for all governance approaches must be coupled with governance diversity and vitality. Governance diversity requires dynamic systems that involve as many political actors as is feasible. Full participation of government officials, rights-holders, non-governmental organizations and private institutions is essential to high-quality governance. Diversity of actors can be enforced through official legislative bodies and informal social structures. Governance vitality is 'the capacity for integration and connectivity, learning from experience and social-ecological history, fostering engagement and developing innovative and empowering solutions' (IUCN World Parks Congress, 2014, p. 3). A focus on improving governance vitality provides a way to ensure the protection of wilderness areas is premised on respectful and equitable relationships.

Section 3 also explores the permitted governance variances from wilderness legislation (see Section 3.7). Within all governance types, wilderness legislation regulates certain human uses within wilderness areas but allows other uses that are consistent with wilderness values (Kormos, 2008, p. 356).

Recommended reading for Section 3

- Abrams, P., Borrini-Feyerabend, G., Gardner, J., and Heylings, P. (2003). *Evaluating Governance--A Handbook to Accompany a Participatory Process for a Protected Area*. Report for Parks Canada and CEESP/CMWG/TILCEPA.
- Borrini-Feyerabend, G., Dudley, N., Jaeger, T., Lassen, B., Broome, N.P., Phillips, A., and Sandwith, T. (2013). *Governance of Protected Areas: From Understanding to Action*. IUCN, Gland, Switzerland.
- Borrini-Feyerabend, G. and Hill, R. (2015). 'Governance for the Conservation of Nature'. In Worboys, G., Lockwood, M., Kothari, A., Feary, S., and Pulsford, I., (eds.) *Protected Area Governance and Management*. pp. 169–206. ANU Press, Canberra.
- Kormos, C.F. (ed.) (2008). *A Handbook on International Wilderness Law and Policy*. Fulcrum Publishing, Golden, Colorado.
- Kothari, A., Corrigan, C., Jonas, H., Neumann, A., Shrumm, H., and Secretariat of the Convention on Biological Diversity (2012). *Recognising and Supporting Territories and Areas Conserved by Indigenous Peoples and Local Communities: Global Overview and National Case Studies*.
- Lockwood, M., Worboys, G., and Kothari, A. (eds.) (2006). *Managing Protected Areas: A Global Guide*. Earthscan, London.
- Stevens, S. (2014). *Indigenous Peoples, National Parks, and Protected Areas*. The University of Arizona Press, Tucson, AZ.
- Worboys, G.L., Lockwood, M., Kothari, A., Feary, S., and Pulsford, I. (eds.) (2015). *Protected Area Governance and Management*. ANU press, Canberra.
- IUCN Protected Areas Governance website, <http://www.iucn.org/pa_governance>.

3.2 Governance and authority of wilderness protected areas by government

Guiding principles

National government governance occurs when a national government body, such as a ministry or protected area agency, has an official mandate and the necessary capacity to govern a wilderness protected area. Sub-national governance of wilderness protected areas occurs at the provincial, regional and local government levels. Most national government and sub-national legislative approaches to wilderness correspond with IUCN protected areas management Category 1b classification. Governance by government of wilderness is growing in adoption internationally. It is likely that more countries will soon adopt their own wilderness laws that correspond to the IUCN categorization.

Key considerations

National government governance

A national government body may declare new wilderness areas, determine the conservation objectives of the areas, and oversee the area's management (Borrini-Feyerabend, et al., 2013; Borrini-Feyerabend & Hill, 2015; Lockwood, et al., 2006; Worboys, et al., 2015). Sometimes the government body in a country, such as Namibia and the Philippines, will delegate day-to-day management and governance, for example to a sub-national government agency, Indigenous Peoples' management board, non-governmental organization, or private-sector actor though usually retaining the ultimate responsibility and decision-making authority (Dawson & Hendee, 2009; Borrini-Feyerabend, et al., 2013).



The Skeleton Coast National Park of Namibia that includes the protection of desert adapted Elephants (*Loxodonta africana*) is managed by the national government. © Vance G. Martin

The legislation of wilderness protection is important to effective conservation efforts. National government approaches to wilderness legislation span a spectrum of *de jure* (existing in law) and *de facto* (existing in fact) protection. Kormos (2008, p. 18) argues that many countries have the *de jure* legal protection of wilderness areas but not all nations refer to the governance as explicit laws. Certain governments, such as

Australia, Canada, Finland, South Africa, Russia, Sri Lanka, the United States, and the Flathead Indian Reservation in the United States, have statutory protection of wilderness areas. Such statutory protection describes the tenets of a wilderness area within a wilderness law and establishes wilderness protected areas protected by law. Other countries, such as New Zealand, Zimbabwe, Japan, Tanzania, and Italy, have less strict legislation of wilderness areas. Instead, these countries protect wilderness areas through administrative wilderness zones in parks, game reserves and forests (Martin & Watson, 2009). This allows for wilderness as a category of protected area within the country but delegates the particular zoning to individual park management authorities. An example of administrative zoning of wilderness is the Mavuradonna Wilderness Area in Zimbabwe, which was designated in 1989 (Martin, 1990).

Wilderness laws perform two tasks: 1) They define the attributes that wild areas must possess to qualify as a wilderness protected area; and 2) They define the range of human uses that are deemed compatible with those attributes and that are, therefore, permitted within wilderness (Kormos, 2008, p. 21). Such laws create the legal and political definition of wilderness protected by those tasked with the conservation of the area. Governance creates and upholds wilderness legislation within protected areas.

With all types of national government legislation of wilderness governance, the challenge for legislators is to combine the social, biological and recreational aspects of wilderness into nationally applicable law that remains consistent with wilderness values (Kormos, 2008). Policymakers should draft wilderness statutes that combine protection for ecological resiliency, recreational values, and Indigenous Peoples' traditional means of livelihoods and cultural needs that are dependent upon the wilderness resource.

Sub-national government governance

Government is not a monolithic entity. A multitude of agencies make up any country's government and work at the local, regional, provincial, and national levels (Lockwood, et al., 2006; Worboys & Trzyna, 2015), often in concert with private interests and non-governmental authorities. Each agency has its own claims to authority, legitimacy and ability to produce quality conservation. Sub-national government governance creates the potential for a more collaborative and decentralized process of conservation (Borrini-Feyerabend



Zapovedniki, the strictly protected areas in Russia (Category 1a), are under jurisdiction of national government, for example the Kronotsky Zapovednik, which is also a World Heritage Area. © Igor Shpilnenok

& Hill, 2015) based upon locally defined relationships among government agencies, local communities, non-governmental organizations and private individuals. Today it is rare that a sub-national wilderness protected area is governed solely by a government agency without collaboration with Indigenous Peoples or other conservation actors.

Implementation

A wilderness protected area governed by a national or sub-national government body should:

- Be transparent in management decisions.
- Alert the public of actions through publication of management policies and performance-effectiveness reports.
- Foster engagement with political actors across government agencies and with non-government individuals and communities.
- Promote dialogue among stakeholders and conservation partners.

Above all, such a governance structure should strive to uphold the ecological and social wilderness values of the area.

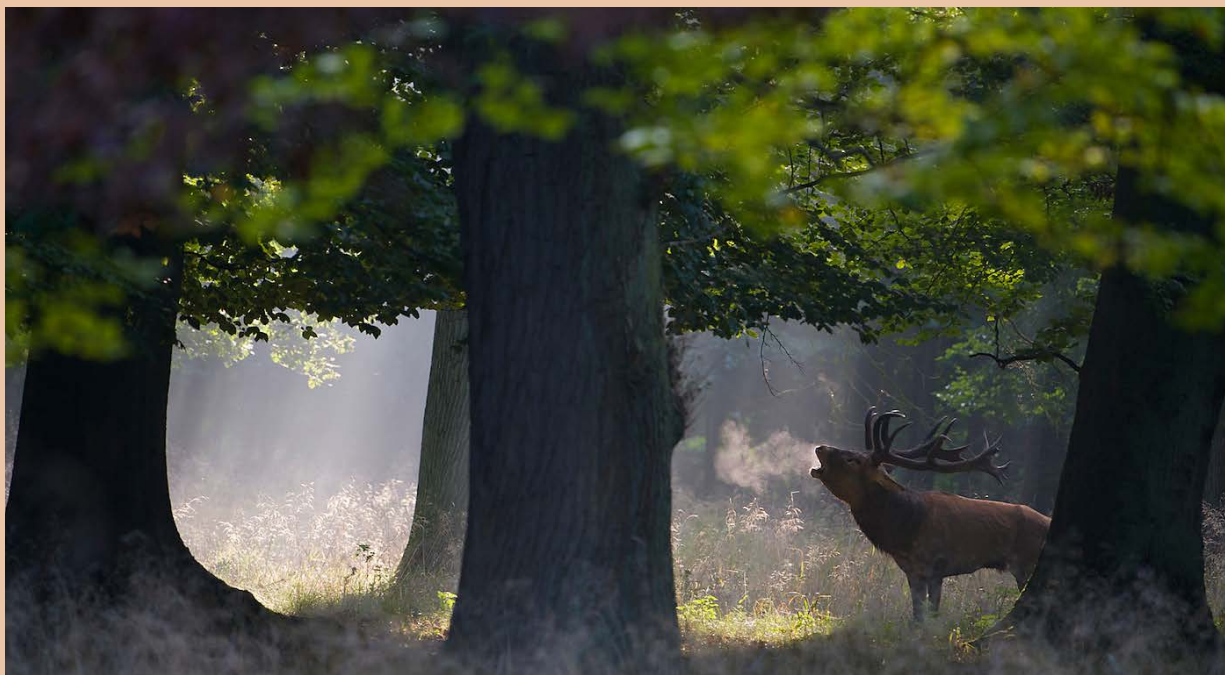
Case study 11

The Natura 2000 Network of Europe

In 2009, the European Parliament passed a resolution calling for improved wilderness protection and recognition. In response to a request by one hundred and thirty non-governmental organizations, the European Commission (2013) published Guidelines on management of wilderness and wild areas within the European Union's Natura 2000 network. This network covers 18 per cent of Europe's terrestrial area - the largest coordinated set of protected areas in the world, some 13 per cent of which is protected for its wilderness attributes (Leiner, 2012).

The wilderness definition used in these Guidelines was developed by the Wild Europe initiative; it is based on the IUCN global definition of Category 1b, adapted to European circumstances (for example, varied types of land ownership). The Guidelines are intended to support implementation of protection and restoration schemes, with emphasis on management by natural processes rather than active human intervention, and on the integrity and resilience of ecosystems as opposed to individual species. They include recommendations on how, where and under which circumstances this approach may be applied. They also promote more effective use of existing legislative capacity for the Natura 2000 network, as well as local law. Decision makers are encouraged to incorporate wilderness areas within more general conservation agendas by realizing the economic, social and cultural importance of wilderness for local communities, landholders and wider society in addition to its intrinsic and biodiversity benefits.

Implementation of the European Commission Guidelines represents part of a broader programme to advance the wilderness and wild area agenda in Europe. In this context they are relevant beyond Europe: if such a highly developed continent can find space to protect and restore nature towards its original self-managing state, and moreover for socio-economic as well as ecological motives, this sends a clear message to countries seeking to determine the fate of their own much larger, more pristine areas.



Most of the wilderness areas of the Natura 2000 network are governed by the national governments of Europe. © Florian Moellers / Wild Wonders of Europe

3.3 Governance and authority of wilderness protected areas by Indigenous Peoples and local communities

Guiding principles

Governance of land and marine territories by Indigenous Peoples, Tribes and local communities is both widespread and the oldest form of governance. If Indigenous Peoples, Tribes or local communities choose to have their self-governed and managed territories designated as a wilderness protected area, those sites can be categorized in numerous ways. The Confederated Salish and Kootenai Tribes in Montana (USA) simply call theirs the Mission Mountains Tribal Wilderness (Confederated Salish & Kootenai Tribes, 2005). Another, more generic name or general categorization is an ICCA (Dudley, 2013; Kothari, et al., 2012). ICCAs—which can be, but are not always, Category 1b—have three key tenets: 1) ‘An Indigenous People or local community possesses a close and profound relation with a site (territory, area or habitat)’; 2) ‘The people or community are the major players in decision-making related to the site and have *de facto* and/or *de jure* capacity to develop and enforce regulations’; and 3) voluntary ‘decisions and efforts lead to the conservation of biodiversity, ecological functions and associated cultural values, regardless of original or primary motivations’ (Borrini-Feyerabend & Hill, 2015, p. 185; Stevens, 2014, p. 71). Within ICCAs there is vast diversity in governance structures, customary and local organizations, mandates, and capacities to protect wilderness attributes. The guidance of the United Nations Declaration on the Rights of Indigenous Peoples should be followed within all ICCAs.

Key considerations

International recognition of Indigenous Peoples’ customary ICCAs as protected areas is an important step within conservation. Many territories governed and managed by Indigenous Peoples and local communities uphold wilderness values and should, if desired by the specific Indigenous Peoples or local communities, be registered as a wilderness protected area. In 2012, the IUCN adopted resolution 5.094 Respecting, Recognizing and Supporting Indigenous Peoples’ and Community Conserved Territories and Areas, which called for governments, non-governmental organizations and the IUCN body to ‘recognize and support ICCAs in situations where they overlap with protected area or other designations’ (IUCN, 2012; Stevens, 2014). Such recognition comes from the proper international and national respect of Indigenous Peoples’ customary territories and laws used to govern those areas. Adhering to the United Nations Declaration on the Rights of Indigenous Peoples is essential. In cases where Indigenous Peoples do not hold direct authority over culturally significant areas, but no other protection exists, ICCA listing goals can motivate communities to seek or declare needed authority.

Holistic approach

Indigenous Peoples’ and local communities’ territories and practices that align with the IUCN definition of Category 1b sites and ICCAs may be concerned with more than biodiversity conservation alone (Stevens, 2014, p. 70). ICCAs often ‘can be central to livelihood, culture (including identity, relationships to territory, and spiritual beliefs), and, when

appropriately recognized and respected, the realization of rights. They are essential to secure livelihoods, providing access to food, water, shelter, clothing, energy and income (Dias, 2012) through sustainable use of natural resources based on local knowledge, cultural values, and collective management of commons’ (Stevens, 2014, p. 70-71). ICCA is an umbrella term that encompasses many of the ways that Indigenous Peoples and local communities conserve and protect their territories and areas through customary traditions, culture, self-governance, and relation to place (Stevens, 2014). Overly restrictive definitions of ICCAs, often premised upon non-indigenous peoples’ romanticization and static understanding of Indigenous Peoples and local communities, undermine the autonomy of ICCAs, Indigenous Peoples’ rights and ICCA’s conservation contributions (Borrini-Feyerabend, et al., 2013; Stevens, 2010; Stevens, 2014; Jonas, et al., 2012; Kothari, et al., 2012).

Collective rights

ICCAs are often governed and managed collectively. Recognition of Indigenous Peoples’ collective—as opposed to individual—rights to their land, water and natural resources is essential (Borrini-Feyerabend & Hill, 2015, p. 183). Collective rights support community institutions’ abilities to be the governing bodies of protected areas. Denying collective rights to Indigenous Peoples harms their capacity to govern their traditional lands.

Acknowledgement of negative conservation legacies

All work done must acknowledge the instances within conservation’s historical legacy of nation-building, subjugation of Indigenous Peoples, blatant racism and ethnocentrism, expulsion of Indigenous Peoples from their territories, and extreme prejudices by non-indigenous peoples of the purported threats posed by Indigenous Peoples to so-called conservation efforts (Stevens, 2014, p. 40). In instances where ICCAs exist within larger government-governed wilderness protected areas, all wilderness decision makers must support ICCAs and governance by Indigenous Peoples in a manner that respects the rights of Indigenous Peoples in accordance with the United Nations Declaration on the Rights of Indigenous Peoples. Without proper recognition of ICCAs, non-indigenous governments risk undermining, suppressing, and violating the rights of Indigenous Peoples (Borrini-Feyerabend & Hill, 2015; Stevens & Pathak-Broome, 2014). Nation states should recognize customary territories and law, and many are beginning to do so (Borrini-Feyerabend & Hill, 2015, p. 193). Customary law must be understood and respected as a legitimate body of law separate from a non-indigenous government’s body of law.

Implementation

A wilderness protected area governed by Indigenous Peoples or local communities should affirm Indigenous Peoples’ sovereignty and rights, including: rights to control their own development and to use, conserve and manage all natural features of their lands, including the rights to keep their own systems of land tenure and to be protected from environmental degradation; and rights to participate in decisions regarding the disposition of any state-owned minerals that may affect them, with the objective of obtaining their agreement or consent, and not to be removed from lands without their consent. This includes the allowance of limitations of recreational access

seasonally and/or spatially to assure privacy for the spiritual and traditional practice of Indigenous Peoples.

By nature and profession, wilderness managers must be intensely aware of and dedicated to protecting the wilderness resource. Cultural norms, international policy, human rights, and best-practice wilderness management are not always easily compatible. This is true of situations within both indigenous and non-indigenous cultures, and may be especially challenging when these cultures converge. Extra sensitivity is required, therefore, whenever a situation arises where a wilderness manager (of whatever cultural background) sees that actions or policies affecting the conservation of a particular wilderness area are contrary to the protection of wilderness values, especially when it occurs at the intersection of cultures. What these Guidelines emphasize is that the wilderness manager should be well-informed about and attempt to integrate the challenging intersection of sovereignty and human rights, wilderness values, diplomacy, and right action.

Recommended reading

- Brosius, J.P., Tsing, A.L., and Zerner, C. (eds.) (2005). *Communities and Conservation: Histories and Politics of Community-Based Natural Resource Management*. Globalization and the environment. AltaMira Press, Walnut Creek, CA.
- Cajune, J., Martin, V., and Tanner, T. (eds.) (2008). *Protecting Wild Nature on Native Lands: Case Studies by Native Peoples from around the World*. vol. 1. Fulcrum Publishing, Golden, Colorado.
- Dudley, N. (ed.) (2013). *Guidelines for Applying Protected Area Management Categories*. IUCN, Gland, Switzerland.
- Indigenous peoples' and community conserved territories and areas (ICCAs) consortium website: <www.iccaconsortium.org>.
- Kothari, A., Corrigan, C., Jonas, H., Neumann, A., Shrumm, H., and Secretariat of the Convention on Biological Diversity (2012). *Recognising and Supporting Territories and Areas Conserved by Indigenous Peoples and Local Communities: Global Overview and National Case Studies*.
- Nie, M. (2008). 'The Use of Co-Management and Protected Land-Use Designations to Protect Tribal Cultural Resources and Reserved Treaty Rights on Federal Lands'. *Natural Resources Journal*. 48: 585.
- Stevens, S. (2010). 'Implementing the UN Declaration on the Rights of Indigenous Peoples and International Human Rights Law through the Recognition of ICCAs'. *Policy Matters* 17: 181–194.
- Stevens, S. (2014). *Indigenous Peoples, National Parks, and Protected Areas*. The University of Arizona Press, Tucson, AZ.

3.4 Private ownership and governance of wilderness protected areas

Guiding principles

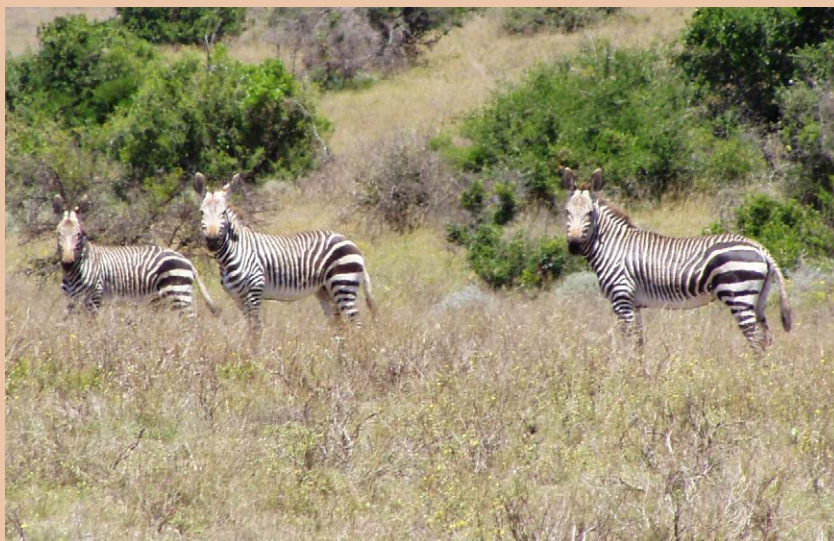
Private governance of wilderness protected areas is an important field of conservation in which wildlands are overseen by private institutions, not government agencies (Dudley, 2013). The authority and responsibility to make conservation decisions rests solely with the private institutions, individuals or trusts who own the land. To be formally recognized within the IUCN definition, any wildlands governed by private actors must prioritize the conservation needs of the area over any activities that might impinge on the conservation objectives and must adhere to best practices as defined within IUCN management guidelines. Varied types of wilderness ownership and oversight are to be encouraged, but it needs to be realized that private-sector wilderness areas are seldom protected in perpetuity unless they are subject to legally binding title deeds, covenants or easements that continue unchanged regardless of ownership or management.

Case study 12

Shamwari Game Reserve, South Africa

The Shamwari Game Reserve in South Africa was the first private wilderness protected area designated in South Africa, which set many good examples of how to govern a privately owned wilderness area. However, Shamwari is no longer a privately owned wilderness protected area because it was sold and the new owners did not keep the protected area status.

Endangered Cape Zebras (*Equus zebra zebra*) have been re-established and protected within the privately owned Shamwari Game Reserve in South Africa that, for several years, had a privately declared and managed core wilderness zone. © Vance G. Martin



Case Study 13

Wilderness in Eastern and Southern Africa

Numerous countries, especially throughout eastern and southern Africa, are well-known for private wilderness management. Many who own land adjacent to Category 1b areas that are managed by state, provincial, or national agencies are dedicating their lands to wilderness. Some of these are large areas in themselves, and when banded together into ‘conservancies’ form large blocks of unfenced wildlands sometimes simply for personal purposes, often for ecotourism, and sometimes for sustainable use such as hunting. Many of these areas, for example to the west of Kruger National Park, allow motorized transport for game viewing, but some do not, such as privately owned Lapalala Wilderness in the Waterberg Mountains 250 kilometres north of Pretoria (<http://lapalala.com>).

Key considerations

Certain countries, particularly eastern and southern African countries, have more land protected under private ownership and governance than under the authority of government (Worboys, et al., 2015). It is important to ensure best practices on these wildlands and proper recognition of the quality of conservation performed through private governance.

Private governance is often best implemented through partnerships between private actors and conservation-focused non-governmental entities, governments, or grant-making foundations. Working at a landscape scale can bring together multiple private landowners and conservation agencies to agree on large conservation management plans and governance objectives (Worboys, et al., 2015). Many examples of such partnerships exist, such as the 2.4 million hectares Adirondack Park in New York State, in which half of the land is privately owned (Kormos, 2008). Another example is the Bush Heritage Australia, a large and expanding network of privately owned lands throughout Australia managed for

biodiversity conservation. Currently, approximately 3 million hectares of land are involved, with plans to at least double this amount by 2017.

Other examples of quality private governance can be found in Kormos’ (2008) writing on conservation by corporations and individual landowners and Borrini-Feyerabend’s (2013) description of ecotourism and private hunting reserves.

Legacy of private governance in conservation

Private ownership and governance has a long history within nature conservation (Borrini-Feyerabend & Hill, 2015; Johnson, 1996; Nash & Hendee, 2009). The origins of private conservation governance can often be found in lands set aside by aristocrats and monarchs to protect areas to use as hunting grounds (Lockwood, et al., 2006). Such governance saw conservation practices as secondary to the wants of private individuals. Today, private governance prioritizes the conservation needs of wildlands, often through conservation easements. A common example of such governance is seen when corporations, non-governmental organizations

Case Study 14

Wilderness in India

India is experiencing a rapid increase in private landowners dedicating their mostly small landholdings as wilderness (Tejpal, 2015). This movement is occurring in all regions of the country and is characterized by small areas of privately owned land, almost all of them former marginal farmland, that are often adjacent to large wilderness areas. Although



these areas in India are much smaller than the areas in Africa—typically 100 hectares or even much less—all of the examples in all countries demonstrate and produce some very real benefits: they enlarge the existing, adjacent wilderness area; often provide critical ecological connectivity; reduce human-wildlife conflict; increase watershed, biodiversity and carbon storage; and, in many cases where the owners then build a small ecotourism lodge, create jobs and revenue in typically very poor, rural areas.

Staff at the Pench Tiger Reserve of Maharashtra, India work closely with the private landowners of the surrounding area to add to the Tiger Reserve and to create wilderness corridors. © Sanctuary Asia

Case Study 15

The Devil's Canyon 'El Carmen' Wilderness Area (Tierra Silvestre Cañón Del Diablo)

CEMEX, the Mexican-based transnational corporation and one of the world's largest cement companies, owns, is continuing to rewild, and manages the Devil's Canyon Wilderness Area. This wilderness area was recognized as a privately held wilderness in 2008 by CONANP, Mexico's protected area commission (CONANP, 2008). The Devil's Canyon Wilderness Area is the first officially declared wilderness in Mexico and in Latin America (Garcia, 2009). This strictly managed wilderness canyon of some 22,400 hectares is the core area of Maderas del Carmen (simply known as 'El Carmen'), a larger (140,000 hectares) private nature reserve owned and managed by CEMEX. El Carmen closely collaborates with adjacent private ranchers managing some 30,000 hectares of additional wildlands, all of which are an important element in the 1.5 million hectares transboundary conservation area proposed in the process of WILD9, the 9th World Wilderness Congress (Robles Gil, et al., 2009) and formally designated in November 2010 by the governments of Mexico and the United States as a 'Natural Area of Binational Interest' (NAWPA Committee, 2010).



The El Carmen Escarpment (Chihuahua, Mexico) contains the El Diablo Canyon, a privately owned and managed wilderness area. © Patricio Robles Gil

Mexico is the fifth most biodiverse country in the world, and the Chihuahuan Desert is recognized as one of the three most biologically rich and unique desert ecoregions in the world, with up to 1,000 species adapted to live nowhere else (Carton, et al., 2005). El Carmen itself is a 'sky island' in this ecosystem—an elevated plateau/mountain range abruptly jutting above the desert floor—rich in biodiversity, home to more than 500 species of plants, 400 species of birds, 70 species of mammals, and 50 types of reptiles and amphibians.

CEMEX's ongoing wilderness conservation accomplishment is anchored by a biodiversity team employed and fully supported by the corporation, whose ambitious agenda over the years has been based on an evolving, 30-year management plan with three core components: protect biodiversity, recover damaged lands, and restore native wildlife to viable populations. Some of CEMEX's wilderness conservation management actions have been: an original baseline inventory; pioneering methods to restore large areas of native grassland; removal of fences; many scientific projects such as black bear monitoring (with 60 collared bears); a comprehensive rewilding programme that features an acclaimed programme to reintroduce desert bighorn sheep; and much more.

CEMEX is quick to recognize that this work has been possible through, and ably assisted by, specific individuals such as Mexican conservationist and artist Patricio Robles Gil, and many non-governmental organizations (e.g. Agrupacion Sierra Madre, Conservation International, WILD Foundation, Birdlife, and WWF), government agencies, and private landowners. Another feature perhaps unique to this private wilderness initiative is the certification of the wilderness designation by CONANP, which provides some legal protections by certain government agencies and from common use by the public (Robles Gil, 2006).

or private trusts purchase and lease wildlands for the explicit purpose of conservation (Langholm & Krug, 2004). Many are driven by respect for nature and the desire to protect wild places (Worboys, et al., 2015). More utilitarian motivations include corporate responsibility objectives, biodiversity offsets, ecotourism income and tax incentives. All of these motivations are important and interrelated.

Oversight and certification

Oversight and certification by external sources should be encouraged to maintain strict standards of best-practice governance and management (Worboys & Trzyna, 2015). Many privately owned and managed protected areas are managed by a board whose purpose is to ensure

proper governance practices (Worboys & Trzyna, 2015). Poor governance practices in private wilderness areas can result in “islands for elites” — places where wealthy landowners host affluent tourists (Langholz & Krug, 2004), (Worboys, et al., 2015, p. 192). This is especially a concern with foreign ownership of lands protected for their wilderness value and character. Oversight by external sources allows for the use of specific legal and political contexts to ensure quality governance, which requires cooperation with the national and sub-national government agencies and relationships with communities surrounding the private wildlands. Proof of such cooperation can come from certification given by the national government or international bodies that monitor and evaluate the effectiveness and equity of a wilderness area (Lockwood, et al., 2006, p. 130). This regulation can ensure private governance adherence to IUCN standards of quality governance and true partnerships with surrounding communities (Worboys, et al., 2015).

A variation on the role of the private sector can be found in cases where private bodies such as non-governmental organizations provide oversight and criteria that designate wilderness or otherwise recognize wilderness quality. For example, the European Wilderness Society is the only Pan-European non-governmental organization that works to identify, designate, manage and generally promote European wild rivers, old growth forests and wilderness. The European Wilderness Society designation process uses the European Wilderness Quality Standard and Audit System, a privately developed auditing system that has already designated 16 areas (European Wilderness Society, 2015).

Implementation

Private wilderness protected areas should:

- Be the subject of legally binding instruments, such as conservation easements, covenants, or voluntarily applied and legally enforced servitudes;
- Be overseen by an external source to ensure best practices;
- Where applicable, use a management board to execute governance decisions;
- Cooperate with national and sub-national government agencies;
- Partner with conservation non-governmental organizations or grant-making entities;
- Where possible, create financial incentives for private actors to respect the ability of Indigenous Peoples to continue accessing traditional places and land uses.

All governance and management decisions should seek to uphold best practices and wilderness values.

3.5 Shared governance and authority of wilderness protected areas

Guiding principles

A shared governance structure that can balance diverse partners and stakeholders with sometimes vastly differing capacities and interests will be a much stronger long-term governance system than one that ignores these complexities to focus only on the politically powerful (Berkes, 2012; Worboys & Trzyna, 2015). This requires institutional mechanisms that share governance and authority among several actors but that can be individualized at the local level (Worboys, et al., 2015). A multilevel emphasis incorporates a management structure able to work with a plurality of governance that brings together different levels of national, state and local governments to work in coordination with Indigenous Peoples, Tribes and local communities' governments. The complexities of power relationships between a politically and culturally diverse group can present major difficulties to a successful shared governance structure, but when successful, this diversity can likewise better ensure the long-term stability and success of a wilderness protected area.

Key considerations

Key features of successful shared governance structures include partnerships that are multiparty, multilevel, multidisciplinary, and flexible with an emphasis on constantly evolving process and created in a paradigm in which powers are shared and benefits distributed (Dudley, 2013; Borrini-Feyerabend & Hill, 2015). An explicit focus on multiparty collaboration requires incorporating different types of political actors and their respective capacities and interests. This focus on diversity allows for a multitude of engaged actors to be involved in the conservation process and for the recognition of partners and stakeholders beyond national government agencies to be formally involved in the governance of a wilderness area (Dovers, et al., 2015). Some actors, like Indigenous Peoples, local communities and private landowners, have often been informally involved in the governance of wilderness but can now be given due recognition through shared governance roles (Lockwood, et al., 2006).

Wilderness decision makers in shared governance structures with Indigenous Peoples must adhere to the United Nations Declaration on the Rights of Indigenous Peoples. Two articles within this declaration of particular importance to shared governance are:

- Article 12: ‘the right to maintain, protect, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect and have access in privacy to their religious and cultural sites, the right to use and control their ceremonial objects and right to repatriations of their human remains...’ (United Nations Declaration on the Rights of Indigenous Peoples, 2007, p. 9).
- Article 31: ‘the right to control, protect and develop their cultural knowledge...and intellectual property rights...’ (United Nations Declaration on the Rights of

Indigenous Peoples, 2007, p. 11). These rights include the right to research employing indigenous science and methodologies and to ensure the inclusion of indigenous science in policy implementation, other research projects, assessments and response to protected area threats.

Shared governance presents the possibility that a protected area could incorporate the ecological and cultural needs of an area in a manner that upholds the best practices required by governments, communities, scientists, and conservationists. In some situations, non-governmental organizations may oversee the governance of a wilderness area and be charged with the responsibility of bringing together a range of stakeholders and conservation actors, including government agencies.

Collaborative governance

Collaborative governance occurs when one government agency—often a state or provincial agency—possesses the authority and mandate to govern an area but must at least consult and inform stakeholders when implementing regulations and initiatives (Borrini-Feyerabend, et al., 2013). Consultation may vary from informal to formal depending upon the regulation at hand and the actors involved. A strong form of collaborative governance uses a type of consultation that requires the fully informed and comprehensive involvement of all stakeholders in the decisions made for the area (Lockwood, et al., 2006; Borrini-Feyerabend & Hill, 2015). Applicable to all protected areas, collaborative governance works well for wilderness protected areas as does joint governance, described below.

Joint governance

Joint governance involves a regulation body composed of actors representing a variety of vested interests and constituencies that are charged with the authority and responsibility of a protected area's decision-making (Borrini-Feyerabend & Hill, 2015). The nuances and balances of such power-sharing structures are defined in a formal manner from the outset of the joint governance relationship. The balance of power between the conservation partners and stakeholders spans a continuum from full control by government agency to full control by non-government conservation partners and is often based upon an individualized platform of shared authority, responsibility, mandate and capacity to govern a wilderness area. Joint governance mechanisms have a strong potential to incorporate the pressing social and ecological needs of conservation (Carlsson & Berkes, 2005).

Transboundary governance

When applicable to wilderness protected areas, transboundary governance refers to the ways in which wilderness protected areas are established and managed across international government borders to allow the free migration or movement of animals across political borders and cooperative management between entities in more than one country (Mittermeier, et al., 2005; Sandwith, et al., 2001; Vasiljević, et al., 2015). Transboundary governance should include management plans in which the management is truly shared among and integrated across the nations involved in the transboundary area. Transboundary efforts may not explicitly focus on wilderness, but include the protection of wilderness areas as part of an overall conservation

strategy. Transboundary governance can and should include collaborative or joint governance.

An example of another conservation effort that uses a transboundary governance structure is the Yellowstone to Yukon Conservation Initiative that stretches from northwestern Wyoming, (Yellowstone, USA) to northeastern Alaska and northwestern Canada (Yukon, Canada) (<http://y2y.net/>). It is an example of an area conserved at a continental scale through a governance structure that incorporates hundreds of diverse political actors and landowners working together to best direct the conservation objectives (Bates, 2010; Locke & McKinney, 2013). These transboundary conservation governance structures allow for the protection of important ecosystems in their entirety. Transboundary protected areas can also be governed through bilateral or multilateral agreements (see Section 3.6).

Implementation

A shared governance structure should recognize the rights of the partners and increase the participation of people involved in the conservation of protected areas. Successfully executed, shared governance can promote both social justice and best practices of conservation. Borrini-Feyerabend and Hill (2015, p. 201) argue that it is possible to achieve a balance 'between fairness and acquired rights, stability and innovation, local meaning and values and broader liberating principles by adopting a 'human rights-based approach', by which a multiplicity of procedural and substantive rights is respected'. Such a structure must incorporate historical events and relationships, previous governance structures, multiplicity of actors with explicit interest in area protected, ecological realities as well as the less tangible aspects like fairness of process, capacity and means to manage, and true power-sharing (Borrini-Feyerabend, et al., 2004; Borrini-Feyerabend & Hill, 2015; Nie, 2008).

The principles of effective shared governance of protected areas as outlined by Stevens (2014, p. 300-301) should be followed in all shared governance of wilderness protected areas that include Indigenous Peoples:

- Recognize Indigenous Peoples' status as Indigenous Peoples and their human and indigenous rights and responsibilities.
- Recognize Indigenous Peoples' territories, collective land and sea tenure, self-determination, self-governance, and customary law or agree to differ on issues such as territorial ownership while dispute resolution processes proceed.
- Undertake shared governance only with the free, prior, and informed consent of Indigenous Peoples.
- Provide for periodic review and renegotiation of shared governance arrangements.
- Provide, when agreed to by all parties, for shared governance to be an interim arrangement to facilitate transition to Indigenous Peoples' self-governance of protected areas in their customary territories.
- Establish formal, clear, legally binding agreements on shared governance that include institutional arrangements, decision-making process, dispute-resolution mechanisms, protected area goals and management categories, and key policies and regulations.

- Ensure that Indigenous Peoples have at least equal decision-making power and authority in shared governance arrangements.
- Develop decision-making processes with Indigenous Peoples' full participation that respect their own decision-making protocols.
- Ensure that when management boards are established, these are not merely advisory and define their purview to include policymaking, planning, assessment and evaluation, oversight of day-to-day management, fiscal responsibility, and accountability.
- Ensure that Indigenous Peoples approve the means by which management board members are selected.
- Ensure that Indigenous Peoples have at least equal representation and leadership on management boards.
- Provide capacity-building for all involved, including for improving cross-cultural communication, relationships, and interactions.
- Foster trust and a strong shared commitment to working together.
- Carry out joint work and training, the shared experience of which can foster better interpersonal relationships, mutual understanding, and respect.
- Strive for decisions that reflect respect for Indigenous Peoples' values and knowledge as well as non-indigenous peoples' concerns and knowledge.
- Recognize ICCAs that overlap with or are contained within these protected areas.
- Provide legal authority for indigenous rangers, guardians, and others designated by Indigenous Peoples to enforce customary law and protected area regulations.

Case study 16

Tenkile Conservation Alliance, Papua New Guinea

The Tenkile Conservation Alliance is a non-government organization established in Papua New Guinea in 2001. Tenkile Conservation Alliance was started to protect the critically endangered Tenkile kangaroo (*Dendrolagus scottae*) from imminent extinction in the Torricelli Mountain Range. Tenkile Conservation Alliance works with the local communities of the Torricelli Mountain Range to ensure habitat protection of the Tenkile kangaroo and the economic prosperity of the local communities. Tenkile Conservation Alliance took a grassroots approach to this conservation crisis in a wilderness area and has worked with local communities' conservation partners for the past 15 years.

A key to Tenkile Conservation Alliance's longevity and success has been the consistency of managerial staff, using a bottom-up approach, listening to the people, empowering the stakeholders, employing local people and being able to deliver tangible benefits to the landowners and communities. Tenkile Conservation Alliance now has 50 villages comprising nearly 13,000 people within its programme, and employs some 30 full-time staff and over 200 casual staff—all but two of whom are from the area (Sandaun and East Sepik Provinces of Papua New Guinea). Tenkile Conservation Alliance has the potential to expand into surrounding areas should the success and funding avenues increase for this non-governmental organization.

Tenkile Conservation Alliance has established its main headquarters in Lumi, at the base of the Torricelli Mountain Range, which has meant problems, decisions and programmes are dealt with at the source and not remotely. Dissemination of information is accurate and done so in the most commonly spoken language—Tok Pisin or Melanesian pidgin.

Tenkile Conservation Alliance has gradually gained the support, understanding and respect of the local-level, provincial and national governments of Papua New Guinea through persistence, determination and, most importantly, desire of the landowners and communities. The Torricelli Mountain Range has now become a legislated protected area under an agreement and partnership with Tenkile Conservation Alliance and the Papua New Guinea Government.

Since its initial project on Tenkile conservation, the roles of Tenkile Conservation Alliance have changed considerably to encompass rainforest protection, community development and capacity-building, research as well as expanding the number of flagship species to include the critically endangered Weimang, or golden-mantled tree kangaroo, the black-spotted cuscus and the northern glider to protect the whole of the Torricelli Mountain Range, which comprises some 200,000 hectares of tropical rainforest. All 50 villages involved within the Tenkile Conservation Alliance have established their own conservation-area committees and mapped much of their land with management rules and regulations. Through the power of the people, who ultimately control their own land and its biodiversity, the Torricelli Mountain Range is currently well-protected.

3.6 Multilateral governance and authority of wilderness protected areas

Guiding principles

Multilateral governance structures can be used to protect wilderness areas through treaties agreed to by three or more sovereign states. These treaties are often concerned with the conservation of wildlands that are transboundary, of global importance, and represent areas such as Antarctica and the High Seas, which are the open ocean areas that are not administered by specific countries. These governance structures often require the participation of many non-governmental organizations, government agencies, advocacy groups and private individuals. The incorporation of so many disparate actors provides both benefits and challenges to the functioning of a successful governance structure.

Key considerations

Multilateral governance in wilderness protected areas

Multilateral governance of wilderness protected areas occurs when three or more national governments decide upon a formal conservation agreement. Governance at the multilateral level require an international instrument, or treaty agreed by the participating countries (Parties) and usually implementing legislation at the national level. Examples of such international instruments are the Convention on Biological Diversity, the Convention on Migratory Species, the Barcelona Convention, and the Abidjan Convention.



'Bergy bits', which originate from glaciers, are essential to the protected Antarctica wilderness. © Howie Chong

Antarctica is the world's largest area with intact wilderness qualities and is governed by a multilateral treaty. The Antarctic Treaty System (ATS) is a complex governance structure that incorporates a multiplicity of regulation agreements among multiple countries. Within ATS, the Protocol on Environmental Protection to the Antarctic Treaty provides specific protection to the wilderness values of Antarctica with a legal status (Deary & Tin, 2015). Two annexes to this protocol provide environmental management directives specific to wilderness: Annex I Environmental Impact Assessment and Annex V Area Protection and Management (Deary & Tin, 2015, p. 2). As the tourism sector increases, visitation to Antarctica and climate change threatens to disrupt Antarctica's ecosystem dynamics, the governance structures must remain adaptive and protective to maintain wilderness values.



Gentoo penguins (*Pygoscelis papua*) are designated as 'near threatened' and reside in the Antarctica wilderness. © Thomas Kramer Hepp

Another example of multilateral governance is a Peace Park that contains wilderness protected areas: Kavango-Zambezi Transfrontier Conservation Area Peace Park, which spans Angola, Botswana, Namibia, Zambia, and Zimbabwe. Peace Parks (<http://www.peaceparks.org>) as multilateral governance structures aim to benefit ecosystems, peoples and wildlife in the name of conservation, social justice, and peaceful cooperation.



Leopards (*Panthera pardus*) are important species found in the Kavango-Zambezi Transfrontier Conservation Area Peace Park. © Alana Roxin

Multilateral agreements applicable to wilderness protected areas

Three multilateral environmental agreements that have been used to protect wilderness and that have great potential for further, more systematic use in the future are the Convention on Wetlands of International Importance (Ramsar Convention), the World Heritage Convention, and the UNESCO Man the Biosphere Programme (MAB) (Dawson & Hende, 2009; Borrini-Feyerabend, et al., 2013). While the Ramsar Convention and the MAB Programme do not explicitly describe wilderness areas, they do describe key wilderness values (see Introduction for discussion of wilderness values) such as naturalness and minimal human

impact (Dawson & Hendee, 2009, p. 58), creating good potential to use these mechanisms to protect wilderness qualities or areas with high wilderness value. The Convention Concerning the Protection of the World Cultural and Natural Heritage of 1972 (World Heritage Convention) protects sites with Outstanding Universal Value by inscribing them on the World Heritage List. The World Heritage Convention has already been used to protect very large, intact areas (including a number of protected areas designated or partially designated as wilderness protected areas), and potential exists for a more systematic contribution to wilderness conservation globally in the future (Kormos & Mittermeier, 2014; Kormos, et al., 2015).

Ocean wilderness governance

The United Nations Convention on the Law of the Sea (UNCLOS) frames governance of the High Seas, which are areas beyond national jurisdiction. UNCLOS provides the foundation upon which any regional governance structures for the High Seas should be built. Any High Seas governance structure should first establish the correct type of governance that allows for as many diverse actors to be as involved in the decision-making process, given their respective capacities, authorities and mandates. Governance vitality can be maintained through the overarching supervision of a multilateral body like the United Nations Environment Programme Regional Seas Programme. The survey on potential High Seas wilderness areas by McCloskey (2001) should be used as a reference in establishing governance of such areas.

Case study 17

Maloti-Drakensberg Park World Heritage Site of South Africa and Lesotho

In 2001 a memorandum of understanding was signed between the Kingdom of Lesotho and the Republic of South Africa to establish the Maloti Drakensberg Transfrontier Conservation and Development Programme (Ezemvelo KZN Wildlife, 2012). This programme created a transboundary protected area between between Sehlabathebe National Park in Lesotho and the uKhahlamba-Drakensberg Park World Heritage Site in South Africa designated in 2000 (UNESCO World Heritage Committee, 2000; UNESCO World Heritage Committee, 2015). The Maloti-Drakensberg Park World Heritage Site spans approximately 242,000 hectares, about half of which contains legally designated wilderness (Ezemvelo KZN Wildlife, 2013). Since then, the Lesotho component of the area has also been designated, making it a transboundary World Heritage Site.

Located in the Maloti and Drakensberg mountain ranges of Lesotho and South Africa respectively, the park protects endangered species such as the Cape vulture (*Gyps coprotheres*), the bearded vulture (*Gypaetus barbatus*), and the Maloti minnow (*Pseudobarbus quathlambae*) (Ezemvelo KZN Wildlife, 2012). The designation of the site contains and protects rock art of the San people found in caves and rock shelters throughout the Maloti-Drakensberg Park World Heritage Site (Mazel, 2008; Mazel, 2013).

The Maloti-Drakensberg Park is managed through a joint management plan that is agreed upon by both the Kingdom of Lesotho and the Republic of South Africa, and the relevant conservation institutions of both countries (Ezemvelo KZN Wildlife, 2012; Maloti Drakensberg Transfrontier Project, 2008; Maloti Drakensberg Transfrontier Project, 2012). The governing bodies of the park have created an integrated management plan that forms a governance framework for deciding upon and implementing management decisions to achieve the conservation objectives of the site (Ezemvelo KZN Wildlife, 2011). Through this framework, the park's management achievements are assessed annually and the overarching conservation plans and objectives are reviewed every five years (Ezemvelo KZN Wildlife, 2011; Ezemvelo KZN Wildlife, 2012).

3.7 Variances in jurisdiction and diversity of governance and authority

Guiding principles

A variance is an exception from legislation on the governance of wilderness protected areas. In certain instances, the interpretation of wilderness legislation recognizes specific variances. General category principles, explained below, should be used in assessing whether certain activities are

consistent with the intent of wilderness law. As a rule, activities should be judged by the extent to which they undermine—or do not undermine—wilderness values of the protected area. As wilderness law and policy continue to evolve, so will the nuances of variances permitted within wilderness areas. All current and future variances should be analyzed for their consistency with the principles of wilderness values. Variances for new designation types, such as those by Indigenous Peoples and the private sector, must be explored further. Wilderness law and the variances from it should be assessed by their ability to work in conjunction with and in a context of Indigenous Peoples' land rights (Kormos, 2008, p. 357). See Section 4.10 for the management and permitting of variances.

Key considerations

Compatible variances

Permitted variances should align with wilderness values (see Section 1). Kormos and Locke (2008) give suggestions of human activity categories, such as fishing, hunting, recreation, benchmark studies, and restoration, that may be compatible with wilderness values. The compatibility of these categories depends upon other factors, including national legislation. At times, these categories may be in conflict with one another. Some of these categories, such as fishing and hunting, may be restricted within individual areas to specific peoples, such as traditional indigenous inhabitants, or to specific zones within the larger wilderness area. Specific activities may be governed at a sub-national level instead of at a national government level. For example, in the United States, wildlife and fish are governed at the sub-national level, which means hunting and gathering variance differs within the country. Sport hunting and fishing is permitted within wilderness areas, provided the activity is regulated in accordance to wilderness values and the prevailing wilderness legislation.

Incompatible variances

All wilderness areas are intended to adhere to a set of wilderness values and attributes (see Section 1). Certain categories of human activity are incompatible with wilderness values and variances cannot be allowed. These categories are described by Kormos and Locke (2008, p. 25) and are listed below. It should be emphasized that these do not refer to traditional and customary-use activities.

1. *Farming*—Humans change the species composition of an area for their own nutritional benefit by altering the land or seabed and planting one or several species.
2. *Mechanical recreation*—Humans use vehicles for recreational activities, including bicycles, automobiles, off-road vehicles, motorboats, and snowmobiles.
3. *Transportation corridors and infrastructure*—Humans build highways, railways, airports, harbours, shipping lanes, irrigation canals, and straightened river channels for navigation.
4. *Permanent dwellings*—Humans build structures that provide permanent human habitation in a fixed place.
5. *Towns and cities*—Humans build large collections of permanent dwellings and associated infrastructure.
6. *Industrial activity*—Humans refine or reassemble primary products from earth on a large scale for human use or obtain such primary products by clearing forests for lumber; damming rivers for hydroelectricity or diverting them for irrigation; mining; and oil and gas exploration and exploitation.

Pastoralism variance

Kormos and Locke (2008) explain that the grazing of domestic animals is often incompatible with wilderness values. Often the grazing that is permitted within a wilderness area is by nomadic peoples and is categorized as non-intensive grazing or pastoralism, more generally (Dudley, 2013). Such pastoralism should be analyzed and continually reanalyzed on an individual basis to confirm its compatibility with wilderness values. Intensive pastoralism can quickly destroy the ecological integrity of a wilderness area. As a general rule, as with all variances, pastoralism within a

wilderness protected area must remain consistent with the overarching wilderness values.

Variance defined within national wilderness legislation

Certain countries have explicit variances written into their wilderness legislation that are not compatible with wilderness values. For example, Finland's wilderness law has explicit allowances for activities such as herding and limited forestry, and infrastructure, such as roads, in wilderness areas that benefit either 'the common good or the indigenous livelihoods in the area' (Kormos & Locke, 2008, p. 27-28). As with all variances, these represent a small fraction of all Finnish wilderness areas and are often exceptions, not norms, within Finnish protected areas. The Alaska National Interest Lands Conservation Act (ANILCA) stipulates variance for subsistence use of wilderness in Alaska (see Section 4.8 for more detail on ANILCA). Similar countrywide variances exist in Australia and Canada (Kormos, 2008). These should all be considered exceptions rather than the rule, should not act as precedents and should be subject to ongoing monitoring where they are in place.

Size variation

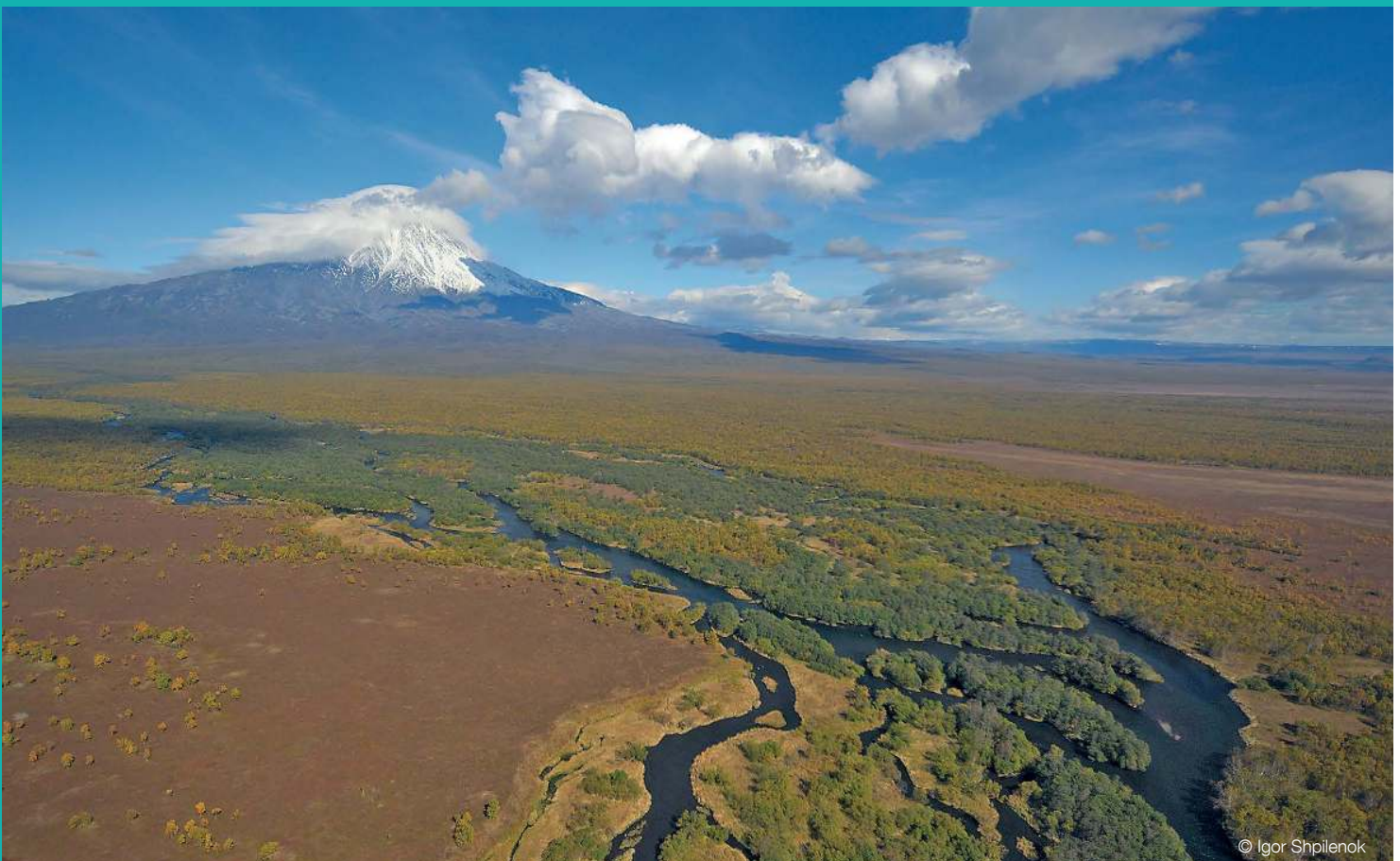
All wilderness areas should meet the biological definitions of size and intactness set by the IUCN. In a few instances, variance should be given to areas that cannot reach these definitions but should still be defined as wilderness. Such exceptions can be reached if the decision makers see potential to restore the area to a wilderness state, to include the area in a landscape wilderness approach, or to make the best of a physically limited, but excellent, representation of wildlands (Kormos & Locke, 2008, p. 28). In some cases, wilderness qualities and values can be obtained in smaller areas that are physically and visually isolated from their surroundings, e.g. canyons and gorges in mountain ecosystems.

Emergency and other essential management

During times of emergency, such as out of control fires and helicopter casualty evaluation, emergency management powers may be permitted to override wilderness legislation and allow fire control equipment to operate in a wilderness area until the emergency is controlled. For example, wilderness areas within the Australian state of New South Wales allow bulldozers within wilderness areas if required during an emergency wildfire incident (Worboys, 2015). Worboys (2015, p. 823-850) gives definitions of incidents requiring emergency management, examples of protocol for handling emergency incidents, and best practices for preventing emergencies that require variance from wilderness legislation. In addition, more routine variances might be allowed to enable essential management activities, e.g. the removal of existing infrastructure too heavy to remove by hand, or to conduct essential monitoring, e.g. through aerial survey to combat poaching, illegal immigration across national borders, or to ensure accuracy in population monitoring of threatened species not amenable to other techniques. To avoid conflict with users of wilderness areas, these activities could be conducted within periods closed to visitors.

Management Tools and Issues

4



4.1 Planning systems and management frameworks

Guiding principles

Frameworks provide ways for wilderness managers to understand complex situations and develop situational awareness (McCool, et al., 2015). Useful indicator-based planning systems and management frameworks are those that help decision makers 'work through' choices in a manner that allows technical expertise, knowledge (of various forms) and public values and interests to be incorporated, assessed and used (Stankey & Clark, 1996). Planning systems and management frameworks ask two questions: 1) What social and biological conditions are desired in wilderness? 2) How much change from the ideal is acceptable?

Key considerations

Desired conditions

The most critical question wilderness stewards face with management and planning decisions is what conditions are desirable that protect the natural conditions at the heart of the wilderness. Finding resolutions to this question is not simple: numerous constituencies compete to protect their interests, cause-and-effect relationships are often loosely coupled and dynamically complex, second- and third-order effects are spatially and temporally discontinuous, and people impacted by decisions may not even yet exist. To account for this complexity, all framework or planning systems should be assessed against four criteria: 1) Are they conceptually sound? 2) Are they easily translated into practice? 3) Are there identified impacts and other consequences? 4) Are they efficient and effective? (Brewer, 1973).

Decision-making

A planning system and management framework helps wilderness management decision makers gain insights about the particular issues within their protected area and provides guidance on how to best address the issues. Frameworks build understanding of what desirable conditions are, what impacts on those conditions are predicted to occur as a result of a proposed action, and what mitigation may be necessary if the proposed action takes place. Frameworks promote appreciation of contexts, relationships and processes and provide specific components to make a management decision.

Promoting understanding

To transfer a puzzling, troubling and uncertain situation into a solvable problem, wilderness decision makers rely on indicator-based planning systems and management frameworks (Weick, 1995). Such reliance avoids oversimplification of management challenges and provides solution possibilities in a systematic way.

Resolving competing trade-offs

Planning systems and frameworks are useful mechanisms for management of wilderness uses that contain two or more competing demands and interests (McCool, et al., 2007). These systems resolve trade-offs among competing

objectives. A common management dilemma is the trade-off between wildness and naturalness. Wilderness decision makers might strive for more naturalness, but impose heavy-handed management to achieve it, imposing or trammelling on the freedom of choices and experiences of risk, uncertainty, and spontaneity.

Indicator-based planning systems often assist in management decisions about trade-offs between human uses of wilderness and the protection of natural conditions by setting limits on impacts to naturalness and wildness (Manning, 2004; McCool & Lime, 2001). Frameworks specifically focused on visitor use, such as limits of acceptable change and visitor experience and resource protection, serve to 1) identify, define and work to ensure that the negative social and biophysical impacts from recreational uses are acceptable, and 2) provide guidance in selection of appropriate and effective management actions.

Implementation

To implement a framework, follow these steps:

- Select a framework appropriate to the question facing management. Useful examples of such a framework can be found on the website <http://www.wilderness.net/planning> for downloadable management plans and planning frameworks.
- Select and modify, if necessary, a framework that has been tested and used in prior situations.
- The dominant indicator-based planning systems have a large base of literature associated with their use, which documents advantages, shortcomings and rationale (see Recommended reading below). Read the literature, talk to other managers and gain insights on what to expect.
- Develop the capacity to use these frameworks in a protected area organization. Each of the frameworks implies a learning curve and managers will need, as with any other management tool, some training for their efficient application. Mentoring and workshops are two ways of developing capacity for their application.
- While some planning frameworks incorporate a prescribed method and timing of public involvement, some do not. Successful implementation of wilderness management planning most commonly includes adoption of a strategy to reflect public opinion, perceptions, and attitudes based on scientific studies to understand currently perceived threats to resources and experiences.

Recommended reading

- Anderies, J.M., Janssen, M.A., and Ostrom, E. (2004). 'A Framework to Analyze the Robustness of Social-ecological Systems from an Institutional Perspective'. *Ecology and Society* 9 (1), 18.
- Borrie, W.T., McCool, S.F., and Stankey, G.H. (1998). 'Protected Area Planning Principles and Strategies'. In *Ecotourism: A Guide for Planners and Managers*. pp. 133-154. vol. 2. The Ecotourism Society, North Bennington, VT.
- Brown, P.J., Driver, B.L., and McConnell, C. (1978). 'The Opportunity Spectrum Concept and Behavioral Information in Outdoor Recreation Resource Supply Inventories: Background and Application'. In *Integrated Inventories of Renewable Natural Resources: Proceedings of the Workshop*. Gen. Tech. Rep. RM-

55. pp. 73-84. US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

- Clark, R.N. and Stankey, G.H. (1979). *The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research. Gen. Tech. Report PNW-98*. US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.
- Cole, D. (2009). 'Ecological Impacts of Wilderness Recreation and Their Management'. in *Wilderness Management: Stewardship and Protection of Resources and Values*. pp. 395-436. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Dawson, C.P. and Hendee, J.C. (2009). 'Chapter 8: Wilderness Management Planning'. in *Wilderness Management: Stewardship and Protection of Resources and Values*. pp. 195-216. 4th edition. Fulcrum Publishing, Golden, Colorado.
- McCool, S.F., Freimund, W.A., and Breen, C. (2015). 'Benefiting from Complexity Thinking'. In *Protected Area Governance and Management*. pp. 291-326. ANU Press, Canberra, Australia.
- Moore, S.A., Smith, A., and Newsome, D. (2003). 'Environmental Performance Reporting for Natural Area Tourism: Contributions by Visitor Impact Management Frameworks and Their Indicators'. *Journal of Sustainable Tourism* 11(4): 348–375.
- Nilsen, P. and Tayler, G. (1997). 'A Comparative Analysis of Protected Area Planning and Management Frameworks'. In *Proceedings – Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions (General Technical Report INT-GTR-371)*. pp. 49–57 Rocky Mountain Research Station, USDA Forest Service, Ogden, Utah.

4.2 Transparency in decision-making

Guiding principles

Wilderness managers have a large responsibility for stewardship of both the resource and the relationship between people and the wilderness resource (Watson & Borrie, 2003; Watson & Borrie, 2006). Those involved in the stewardship of wilderness areas are often faced with challenging issues where their decisions may affect public support and trust for an agency's wilderness management mission. Transparency in decision-making can improve a manager's ability to make informed, consistent and defensible decisions that help achieve wilderness protection objectives.

Key considerations

Understand wilderness, protected area and biodiversity conservation law and policies

It is imperative that decision makers understand and comply with laws and statutes related to wilderness, including legislative history and intent, specific statutory prohibitions, and special provisions. Understanding the law and associated compliance requirements is essential to maintaining programme integrity and public trust. Sound decision-making can also be enhanced through understanding and awareness of previous case law rulings related to legal challenges of previous decisions or actions. The public is often observant, sometimes critical and always ready to challenge departures from legislation and stewardship policy designed to protect wilderness attributes.

Know the wilderness resource

It is essential that decision makers understand and protect what is unique and special about a wilderness area. This includes tangible biophysical resources and characteristics as well as the intangible, experiential, and inspirational aspects of a wilderness. This understanding is an important aspect of making sound and informed wilderness stewardship decisions.

Establish wilderness policy

It is extremely important that wilderness management agencies develop and institute clear and concise policies related to their wilderness stewardship mission and objectives, including implementation of designation decisions, protection of wilderness resources from identified threats, description and monitoring of wilderness attributes to be protected, public recreational use of wilderness, special provisions management, and gathering and disseminating information regarding use and enjoyment as wilderness. A general policy should also address how wilderness management objectives interface with an agency's enabling legislation and/or stated mission.

Define responsibilities

Managing agencies should clearly identify the specific role and function, required competencies, supervisory hierarchy, and decision-making authority for all key staff engaged in wilderness stewardship. These responsibilities should be identified in policy and articulated in appropriate position vacancy announcements, position descriptions, and annual performance plans.

Foster consistency

Wilderness management agencies should seek to achieve consistency in wilderness management objectives, techniques, and practices both within an agency and at an interagency level. Agencies should maintain effective intra-agency and inter-agency communications, and should encourage, sponsor, and participate in intra-agency and inter-agency training and workshops designed to promote the sharing of ideas, concerns, and techniques related to wilderness management. Consistency can be encouraged and enhanced through the development and implementation of agency-wide policies, guidelines, and standard operating procedures.

Provide continuity

Nature conservation management agencies should actively address the importance of continuity and the need for succession planning associated with changing administrations and/or decision-making personnel. This can be accomplished through training, development and recruitment programmes that focus on entry and mid-level personnel who will become the next generation of decision makers.

Ensure accountability

Human resource management processes should be implemented to acknowledge and reward personnel for sound stewardship decisions, particularly those involving sensitive, controversial, innovative or courageous decisions. In addition, agencies should establish human resource

management protocols and procedures to hold wilderness management decision makers accountable when failures occur with regard to compliance with wilderness law, policy or other guidelines.

Engage the public

Those working in wilderness stewardship should strive to engage the public in important decision-making processes within the context of policy or law. Proposed actions involving legislation, rule-making, management or access plans are of particular importance. Solicitation of public comment is an important aspect of involving stakeholders and constituents and analysis of public comments can have a significant influence on final decisions.



Visitors learning about the wilderness qualities of the Ogasawara Islands, Japan. © Naomi Doak

Document and disclose decisions

Proper documentation and archiving of decisions is an important aspect of a progressive wilderness stewardship programme. The ability for decision makers to access and review administrative records associated with past wilderness decisions can play an important role in informing contemporary decisions.

Establish priorities

The establishment of wilderness stewardship priorities through vision or mission statements and management plans can help decision makers stay focused on the most important wilderness preservation issues at hand and apply an appropriate level of attention to make informed decisions.

Implementation

The following tenets should be used to implement transparency in decision-making.

Wilderness training and development

The training and development of key staff with wilderness management responsibilities is a vital component of sound decision-making. Wilderness management agencies should identify specific core competencies, such as those listed in the WCPA Register of Competences, including cross-cultural orientations if indigenous cultures are impacted, for all staff engaged in wilderness management decision-making along with the specific training requirements to ensure

these competencies. Training should be made available on regular intervals commensurate with the demand. Agencies are encouraged to develop and institute a programme to identify and train trainers along with appropriate curricula to meet training objectives. Training requirements should be incorporated into annual training and development plans for appropriate personnel. The Arthur Carhart National Wilderness Training Center (<http://carhart.wilderness.net/>) in the United States represents an excellent example of an interagency wilderness stewardship training programme that services the United States' national wilderness preservation system. Some universities also sponsor distance education programmes (e.g. the Wilderness Management Distance Education Program at the University of Montana (<http://www.cfc.umt.edu/wmdep/>) that are available worldwide.

Legal compliance and counsel

Wilderness management decisions should be made within the context of law and statute to ensure the integrity of and public trust for wilderness stewardship programmes. It is vital that appropriate due diligence be given to legal compliance requirements for proposed actions, including wilderness legislation, environmental protection, impacts to indigenous cultures, endangered species, clean air and water, and historic and archeological resource protection. Consulting with agency legal counsel is a highly encouraged practice when making decisions associated with sensitive or controversial issues.

Wilderness regulations

Statutes that mandate wilderness preservation and stewardship must be supported by lawful regulations that allow for the enforcement of specific statutory requirements and prohibitions. Wilderness regulations should be based on well-articulated definitions and include language that clearly describes the elements of the regulation. Wilderness regulations are of particular importance to visitor use management objectives that address visitor behaviour, carrying capacity and use allocations.

Wilderness character narrative

A qualitative, affirming, and holistic narrative describing what is unique and special about a specific wilderness can serve as an important component in helping decision makers recognize the broader and more holistic meanings of wilderness for an area. These meanings, in turn, are essential for highlighting priorities for monitoring wilderness character as well as for identifying priorities in planning and stewardship. The narrative is intended to capture the feelings and relationships of a wilderness. For example, a narrative may describe the ecological processes that shaped a wilderness landscape, visitor experiences that may not be available elsewhere, or notable scientific, conservation, educational, scenic, or historical values of a wilderness area. In addition, the narrative can acknowledge and celebrate the intangible, experiential, and inspirational aspects of a wilderness, including historical or cultural connections to the landscape.

Wilderness management planning

Wilderness management plans or equivalent documents should be developed and maintained to guide the preservation, management, and use of wilderness areas (see also Section 2.6). Wilderness management plans

should identify the desired future conditions and establish indicators, standards, conditions, and thresholds beyond which management actions will be taken to reduce human impacts on wilderness resources. In addition to wilderness management plans, wilderness management actions should be carried out within an interdisciplinary framework of other management plans, including natural resource management plans, cultural resource management plans, fire management plans, and other activity-level plans. Wilderness management and other associated plans serve as a key tool in fostering consistent and defensible decisions that help achieve wilderness management objectives. Established management plans also help provide for continuity needed to address the succession of personnel and decision makers.

Inventory and monitoring

The ability to make informed wilderness management decisions can be enhanced through an understanding of the presence, extent, and condition of tangible wilderness resources in an area. The conditions and long-term trends of wilderness resources should be monitored to identify the need for or effects of management actions. The purpose of monitoring is to ensure that management actions and visitor impacts on wilderness resources and character do not exceed established standards and conditions (see also Section 2.10). As appropriate, wilderness monitoring programmes may assess physical, biological, and cultural resources and social impacts. Monitoring programmes may also need to assess potential problems that may originate outside the wilderness to determine the nature, magnitude, and probable source of the impacts.

Wilderness science

Knowledge gained through scientific research in wilderness can serve as a vital link to making sound and defensible wilderness management decisions. Scientific research is of particular importance when the desired information is essential for understanding health, management, or administration of wilderness and should be encouraged when consistent with agencies' responsibilities to preserve and protect wilderness. Wilderness can and should serve as an important resource for long-term research into and observation of ecological processes and the impacts of humans on the ecosystem. The Aldo Leopold Wilderness Research Institute (<http://www.leopold.wilderness.net/>) represents an excellent example of an interagency wilderness science programme that serves the United States' national wilderness preservation system and provides a repository of recent and previous wilderness science studies, administrative studies, compilations of papers, publications, and monitoring and application guidelines.

It should be noted that indigenous science can provide invaluable insights into ecological processes and ecosystem integrity of the managed area.

Case studies

Detailed case studies summarizing challenging wilderness management issues and associated decisions can provide a very useful tool to help inform wilderness management decisions. Case studies can be shared and discussed in a number of forums, including interactive training sessions, webinars, written narratives, discussion forums and document-sharing sites.

Wilderness mentors

The international wilderness management 'community' is blessed with a number of current and retired professionals who have dedicated their careers to wilderness stewardship. These individuals represent an invaluable source of subject expertise and advice and are often willing to provide consultation or serve as a mentor to fellow wilderness colleagues. Wilderness management agencies are encouraged to explore avenues to advertise opportunities and initiate mentoring programmes. The WCPA Wilderness Specialist Group is one opportunity for interested professional volunteers to contribute their expertise for enhanced practice for effective wilderness.

Decision-making resources

There are a variety of techniques and formats available to share and distribute guidelines and resources that inform wilderness management decisions, including decision trees, flow charts, frameworks, handbooks, policy manuals, reference manuals, and memoranda. These resources may be provided in either hard copy or digital format and may be distributed through websites, document-sharing sites, face-to-face meetings or trainings, webinars, and other venues. The MRDG developed by the Arthur Carhart National Wilderness Training Center (see also Section 2.9) serves as an excellent example of a step-by-step decision-making tool that guides decisions related to prohibited uses in the national wilderness preservation system (<http://www.wilderness.net/MRA>).

Recommended reading

- Landres, P., Barns, C., Boutcher, S., Devine, T., Dratch, P., Lindholm, A., Merigliano, L., Roeper, N., and Simpson, E. (2015). *Keeping It Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character across the National Wilderness Preservation System. Gen. Tech. Rep. RMRS-GTR-340*. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Meyer, S.S. (2000). 'Legislative Interpretation as a Guiding Tool for Wilderness Management'. In *Wilderness Science in a Time of Change. Conference May 23– 27, 2000; Missoula, MT. Volume 5: Wilderness Ecosystems, Threats, and Management. Proceedings RMRS-P-15-VOL-5*. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Minimum Requirement Decision Guide (MRDG) (2014). Instructions for MRDG available online: <http://www.wilderness.net/MRA>.
- Watson, A.E., Patterson, M., Christensen, N., Puttkammer, A., and Meyer, S. (2004). 'Legislative Intent, Science and Special Provisions in Wilderness: A Process for Navigating Statutory Compromises'. *International Journal of Wilderness* 10(1): 22–26.

4.3 Infrastructure and technology in wilderness protected areas

Guiding principles

Infrastructure and technology in wilderness protected areas should be regulated carefully by wilderness decision makers. The potential uses of emerging technologies such as mobile phones, global positioning system (GPS) devices, and unmanned aircraft systems (drones) in wilderness are nearly limitless. These uses include recreational use by visitors (see Section 4.5), commercial use, managerial or administrative use, search and rescue, and scientific research. The use of these emerging technologies also has the potential for serious negative impacts to a wilderness area and its users and should therefore be monitored closely by wilderness decision makers. Infrastructure is generally not permitted within wilderness areas, although exceptions are allowed in certain instances like built structures, trails, scientific installations and variances given to Indigenous Peoples (see Section 4.10). Such exceptions are only permitted within wilderness protected areas if their production and use are consistent with wilderness values, generally to protect the resource and not for visitor convenience.

Key considerations

Emerging technologies

While wilderness decision makers have long dealt with the complexities of infrastructure in wilderness areas, the regulation of technology within wilderness areas is new. Researchers and managers are just beginning to examine visitor attitudes towards such technology (Pope & Martin, 2011); visitor use of technology in wilderness (Blackwell, 2015); how such technology might affect use levels and the spatial distribution of use and impacts (e.g. more inexperienced people visiting wilderness because the technology makes them feel safer, increased use of remote areas and cross-country routes); whether such technology could influence visitor behaviours in wilderness (e.g. increased risk-taking); how such technology might both increase the frequency of search and rescue efforts and potentially make such efforts easier; and how the use of such technology might affect visitor experiences, including the experiences of other visitors who might be exposed to it. In addition, advanced technology such as mobile phones, two-way radios, and drones that can record and quickly disseminate high-quality photography, when combined with advanced digital trip-planning tools, also have the potential to attract, increase and redistribute use and potentially lead to an over-reliance on such technology relative to route-finding and risk-taking. On the other hand, all of these technologies also have the potential to increase support for wilderness through both direct use and indirect appreciation. Incorporating the most recent research on this topic will support management strategies (Watson, et al., 2015).

Implementation

All uses of technology and infrastructure in wilderness areas must first comply with wilderness values. While certain uses of technology are permitted within wilderness areas, most instances of infrastructure are incompatible with wilderness



Visitors to wilderness areas may bring advanced technologies and cutting-edge gear for recreational purposes. © Aldo Leopold Wilderness Research Institute

values and thus not allowed within wilderness areas. The following categories should be used in the decision-making process to determine if use of a technology is compatible with wilderness values.

Protection of biological resources and ecological processes

The use of technologies, such as drones, or infrastructure in wilderness protected areas may disturb or disrupt certain types of resources and processes, like the natural behaviours of wildlife. To minimize impacts to biological resources and ecological processes, recreational and commercial use of drones and other similar and potentially disruptive technologies should not be permitted.

Visitor opportunities for solitude

Wilderness decision makers should manage technology and infrastructure to maximize visitor opportunities for solitude and a sense of remoteness. An essential characteristic of wilderness is freedom, including personal privacy, freedom from surveillance, and the ability to enjoy nature free from the disruptions and distractions of modern industrial civilization. The presence of drones can negatively impact visitors' sense of solitude and separation from civilization. Recreational and commercial use of these technologies should not be permitted (see Section 4.5).

Motorized equipment

A natural soundscape is an important part of a wilderness experience for visitors and equally important to wildlife species. The use of motorized equipment disturbs and intrudes on a natural soundscape. Motorized equipment, except in specific variances (see Section 4.10), is not permitted in a wilderness area. Drones and other similar technologies are a form of motorized equipment. Therefore, wilderness decision makers should not permit the use of recreational and commercial drones, as well as other forms of motorized equipment and technology, within a wilderness

area. Any permitted variances must minimize the use of and intrusions by motorized equipment in accordance to wilderness values.

Administrative and managerial use

Any administrative or managerial use of technology and infrastructure in a wilderness area must first comply with wilderness values. Such use should be limited by wilderness decision makers. In certain circumstances, administrative or managerial use of unmanned aircraft systems or other motorized technology may be the best, the only, or the most appropriate action. Managers must be sure that such use is justified as being the minimum required action. Administrative use of drones and other future technology should be limited to applications such as search and rescue, fire management, law enforcement, and scientific research, and permitted only after a minimum requirements analysis has been completed. A procedure for conducting a minimum requirements analysis should be formalized and should take into account factors such as how the proposed use of drones (and other future technology) would: 1) contribute to the preservation of wilderness character; 2) protect resources, including visitor experiences; and 3) be consistent with the legislative purpose of the wilderness area.

Recommended reading

- Pope, K. and Martin, S. (2011). 'Visitor Perceptions of Technology, Risk and Rescue in Wilderness'. *International Journal of Wilderness* 17(2): 19–26, 48.
- Watson, A., Cordell, H.K., Manning, R., and Martin, S. (2015). 'The Evolution of Wilderness Social Science and Future Research to Protect Experiences, Resources, and Societal Benefits'. *Journal of Forestry*.

4.4 Changing demographics and relevance of wilderness

Guiding principles

Changing demographics of populations around the world and the dynamic nature of 'what's relevant' to societies in general present a challenge for promoting the establishment, protection and management of large wilderness areas across the globe, as well as new opportunities. The understanding of these changing demographics has important implications for management and policymaking regarding wilderness protected areas. The accumulation of new information and knowledge about the benefits of wilderness will change our approach to educating managers, policymakers, and the general public about the importance of wilderness protection. Wilderness protected areas are relevant to all people and significant worldwide.

Key considerations

Wilderness practitioners, policy managers, research scientists, and advocates must examine and understand the changing demographics of our global population. It is necessary to understand the meaning of nature across our diverse cultures and how the relevance of wilderness may ebb and flow over time. Such an understanding should inform the education, interpretation, and outreach efforts that

will invigorate and inspire future generations of wilderness advocates and stewards.

Young adults

Many resource managers and wilderness advocates see links among appreciating wild nature, participating in traditional outdoor activities, and supporting protection of wild areas. Some of these individuals express concern that the values and recreation behavior of today's young people may suggest less support for protecting wilderness in the future. However, emerging adults appear to express strong pro-environmental values, even though they exhibit outdoor recreation patterns strikingly different from the past (Zinn & Graefe, 2007).

Future generations of wilderness advocates, scientists, and stewards must be engaged. Young adults often have strong environmental values and land ethics. Organizations, management agencies, and educational institutions should continue to provide entry into wilderness stewardship as a profession. Career ladders need to be built and expanded to allow individuals to direct their passion for wilderness into a lifelong career. Young adult professionals who strive towards the future sustainability of wilderness are essential to the continued protection of wild nature.



Engaging young adults through wilderness education programs, such as the National Outdoor Leadership School, can help encourage future protection of wilderness. © Sarah A. Casson

If we are to influence younger generations to appreciate and protect nature, this will occur in a global context that has been more urbanized and with greater challenges to have transformational experiences in nature and protected areas. Efforts to address urbanization should be focused on its implications for humans' conceptualization and connection with nature (Kowari, 2013). The 'Promise of Sydney' recognizes that rebalancing of the relationship between human society and nature is essential. Valuing wild nature can strengthen the link between nature and urban young adult residents.

Diversity

One line of thought suggests that connections and experiences within nature are also critical for the development of environmental values and an understanding of the importance of wilderness (Stumpff, 2013). It is through personal experiences that people form a lasting relationship and bond with nature. However, a greater understanding of how wilderness benefits increasingly diverse populations, who may or may not have strong connections to nature, is critical for developing support for wilderness management and policy (Turner, et al., 2004).

If a constituency is to be nurtured that can embrace and protect wilderness values, a greater diversity of wilderness users and advocates must be involved (Chavez, et al., 2008; Pease, 2015). Previous research has shown that barriers continue to exist for people from minority, racial, and ethnic groups to recreate in parks and protected areas (Johnson, et al., 2004). Lack of financial resources, time, and information about visiting protected areas continue to be constraints to access and enjoyment. Individuals may not feel welcome or perhaps discriminated against if workers at sites and protected areas are not of their ethnicity or heritage. Efforts need to target mitigating these barriers to participation, thus growing this potential wilderness constituency.

Ageing

According to the 2013 edition of the United Nation's report, *World Population Ageing*, the number of individuals globally age 60 years or over is expected to more than double from 841 million in 2013 to more than 2 billion in 2050. This global demographic profile is particularly important when compared to wilderness area user profiles. Dvorak, et al. (2012), examined wilderness visitor use and users' trends over a 40-year period in the United States' Boundary Waters Canoe Area Wilderness. Over this period, mean user ages increased from 26 years of age in 1969 to 45 years of age in 2007. Little change in gender differences was observed, with men representing approximately 75 per cent of wilderness users over that time period. Similar user profiles were observed by Gundersen, Tangeland, and Kaltenbron (2015) among users of the Oslomarka outside Oslo, Norway. Users of the urban wilderness area zones were typically male (61 per cent) and on average 52 years old.



Studies of the Boundary Waters Canoe Area Wilderness in the United States help inform general trends of wilderness user demographics. © Amber Collett

If we are to inspire people across generations, geography, and cultures to experience nature through wilderness, it will be necessary for us to understand the implications of an ageing population with gender disparities. In terms of wilderness users, an ageing population may have constraints related to accessibility, personal mobility, and recreation choice behaviour. These constraints must be negotiated while maintaining wilderness values. Our ageing population is predominantly female, while wilderness users are predominantly male. If future generations are to form bonds and relationships with nature, protected areas, and wilderness, gender differences should be addressed and barriers to participation and inclusion must be removed among wilderness users. Wilderness practitioners, scientists, and advocates should prioritize efforts to negotiate and overcome these barriers and constraints. On the other hand, Watson (2013) suggests that the relevance of the ecosystem services provided to the population is not age or gender specific and that the growing importance of these relationships with wilderness only needs to be recognized through better interpretation to visitors and non-visitors.

Interpretation

It is important to recognize that while recreational experiences in wilderness and nature are necessary to create bonds and form relationships, efforts must be made to communicate conceptualizations of wilderness and protected areas that are beyond a utilitarian point of view. Managers engage the public in discussions that frame wilderness as something beyond only tourism and recreation experiences. The 'Promise of Sydney' calls for an investment in nature's solutions. Wilderness is a safeguard for biodiversity, mitigates climate change impacts, and is deeply embedded in the cultures of many Indigenous Peoples. Wilderness provides ecosystem services that improve food and water security along with global human health. Wilderness managers should ensure that wilderness areas are understood in these value contexts as well as the economic and recreational benefits often associated with wilderness and protected areas.

Understanding how different societies appreciate wilderness can help managers anticipate potential conflict and educate wilderness users. For example, Boxall, et al. (2002), found that canoeists in wilderness areas in Canada highly valued the experience of viewing traditional indigenous rock art. However, they also noted that managers are faced with the conundrum of promoting this benefit for an enhanced visitor experience whilst also risking the negative impacts of directing visitors to a place that holds spiritual and cultural

Case Study 18

Boundary Waters Canoe Area Wilderness, United States

In the United States, Dvorak, et al. (2012), examined how visitors to the Boundary Waters Canoe Area Wilderness changed between 1969 and 2007 by analyzing survey data collected in 1969, 1991, and 2007. The trend analysis focused on changes in user characteristics (e.g. age, education, gender), activities (e.g. fishing, camping) and opinions (e.g. perceptions of crowding). Although collecting data over long periods of time is costly, there are ongoing efforts to make previously collected data more available to the public. For instance, a data catalogue of raw data, survey instruments, and other relevant supporting documents from many wilderness studies completed in the United States is available on the United States Department of Agriculture, Forest Service website (<http://www.fs.usda.gov/rds/archive/Catalog>).

importance to Canadian First Nations Peoples. Education and interpretation may help visitors to understand values and therefore encourage users to be sensitive and respectful to wilderness areas.

Wilderness activities

A narrow focus on particular wilderness activities may result in the perception that wilderness support is declining (Cordell, et al., 2008). For example, during the early 2000s in the United States, a growing perception that wilderness-based recreation was declining created the opportunity for cuts to wilderness funding and decreased support for wilderness designation. However, by considering a broad range of activities (not just fishing and hunting, but also other activities such as foraging, landscape viewing and photography, kayaking, and the study of nature), Cordell, et al. (2008), found that despite a decrease of participation in particular activities, there was an overall increase in nature-based recreation and visits to wilderness. However, actual visits to wilderness may not be the primary benefit future generations will receive from wilderness protection.

Implementation

To understand the relevance of wilderness to visitors, non-visitors, future generations, and overall conservation accomplishments, wilderness decision makers must employ social science qualitative and quantitative research. Data archives can provide the needed baseline data for trend studies and provide supporting information (e.g. example questions and survey instruments) for collecting data in areas where data regarding human perceptions of wilderness may not be readily available.

Social science approaches and efforts to compile baseline data should target developing:

- Increased documentation and representation of the relevancy of wilderness for minority, racial, and ethnic groups;
- Identification of barriers to wilderness recreation and engagement, particularly for underrepresented populations and young adults;
- Ways to monitor the ongoing influence of urbanization on individual nature experiences and the value of protected areas;
- Interpretation and education materials that emphasize both the regional and global significance of protected areas to all citizens.

Recommended reading

- Chavez, D.J., Winter, P.L., and Absher, J.D. (2008). *Recreation Visitor Research: Studies of Diversity. General Technical Report PSW-GTR-210*. US Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA.
- Cordell, H.K. (2012). *Outdoor Recreation Trends and Futures: A Technical Document Supporting the Forest Service 2010 RPA Assessment. General Technical Report SRS-150*. US Department of Agriculture, Forest Service, Southern Research Station, Asheville, NC.
- Pease, J.L. (2015). 'Parks and Underserved Audiences: An Annotated Literature Review'. *Journal of Interpretation Research* 20(1): 11–56.

- United Nations (2014). *World Urbanization Prospects: The 2014 Revision, Highlights*. World Urbanization Prospects: The 2014 Revision, Highlights. (ST/ESA/SER.A/352).
- Watson, A. (2013). 'The Role of Wilderness Protection and Societal Engagement as Indicators of Well-Being: An Examination of Change at the Boundary Waters Canoe Area Wilderness'. *Soc Indic Res* 110: 597–61.

4.5 Emerging recreation management issues

Guiding principles

Wilderness decision makers are witnessing a whole new array of recreation management issues that they were not confronted with in the past. How visitors use or recreate in wilderness can create challenges for wilderness decision makers. Emerging recreation management issues in wilderness have increased as a result of advancement in backpacking equipment and gear, new technology being used by visitors in wilderness, and the ways in which wilderness visitors pursue recreation in wild nature. User issues will never end; they are, in fact, the most consistent challenges faced by a manager, and the manager must be prepared for this. Finding solutions to future unanticipated (or repeated) recreation conflicts requires that wilderness decision makers ensure that the solutions to the emerging issues adhere to the central mandates of wilderness values.

Key considerations

Emerging issues are not new to wilderness stewardship. New technology has always been problematic for wilderness visitors and managers. In the United States, Aldo Leopold was confronted in the 20th century with the issue of hunting scopes on rifles and whether this new technology was ethical or created an unfair hunt (Leopold, 1949). As was true in Leopold's time, it can be difficult to tell if the new technology is changing the values of those recreating in wilderness or reflecting a new way to recreate in wilderness.

Equipment and gear

New equipment and gear can present issues for wilderness visitors, wilderness managers and rangers. As new products enter the marketplace, wilderness consumers have embraced products that have helped them recreate in wilderness. Since the 1960s, improved clothing (such as waterproof materials), backpack design (internal frame packs), tent construction (dome tents) and lightweight hiking boots with rock-gripping tread, have made backpacking, camping and hiking in remote wilderness safer, more comfortable and convenient (Turner, 2002). Managers observed that these new comforts drastically changed visitor length of stay and travel patterns. Wilderness visitors ventured to more remote corners of the wilderness and camped in shoulder seasons—earlier in spring and later in autumn. Wilderness managers and rangers began to witness increased resource degradation, more user-created trails and crowding.



Tent construction has changed considerably in recent decades, allowing visitors to venture deep into wilderness areas, as shown by this tent in the Three Sisters Wilderness Area in the United States © Amber Collett

Unmanned aircraft systems as recreational tools

As discussed in Section 4.3, unmanned aircraft systems (drones) are unprecedented for wilderness managers. The ramifications of recreational drone use are incompatible with wilderness values. Today's sophisticated recreational or hobby drones, if permitted, would remove the very essence of wilderness being a place of self-discovery and mystery, changing wilderness to a landscape that can be viewed in real time. Drones, with their high-definition cameras attached to the aircraft, become eyes in the sky for the drone operator, providing real-time images of landscapes, possible campsites, number of other people in areas and even nearby wildlife. See Section 4.3 for more information about the use of technology in wilderness areas.

Personal computers in wilderness

Some of today's wilderness visitors use modern technology never envisioned by previous generations of wilderness decision makers. It is not uncommon today to find a wilderness visitor at an alpine lake deep inside a wilderness using a personal laptop computer powered by a solar panel and Internet connection obtained through a mobile phone or satellite hot-spot device to stay connected with work or respond to emails. Other visitors now hike wilderness trails listening to Internet-streamed music on a device powered by small, lightweight solar panels that take up little space in a backpack.

Global positioning systems as a recreational tool

Advances in technology also help visitors navigate in wilderness areas beyond the conventional use of map and compass orienteering. Today's GPS devices and the presence of this technology in mobile phones have changed how visitors can plan their wilderness adventure, orient themselves to rugged and remote landscapes, and find their way back to the trailhead in ways never available 10 or 20 years ago. New products such as personal satellite tracking devices allow for immediate response to a 'need help' or emergency notice (even when the visitor is only temporarily lost, cold, out of water or injured in ways that most would not define as life-threatening). Wilderness managers and search and rescue teams have responded to these satellite alerts only to find backcountry visitors scared or disoriented. An increase in such alerts can have negative resourcing implications for managing agencies.

Changing recreation pursuits

Wilderness recreation pursuits are changing just as quickly as the gadgets are changing. Today, it is not uncommon to find a ridge runner (or extreme trail runner) covering long distances in remote wilderness and sharing the trail with other users who are hiking, backpacking or horseback riding. Trail running as an individual pursuit in wilderness is an acceptable recreational use; however, sponsored and commercial running races in the United States are not permitted within wilderness areas, as they are considered to be in conflict with and an impact on wilderness values.

Overcrowding of recreation areas

Even the pursuit of solitude, it appears, is changing. In the past, it was common to travel in small groups and seek out remote areas to find solitude so that one could connect to wild places with friends who have a similar desire for quietness and tranquility.

In the United States, the central mandate of the Wilderness Act is to preserve wilderness character. The qualities of wilderness character can be degraded by signs of human use and overuse at popular 'magnet areas' where visitors congregate. The Wilderness Act established the United States' National Wilderness Preservation System, in part, for use and enjoyment by the country's citizens. No doubt these popular spots have always been a draw, but through continued use, these fragile wilderness sites are starting to show the wear and tear of thousands of boots. Associated impacts of trash, human waste and denuded campsites diminish the wilderness values of an area.

Implementation

To deal with increasing use, managers have implemented a variety of management actions such as indirect controls to educate visitors about Leave No Trace techniques and to promote user responsibilities for taking care of the land. In some circumstances, more direct controls, such as visitor use restrictions (permits) are now required to limit the number of visitors to a particular area so that the land has a chance to heal.

With the exception of the use of recreational drones, many managers would argue that new technology and how visitors



Managers, such as those who oversee the Bridger Wilderness in the United States, must carefully manage for emerging recreational issues. © Noah Fribley

use new technology in wilderness is a personal decision. Unless the use of emerging technology creates resource damage or interferes with others' ability to enjoy wilderness, little if any management intervention is needed or appropriate. It is difficult to tell if the new technology is changing the values of those recreating in wilderness. When faced with new and emerging recreation management challenges, wilderness decision makers must evaluate these challenges for their compatibility with wilderness values.

Recommended reading

- Cole, D. (2009). 'Ecological Impacts of Wilderness Recreation and Their Management'. in *Wilderness Management: Stewardship and Protection of Resources and Values*. pp. 395–436. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Landres, P., Barns, S., Boutcher, S., Devine, T., Dratch, P., Lindholm, A., Merigiano, L., Roeper, N., and Simpson, E. (2015). *Keeping It Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character across the National Wilderness Preservation System. Service General Technical Report RMRS-GTR-340*. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

4.6 Managing for marine wilderness values

Guiding principles

The places most often identified or designated as wilderness are terrestrial, yet the idea of areas in the oceans and coastal waters possessing wilderness qualities and values worthy of preservation has been debated and discussed for more than half a century (Barr, 2007). Effective wilderness stewardship requires the management agency to have the legal authority to establish and manage wilderness, as well as wilderness-specific management goals and strategies adopted, implemented, and evaluated that ensure the wilderness values and qualities of the area are preserved. This is true of both terrestrial and marine wilderness areas.



Southern Right Whales (*Eubalaena australis*) migrate to marine wilderness areas for birthing and raising calves and through the High Seas for migration patterns. © Stephanie Stefanski

Key considerations

Similar tenets as terrestrial wilderness

While the specific human uses encountered in marine wilderness may differ from those on land, they are similar enough in terms of their general characteristics and potential impacts to wilderness character and values. This can offer managers a clear place to start when developing a management framework for marine wilderness (Day, et al., 2012). There are few examples of international wilderness law or policy that explicitly mention or offer specific guidance for marine wilderness areas (Landres, et al., 2008b; Barr, 2012). The management framework for marine wilderness areas can appropriately be captured from the overarching IUCN management guidelines for Category 1b.

Implementation

Marine wilderness areas should uphold the same wilderness values and management principles expected of terrestrial wilderness areas. The tenets detailed within these Category 1b guidelines apply both to terrestrial and marine wilderness areas.

Recommended reading

- Clifton, J. (2003). 'Prospects for Co-Management in Indonesia's Marine Protected Areas'. *Marine Policy* 27: 389–395.
- Day, J., Dudley, N., Hockings, M., Holmes, G., Stolton, S., and Wells, S. (2012). *Guidelines for Applying the IUCN Protected Area Management Categories to Marine Protected Areas*. Best practice protected area guidelines series 19. IUCN, Gland, Switzerland.
- Edgar, G.J., Stuart-Smith, R.D., Willis, T.J., Kininmonth, S., Baker, S.C., Banks, S., Barrett, N.S., Becerro, M.A., Bernard, A.T.F., Berkhout, J., Buxton, C.D., Campbell, S.J., Cooper, A.T., Davey, M., Edgar, S.C., Försterra, G., Galván, D.E., Irigoyen, A.J., Kushner, D.J., Moura, R., Parnell, P.E., Shears, N.T., Soler, G., Strain, E.M.A., and Thomson, R.J. (2014). 'Global Conservation Outcomes Depend on Marine Protected Areas with Five Key Features'. *Nature* 506(7487): 216–220.
- Kormos, C.F. (2011). 'We Need to Scale Up Marine Wilderness Protection'. *International Journal of Wilderness* 17(3): 12–15.

Case study 19

North American Marine Wilderness

Examples of ocean and coastal waters included in designated boundaries of wilderness can be found in the United States. Around 40,470 hectares of marine waters, designated under the Wilderness Act, are included in the National Wilderness Preservation System (Barr, 2012). In their evaluation of international wilderness law and policy, Landres, et al. (2008b), found that, generally, the Wilderness Act possesses similar goals and provisions included in the wilderness laws and policies of many other countries. There is no language explicitly included in the Wilderness Act that would preclude the designation of ocean and coastal waters, and the wilderness waters inventory provided in Barr (2012) offers at least 13 examples of wilderness areas designated under this law. As statutory language, it offers relatively unambiguous guidance for a management framework for wilderness areas designated under this legislation. Examples of marine wilderness management within North America (Canada, Mexico, and the United States) have been outlined by the Marine Wilderness and Protected Areas Working Group, part of NAWPA. Examples are available online (<http://www.nawpacommittee.org>). This working group produced what may be considered the first international, working definition of marine wilderness in 2013:

Marine wilderness areas are primarily intact, self-sustaining, and undeveloped, with no modern infrastructure, industrial activity, or permanent or non-traditional human habitation, including also areas capable of being returned to a natural state. They retain their intrinsically wild appearance and character and are protected and managed to preserve their ecological integrity, biological diversity, and environmental health. In marine wilderness, where the earth and its community of life are uncontrolled by humans and natural processes dominate, humans use and enjoy the areas in ways that are consistent with their wild character and that leave the areas unimpaired for future generations.

Marine wilderness also should be of sufficient size to: perpetuate its protection and use in a relatively unimpaired condition; continue opportunities for compatible subsistence uses and indigenous cultural practices; allow low-impact, minimally invasive educational and scientific research activities that further the administrative or educational objectives or scientific knowledge of the wilderness area; and if degraded, be capable of being restored or rehabilitated to a wilderness state.

The working group has also produced many case studies that examine and address the key tenets of marine wilderness areas that are managed and governed by a plurality of political actors, including partnerships between Indigenous Peoples governments and non-indigenous government agencies. More examples of marine wilderness can be found at <http://www.natureneedshalf.org>.



The Marismas Nacionales Biosphere Reserve, Mexico is a marine wilderness addressed by the work of the NAWPA Committee, which implemented the first international agreement on wilderness. © José Pons

Case Study 20

Likskär Nature Reserve, Sweden

The Likskär Nature Reserve of Sweden is designated as a marine Category 1b site and overseen by the Swedish national government. This nature reserve of 25 square kilometres contains marine area as well as 25 islands and islets within the Kalix archipelago in northern Sweden. It is part of the European Union's Natura 2000 network (see Section 3.2) and was designated as a site of community importance within this network in 2000. As an archipelago and wilderness protected area, it is managed to uphold wilderness values across both marine and terrestrial areas within the Category 1b site. While the area was inhabited by a small fishing community in the 18th century, it is now uninhabited. Wilderness recreationalists occasionally sail within the Likskär Nature Reserve to hike on islands within the Category 1b site. Information for wilderness visitors is distributed through the website <http://www.bottenviken.se/>. During the summer months, visitors are restricted from entering certain locations on land and sea within the wilderness area to protect nests of many bird species.

Case Study 21

Sundarbans East Wildlife Sanctuary, Bangladesh

The mangrove forests and network of waterways of the Sundarbans East Wildlife Sanctuary were designated as a marine Category 1b site by the national government of Bangladesh in 1996 (IUCN & UNEP-WCMC, 2016). This wilderness site covers 312 square kilometres. The site was originally designated in 1977 by the national government as a forest reserve but has since been redesignated as a marine wilderness because of the site's waterways. The Sundarbans East Wildlife Sanctuary is part of the UNESCO World Heritage site, The Sundarbans, which was created in 1997 to protect the site's ecological processes and important biological diversity (UNESCO, 1998; Faridah-Hanum, et al., 2014). This UNESCO site contains two other marine wilderness areas, Sundarbans South Wildlife Sanctuary and Sundarbans West Wildlife Sanctuary. The three are nonadjacent but protect similar ecosystems and biodiversity.

The deltaic islands within the Sundarbans East Wildlife Sanctuary are the most fertile of the three wilderness areas and are created by the region's tidal phenomenon. This important phenomenon deposits sediment in a manner that continually changes the backwater delta, ensuring a multitude of ecological processes and maintaining the health of terrestrial and aquatic species. Iconic species, such as the royal Bengal tiger (*Panthera tigris tigris*), are protected by the wilderness stewardship of this site. The managers who protect the Sundarbans East Wildlife Sanctuary through the governance of the Bangladesh national government work closely with international conservation organizations such as the World Wildlife Fund, National Zoological Park, and the Smithsonian Institution, to create and implement management plans (UNESCO, 1998).

Case Study 22

Kepulauan Karimata, Indonesia

Near the island of Borneo in West Kalimantan, Indonesia, is the 770-square-kilometre wilderness protected area Kepulauan Karimata. It is a marine Category 1b site designated by the Indonesian national government in 1985 (IUCN & UNEP-WCMC, 2016). Kepulauan Karimata is managed jointly by the Indonesian Ministry of Forestry (<http://www.dephut.go.id/>) and Ministry of Marine Affairs and Fisheries (<http://kkp.go.id/>). This protected area comprises multiple small islands and marine waters. A major threat to the ecosystem of Kepulauan Karimata and rationale for its protection is the illegal harvesting the nests of cave swiftlets (*Collocalia linchi*), which are used in the popular dish Birds Nest Soup (Huffard, et al., 2012). The cave swiftlets create nests on granite cliffs high on the islands' mountains. The nests, mostly made from the cave swiftlets' solidified saliva, are the main ingredient in the soup, which is popular throughout much of Asia. Harvesting of these nests by non-indigenous populations is illegal but continues to be a threat to the survival of the cave swiftlets.

Kepulauan Karimata is located within the area protected under the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, a multilateral partnership of six countries: Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste (<http://www.coraltriangleinitiative.org>). The area protected by the Coral Triangle Initiative contains some of the richest marine biodiversity in the world (Huffard, et al., 2012). This multilateral agreement allows for increased connectivity among protected areas and aims to conserve biodiversity at a large scale with a focus on intact wilderness (see Section 2.1).

4.7 Management decisions about rewilding, restoration, passive management, and climate change intervention

Guiding principles

Wilderness management, especially of large and reasonably intact areas, is normally based on passive (or non-interventionist) management. In certain instances, interventionist methods are required. There is little that managers can actually do to ameliorate the wider impacts of climate change or large-scale environmental degradation, but they can act to influence outcomes and make wilderness ecosystems more resilient to the worst effects. Such resilience may best come from the rewilding, restoration and passive management of wilderness areas. In certain circumstances where rewilding, restoration and passive management do not adequately address the threats posed by climate change, managers may need to intervene in the species' range, breeding and location within the protected area.

Key considerations

Wilderness managers undertake essential, field-level actions that help advance knowledge of the highly cost-efficient and biologically productive role that wilderness plays in mitigating climate change. One of the more important values in this regard is that wilderness is an efficient and low-cost natural solution for carbon storage. Another is that wilderness areas provide space, unhindered by modern human land use, in which wildlife can respond to climate change by natural processes of succession and migration, and so adapt and adjust to changing climatic conditions (Cole, 2010). Where relevant, wilderness decision makers should consult with Indigenous Peoples, drawing on their knowledge and capacity to promote adaptation activities. Indigenous science and world views should be considered and implemented in policy decisions and actions in appropriate ways (Cruikshank, 2005).

When considering intervention, the terms 'rewilding', 'restoration', and 'intervention' vary by location and practitioners. These Guidelines conform with previously published WCPA Best Practice Guidelines, Ecological Restoration of Protected Areas (Keenleyside, 2012). Rewilding has come into common use more recently than the other terms, coined particularly by wilderness scientists and advocates, and is also variously defined (Johns, 2016). What may distinguish the three terms used for intervention is a difference in management goal rather than a difference in practice. This is to say that one manager may be 'rewilding' specifically to reestablish baseline conditions more relevant to a Category 1b area, whereas another may be 'restoring' an ecological process or species to create a more balanced, more beautiful, or better-functioning natural or protected area.

When these different words and the management options they entail are considered alongside the rapidly increasing, systemic impacts of climate change, interventionist methods in wilderness increasingly require more serious consideration. The wilderness manager's role is often a balancing act between the highly desired, baseline standard of passive management and the need to intervene by restoring a

wilderness or completely rewilding a seriously degraded area. What is abundantly clear is that rewilding is relevant to wilderness areas, either existing or possible, and is therefore an important and related concept for wilderness managers to understand. Therefore, it will be very briefly considered in these Guidelines as one style of restoration across a range of intervention options (and diverse terminologies) that is of interest and relevance to wilderness decision makers.

Rewilding

The definition of rewilding differs among practitioners. While some believe rewilding should focus on objective, other practitioners argue that rewilding is a matter of scale: 'rewilding is a type of large-scale biological and ecological restoration that emphasizes recovery of wide-ranging native species, top carnivores, and other keystone species in their natural patterns of abundance to regain functional and resilient ecosystems' (Noss, 1992).

Whether rewilding is a difference in scale, objective, or both, the practice of rewilding is anything but uniform, with diverse applications around the world, and it should be regarded as a core concept in wilderness managers' toolkits. When considering non-Category 1b areas, it is clear that degraded land and seascapes abound and present significant and desirable opportunities to enlarge the wilderness estate and thereby enhance life-supporting services of our planet. Therefore, the manager's wilderness practice needs to embrace the opportunities presented by the term rewilding.

Some of the key considerations in the practice of rewilding are those common to restoration and intervention in general: when and where to engage in it, in what manner, at what level of intensity, according to what baseline standards and for what goals, and what sort of ongoing management is needed for the intervention. While it is beyond the scope and purpose of these Guidelines to provide a detailed exploration of 'rewilding' in Category 1b or in non-wilderness areas, following is a brief review of some diverse examples of where the terminology is employed and how it is practiced.

Rewilding in Europe

Relevant work and progress in Europe demonstrates the wide range of activities and ideas that characterize the rewilding movement, which has been in progress for over 40 years. In Europe, wilderness and wildlife are staging a significant return to the world's most densely populated continent (not the most populated). While estimates vary, it is generally agreed that by 2030 there will be up to 30 million hectares of land in various stages of natural rewilding (Navarro & Pereira, 2012; Sylvén, et al., 2014). Many mammal and bird species are returning to healthy population levels because of better conservation laws and policies, habitat expansion due to rural land abandonment, and through many specific species reintroductions (Deinet, et al., 2013).

In the United Kingdom, one of the original and longest-running rewilding projects, Trees for Life, has worked since the early 1980s to restore the Caledonian forest in Northwest Scotland. Trees for Life began as a simple 'tree project' but soon expanded into an award-winning, global model of rewilding (Monbiot, 2013). The Wales Wildland Foundation runs a similar rewilding project, Cambrian Wildwood, which is located in the Welsh upland and aims to rewild over 7,200

hectares of land (<http://www.cambrianwildwood.org/>). The Alladale Wilderness Reserve is privately owned land in the Caledonian Forest of northern Scotland and is the largest rewilding project in the United Kingdom (Fraser, 2010; <http://www.alladale.co.uk/>).

George Monbiot is one of the most recognized and articulate voices of this European rewilding movement, presenting well-researched critical and popular thinking that captures the range of possibilities and actions of rewilding. Monbiot calls not only for the rewilding of nature but also for the rewilding of the mind, citing the need for new imagination, and for rethinking, reframing, and reconceptualizing the human relationship to wild nature (Monbiot, 2013). The non-governmental organization, Rewilding Britain, is relatively new and has grown out of Monbiot's popularization of the rewilding concept.

On the European continent, one of the most ambitious examples is Rewilding Europe (<http://www.rewildingeurope.com>). This non-governmental organization was established in 2012 with the goal of rewilding at least 1 million hectares of land in 10 areas in different habitats and human cultures across the European continent. The work of Rewilding Europe includes generating new natural solutions through private investment opportunities, employment, scientific research, species reintroductions, and classic wilderness management. Rewilding Europe and other initiatives could not be possible without an evolving legal and policy environment. A non-governmental organization network called the Wild Europe Initiative undertakes this legal and political role (Wild Europe Initiative 2013). The Wild Europe Initiative primarily lobbies the European Parliament and European Commission and provided a case study elsewhere in these Guidelines. For interest, the Wild Europe Initiative defines rewilding as:

...the return of an area to its wild natural condition. As with restoration, rewilding involves initiating, stimulating and allowing natural processes to occur (again), replacing human management and interference to shape new and wilder areas; it is applicable to any type of landscape and may not result in a predictable end-state, or restoration of an old state. A naturally functioning landscape that can sustain itself into the future without active human management is the ultimate goal of the approach (Wild Europe Initiative, 2013, p. 7).



As part of a rewilding program, Wisent (or European bison, *Bison bonasus*) were relocated to the dunes of the National Park Zuid Kennemerland, along the Western coastline of the Netherlands. © Staffan Widstrand

Rewilding in India

Rewilding is also a popular concept outside Europe. In India, for example many private rural landowners are increasingly engaged in rewilding. One such example is the pilot project, Community Nature Conservancy, in the Nagpur District of Maharashtra. The Community Nature Conservancy project is rewilding 42 hectares of farmland at the edge of the Umred-Karhandla Wildlife Sanctuary. Thirty-nine local villagers own this farmland and have formed a cooperative to oversee the rewilding of this land, which was overused, failing, and producing increasingly poor returns. As the forest returns to this land, so do the herbivores and, in turn, especially in larger areas, predators such as tigers and leopards (Sahgal, 2016). Another non-governmental organization in India, Sanctuary Asia, and their colleagues are in the process of determining the ecosystem services provided by these rewilding forests created by Community Nature Conservancy. Sanctuary Asia hopes to argue, using this and other examples in India, for a new category of protected area in India that will benefit both people and wildlife. Guidelines for such a category have already been drafted and, while not Category 1b per se, have been prompted by the many rewilding projects that provide ecological connectivity and new habitats across the subcontinent (Maharashtra, 2015).



Women of Gothangaon village in Maharashtra, India on the land that they and other local landowners have dedicated to rewilding. © Sanctuary Asia

Restoration

Restoration is a general and accepted term for all management interventions. It is defined as 'the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed' (Society for Ecological Restoration, 2004). It is an intentional intervention that initiates or accelerates recovery of an ecosystem with respect to its structure (e.g. species composition, soil and water properties) and functional properties (e.g. productivity, energy flow, nutrient cycling), including exchanges with surrounding landscapes and seascapes (Keenleyside, 2012). It can be practiced at any scale, both inside and outside protected areas, whether wilderness or otherwise. Restoration can also vary in degree of intervention: relatively passive (e.g. doing nothing following damage to forests from storm events or other natural disturbances) or relatively active (e.g. reintroducing ecological processes like fire or large-herbivore grazing on the landscape). Considered here are a few, specific types of restoration, with special relevance (in some cases) to addressing the effects of climate change.

Connectivity

Maintaining connectivity at a landscape scale will allow species to migrate and shift their ranges in response to climate change (Heller & Zavaleta 2009). Many species, whether plants or animals, occupy particular environmental niches determined by geology, soil, topography and climate. If the global climate is warming, then it is logical to expect that temperature-limited species will migrate to higher latitudes and higher altitudes to compensate (McKelvey, et al., 2011). Ensuring ecological and physical connectivity among core wilderness areas can accommodate latitudinal shifts in species ranges. Altitudinal shifts are less easy to manage, as species found locally only at the tops of mountains have nowhere to migrate to and may disappear from these areas as the climate warms (Gifford & Kozak, 2012). Island ecological communities face similar problems, as the surrounding water means there is nowhere to migrate to latitudinally. This is a particular problem for endemic species in both mountain and island ecosystems, because they are found nowhere else and face extinction from climate-change-induced shifts in their ecoclimatic niche unless they can adapt to the changing conditions. Strategic-level management across landscape, regional, national and continental scales is required to ensure maximum connectivity among core wilderness areas that will permit the maximum degree of freedom of movement to threatened wildlife species. The Cores, Corridors and Carnivores (CCC) model attempts to encapsulate this level of thinking, wherein protected-area cores are connected into a coherent network via landscape corridors, linear corridors (e.g. riparian zones), permeable landscapes or intermediate stepping stones (Soulé & Noss, 1998).

Wildfire

Wildfire has received a great deal of attention in the past and continues to do so as climate change increases global temperatures and affects seasonality leading to reduced precipitation in some areas (Marlon, et al., 2009). In forest and grassland ecosystems, higher temperatures and reduced precipitation can lead to increased incidence of wildfires, especially when linked to greater incidence of ignition from lightning associated with dry thunderstorms. Managers can intervene here in one of two main ways—by either reducing the available fuel loading that can lead to disastrous (large, intense, and unseasonal) and therefore very destructive fires, or by fighting fires when they occur and stopping them from getting out of hand. The former approach is usually a better choice and involves reducing the fuel load by either prescribed burning (small magnitude, controlled burns) or by mechanical thinning and removal of the fuel.

Natural disturbance processes are important in maintaining wilderness landscapes. Allowing fires to burn in as natural conditions as possible, for example, is highly desirable and has been an important, sometimes controversial, element of wilderness stewardship. Having fire as both a wild and natural source of disturbance is important ecologically, experientially, and scientifically, but also introduces risk to humans and property on adjacent lands. In some cases, fire has been eliminated or greatly reduced through management suppression efforts. Humans have become used to not having fire in many ecosystems and many ecosystems have developed floral and faunal conditions that are unnatural because of fire exclusion. Therefore, restoration of fire is a common objective of wilderness management. Where

conditions allow, either allowing natural-caused fires to burn or applying prescribed fires to achieve resource objectives is an important wilderness stewardship activity. In places where fires have not been excluded, maintaining their natural role is highly desirable. Development of wilderness management plans, addressing both maintenance of this keystone natural process and restoration of fire, is a high priority for management and scientific understanding (Miller, 2014).

Indigenous lands managed for wilderness qualities have an additional cultural landscape consideration. In addition to using fire to maintain what many may call natural environmental conditions, there is often a great deal of indigenous science that is place-specific and accumulated across generations about the benefits of fire to production of edible plants, medicinal plants and attraction of animals for subsistence use. Indigenous Peoples might see the aesthetics of fire differently than newer migrant populations because of a longer history with the landscape and shared knowledge about how fires have occurred and their benefits in the past.

Armatas, et al. (2016) have clearly pointed out the relationship between accumulated indigenous science and adaptive management for natural landscapes. They suggest that traditional phenological knowledge, specifically, can facilitate: (1) implementation of proactive fire management strategies, such as prescribed burns, to increase benefits from nature; (2) restoration of natural fire and resultant effects through better understanding of reference conditions and environmental response; (3) identification of culturally significant natural resource values that can be protected, restored, and sustained by methods such as prescribed fire, thus garnering support for proactive fire management; and (4) protection of important livelihood practices such as agriculture and hunting and gathering.

Hydrology

Alterations in hydrological regimes are highly likely as a result of predicted climatic changes in temperature and precipitation, which will influence potential evapotranspiration and corresponding changes in vegetation, soil moisture and runoff. Water levels in lakes and rivers will be affected, as will season flow regimes that affect aquatic ecosystems and water availability for animals. Water impoundments are an important aspect of hydrological restoration in light of climate change effects. Constructing animal watering holes (guzzlers) is one possible intervention, but this is likely to result in modified animal behaviour and local impacts on animal populations and vegetation cover. Water extraction upstream of a wilderness protected area can clearly impact heavily on river levels such as seen in many rivers in the southwest United States. In such circumstances, managers should carefully coordinate abstraction licenses in liaison with relevant upstream authorities.

Alien and invasive species

Climate change may be responsible for outbreaks of alien and invasive species within wilderness areas. It is likely, however, that this has more to do with humans introducing both plant and animal species into ecosystems where they have hitherto been unrecorded. Species introduced in this manner become invasive when both the conditions are particularly suited for the species in question, and a niche exists within the existing ecosystem that it can effectively exploit. Having

found such a niche within a suitable habitat, the alien species can proliferate and spread, outcompeting endemic species, at which point it is considered invasive. Despite the negative connotations of the 'invasive' label, this is simply a natural process of species establishment, competition and succession, albeit often one accelerated by human action. Often invasive species find their own balance and place within their adopted ecosystem and, after an initial period of rapid colonization, become naturalized and add to the biodiversity. Rather, the aesthetics of invasive species and their ability to outcompete established native species (at least to begin with) is often met with disapproval by humans.

Nonetheless, managers should be aware of the potential problems posed by alien and invasive species and take action to protect indigenous species wherever possible, especially where the effects of climate change and human modification of natural ecosystems have made them vulnerable to competition. Actions that managers may consider include eradication of the invasive species using trapping and hunting for larger animals and pesticides and herbicides for smaller species and plants. Once established, however, invasive species are notoriously difficult to get rid of, so the best a manager can hope for is to perhaps halt or limit their progress (Pearce, 2015).

Disease

Outbreaks of disease are often associated with climate change, either because the affected organism is under stress from the effects of climate change, or because the changing conditions allow the pathogen to spread and infect new hosts without the normal environmental controls (Millar, et al., 2007). Managerial responses to disease outbreaks are very much dependent on the pathogen and the conditions observed, but can include inoculation, creating disease breaks or barriers to its spread, or introducing a counter-pathogen where this is possible. Whichever approach (if any) is adopted, this needs to be done carefully with a view to costs, chances of success and the possibility of unforeseen effects (such as diseases jumping from one species to another or introduced biological countermeasures attacking unintended targets). The most common approach is often just to monitor the situation and hope that the incidence dissipates in due course (Heller & Zavaleta, 2009).

Species relocation

The relocation of individual flora and fauna species from healthy or weakening populations to suitable habitat within their former range has also been shown to be effective (IUCN Species Survival Commission, 2013). The return of the grey wolf (*Canis lupus*) to Yellowstone National Park is a well-documented example (Mech & Boitano, 2010; Smith, et al., 2003). Originally exterminated by hunting from the park in the early years of the 20th century, wolves were reintroduced by the United States National Park Service in 1995 (14 wolves) and 1996 (17 wolves) and have increased in number to around 100. The reintroduction of this missing keystone predator has been credited with widespread ecological recovery within the park due to its effect on modifying the behaviour and numbers of elk in the park and leading to unforeseen trophic effects on other species, vegetation and even the rivers (Ripple & Beschta, 2003). While these effects are still disputed, the recovery of the wolf in Yellowstone has clearly been an ecological success. The fact that it is also hotly disputed by some stakeholders within the ranching,

hunting, and political sectors is also true. Managers need to carefully weigh the pros and cons of any reintroduction programme before engaging what will most likely be a costly, and sometimes controversial, course of action before proceeding. Reintroduction may also fall under the category of climate change intervention to help a species adapt to climate changes.

Passive Management

The opposite of active intervention is passive (or non-intervention) management, a philosophy central to the wilderness concept. In the face of environmental degradation in wilderness, especially related to climate change, passive management is perhaps the best and least-costly approach for the manager to adopt and is consistent with core values of wilderness management. In such a case, wilderness areas are simply retained as non-intervention areas that allow wildlife and ecosystems to adapt and respond to climate change or other environmental degradation as it occurs.

This philosophy accepts that active management or direct interventions in wilderness areas are difficult and likely to fail in many instances, and so maintains that the best approach to increase resilience to climate change is through actions such as ensuring that wilderness is protected from human impacts (beyond climate change), and ensuring that core areas are connected via landscape corridors and permeable landscapes that give wildlife the ability to move and migrate unhindered to more favourable areas as ecosystems change. Human stresses on flora and fauna should be maintained at a minimum acceptable level by tightly managing (or restricting, if necessary) disturbance from hunting, tourism, recreation and management.



European Silver Fir (*Abies alba*) in a remnant of old growth forest in the Bavarian Forest National Park, which is managed by the 'let nature be nature' philosophy and motto now used by all German national parks. © Vance G. Martin

Passive management in German wilderness

Examples of good case studies can be found in both the public and private sectors of Germany. '*Natur Natur sein lassen*' ('let nature be nature') is a phrase coined in 1992 by Hans Bibelriether, the first director of the Bavarian Forest National Park that describes a strict version of passive management for wilderness principles (Gissibl, 2014). While controversial when implemented, this philosophy has become both the popular wording for and the official policy of management in the core zones of all 16 national parks in Germany. First adopted in the Bavarian Conservation

Law of 1997, this principle was later adopted in National Conservation Law in 2002 and affirmed in the Federal Nature Conservation Act of 2010.

Numerous German non-governmental organizations have dedicated wilderness agendas. A good example is the Frankfurt Zoological Society (FZS) that works for wilderness in Germany, Europe, and internationally. Another example is the Brandenburg Wilderness Foundation (Stiftung Naturlandschaften Brandenburg), which was founded in 2000 by a collection of government agencies and non-governmental organizations, including FZS (<http://www.stiftung-nlb.de/en/stiftung.html>). The Brandenburg Wilderness Foundation was established to rewild abandoned military training grounds. Today, the Brandenburg Wilderness Foundation is also dedicated to many other aspects of wilderness values and management, including increasing ecological connectivity. However, despite the above public use, official policies, and professional practices, the German government's formal adoption of Category 1b is still awaited and remains a topic of discussion and the subject of workshops and meetings. To assist this process, Vision for a Wilder Europe was translated into German (Sylvén, 2014).

Climate Change Intervention

It is impossible to predict accurately all future climatic changes or environmental degradation, which creates challenging management decisions for social and ecological adaptation within wilderness areas (Adger et al., 2012). The ecological resiliency of a wilderness requires the social resiliency of the communities within and around the protected area (Adger, 2000). Climate change impacts the social and ecological aspects of a protected area. While climate change is an external forcing factor impacting wilderness ecosystems, it is incumbent on managers to respond to changes within the ecosystem that go beyond normal successional changes. All intervention decisions should align with the principle wilderness values.

Interventions should work to address both the social and ecological impacts of climate change. Often, this means including relevant conservation partners, such as Indigenous Peoples, in the intervention decision processes. Many communities who rely upon wilderness areas are vulnerable to climate changes' effects on their water sources, sacred natural sites, and customary uses of flora and fauna species with ecological processes that will be disrupted by climatic changes (Watson et al., 2012; Watson et al., 2013).

Species range

Climate change will inevitably mean there are both winners and losers within wilderness ecosystems. The consequences of climate changes can be more intensive in smaller or isolated wilderness areas where habitats or species have only island occurrence (for example, coniferous boreal forests in mountains of lower latitude). Local actions can be implemented to try to help some especially threatened species to survive climate change. Such actions, like species relocation described above, could be extremely expensive and not guaranteed to succeed. Managers need to look carefully at what they are trying to preserve. If a species deemed to be at risk is locally rare but globally common throughout a wide home range, it may be that we have to accept the loss of that species in that area hoping it will be

safe across the rest of its home range (Araújo, et al., 2011). If a threatened species is locally common but globally rare, then it might be necessary to intervene to ensure its survival. Introducing new genetic material into a wilderness protected area is an important but complicated aspect of climate change adaptation.

Captive breeding

Those species that are globally rare and under threat of extinction, either regionally or globally, because of climate-change-induced shifts in their habitat may require direct intervention if they are to survive. Where species interventions are deemed necessary and beneficial, these should be based on best-available scientific evidence, use appropriate genetic stock and as far as is possible minimize the stress to the individual animals. Capture and release programmes have been shown as one way of ensuring meta populations survive in new and suitable habitat areas (Parker, 2008). Captive breeding programmes for especially rare and endangered species have been successful in maintaining and increasing the numbers of individuals in a species population. Captive breeding should be carried out with the minimum amount of exposure to humans and in conditions that mimic the species' natural habitat and food sources as closely as possible. Release sites should be carefully chosen to ensure the maximum possible chances of survival and naturalization, taking into consideration the remoteness from human disturbance, availability of suitable habitat for feeding, breeding and cover, and connectivity to other suitable habitat in the wider landscape. Planning tools may be found at the IUCN Conservation Breeding Specialist Group website: <http://www.cbsg.org/new-initiatives/species-conservation-planning-tools-library>.

Implementation

When passive management is not enough because of climate change or other human-induced environmental degradations, managers should strive to restore wilderness areas to a level of health at which the area can be managed passively. In extreme circumstances, such as in adaptation to climate change, intervention may be required but managers should be aware of the complications and controversies surrounding climate change interventions. Restoration and intervention, when done in accordance with wilderness values, can help wilderness areas adapt to climate change by creating more resilient ecosystems able to withstand future climatic uncertainties. They can also help highly degraded areas be restored to high-functioning areas capable of being designated as Category 1b. Managers must work to protect the ecological functions of ecosystems within wilderness areas and can do so by implementing the key principles of restoration and intervention outlined above.

Recommended reading

- Cole, D.N. (2010). *Beyond Naturalness: Rethinking Park and Wilderness Stewardship in an Era of Rapid Change*. Island Press, Washington, DC.
- Cruikshank, J. (2005). *Do Glaciers Listen? Local Knowledge, Colonial Encounters and Social Imagination*. University of Washington Press, Seattle, WA.
- Hilty, J.A., Chester, C.C., and Cross, M.S. (eds.) (2012). *Climate and Conservation: Landscape and Seascape Science, Planning, and Action*. Island Press, Washington, DC.

- Johns, D. (2016). 'Rewilding'. In *Reference Module in Earth Systems and Environmental Sciences*. Elsevier.
- Pearce, F. (2015). *The New Wild: Why Invasive Species Will Be Nature's Salvation*. Beacon Press, Boston.
- Soulé, M. and Noss, R. (1998). 'Rewilding and Biodiversity as Complementary Goals for Continental Conservation'. *Wild Earth* 22.
- Watson, A., Martin, S., Christensen, N., Fauth, G., and Williams, D. (2015). 'The Relationship between Perceptions of Wilderness Character and Attitudes toward Management Intervention to Adapt Biophysical Resources to a Changing Climate and Nature Restoration at Sequoia and Kings Canyon National Parks'. *Environmental Management* 56: 653–663.
- Watson, J.E.M., Iwamura, T., and Butt, N. (2013). 'Mapping Vulnerability and Conservation Adaptation Strategies in a Time of Climate Change'. *Nature Climate Change* 3: 989–994.

4.8 Subsistence use and relationship values of wilderness

Guiding principles

Subsistence users are a powerful and necessary partner for the protection and stewardship of wilderness areas. These constituencies, who are often but not always Indigenous Peoples, have deep cultural and traditional connections to the landscape. These close relationships with resources and natural systems should be embraced as part of the vision for wilderness areas. Traditional subsistence practices and relationship values of wilderness are complementary to the protection of wilderness. Subsistence use and the recognition of relationship values of wilderness can help protect indigenous culture and advance the conservation of large, intact landscapes.

Key considerations

The harvest of wild resources in large wilderness protected areas presents many unique management challenges. Allowable subsistence use is very context specific and a number of variables and conditions play into resource exploitation and stewardship. Here, permissible uses and the goals of wilderness areas have to be effectively balanced.

Defining subsistence

The meaning of subsistence is complex, context and regionally specific, and ever-changing. It refers to traditional means of livelihood and can be understood as a way of life that involves the harvest, preparation, sharing, and consumption of wild resources for food and other cultural purposes. The Alaska National Interest Land Conservation Act protects subsistence resources and practices in wilderness areas in Alaska, formally defines subsistence as 'the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for customary trade' (Alaska National Interest Lands Conservation Act,

1980). The meaning of subsistence extends well beyond food and has a deep level of social and cultural importance that is directly related to the natural environment (Whiting, 2004).

Allowable uses

The effective management of wild resources is critical to ensuring sustained subsistence uses within wilderness areas. Biological and physical systems are multifaceted, dynamic, and often not completely understood (Ludwig, et al., 1993). As such, effective resource stewardship requires intensive monitoring and adaptive management, and this may be undertaken utilizing indigenous science or other methods. A variety of variables should be considered when allowing for the use of wild resources in protected areas. Wilderness managers should consider, among others, the following factors and circumstances to ensure ecosystem values and processes and subsistence resource abundance:

- Size of the protected area;
- Natural history of the particular wild resource;
- Level of resource abundance;
- Amount of harvest and the desired level of harvest;
- Resource replacement rate;
- Indigenous science and the legal rights of some Indigenous Peoples;
- Factors that could influence and/or complicate resource stewardship, such as climate change or other anthropogenic disturbances.

Buffer zones

Wilderness areas may sometimes surround or be within proximity to small, rural communities that rely on the larger landscape for subsistence purposes. Recognizing that some elements of rural community life, such as clearing tracts of land for agriculture or cutting wood for building materials or fuel, may be contrary to the goals of wilderness protection, buffer zones offer an effective way to protect and manage wilderness areas. In such instances, buffers can allow less-restrictive activities around communities and offer an effective transition area that can reduce conflict and better ensure that the goals of wilderness area management are achieved.

Benefits

Subsistence resources and practices have numerous benefits for remote residents and help elevate the relevance and importance of conservation. While functioning ecosystems are a foundational determinant of the public's health and



Reindeer herding in Finland is an important element of Sámi culture and therefore is allowed in wilderness areas. © Aldo Leopold Wilderness Research Institute

Case study 23

Wilderness Act of Finland

With deep roots in the hunting and fishing tradition, the formal process in Finland towards a national wilderness law began in 1987 through the work of the Finnish Wilderness Committee. This work culminated in 1991 with the adoption of the Wilderness Act (Kormos, 2008). Finland created 12 wilderness areas (managed by Metsähallitus) out of large, existing road-less areas in the far north—10 of them in the Sámi home territory (Sápmi)—‘to preserve wilderness character of the areas, to protect Sámi culture and the traditional subsistence uses of the area, and to enhance possibilities for multiple use of nature’ (Erämaalaki: Act on Wilderness Reserves, 1991). This is the only wilderness legislation of fully national jurisdiction—notwithstanding the Mission Mountains Tribal Wilderness Act that applies to the sovereign land of the Confederated Salish and Kootenai Tribes in Montana, USA—that has a specific objective of the well-being of traditional culture and subsistence uses.

The Wilderness Act of Finland is a study in compromise and adaptation. Some of both traditional and modern forms of resource use are allowed in the wilderness areas. These include hunting, fishing, gathering natural foods, reindeer herding, small-scale mineral prospecting, and restricted tourism and forestry. For example, Finland’s is the only wilderness act that allows for some selective logging (in 3.5 per cent of the areas), a provision required to assure its passage through Parliament. In practice, however, Metsähallitus has ceased forestry in the areas. Also, because of the emphasis in the Finnish Act on Sámi traditional culture, another variance from ‘normal’ wilderness management is that reindeer herding (semi-nomadic, domestic husbandry of reindeer) is allowed. The activity and impact of these herds and the culture of herding has numerous and diverse effects on the ecology, such as: overgrazing in some areas, with both positive and negative impacts on biodiversity and cultural landscapes depending on intensity of the grazing; and occasionally killing of predators, especially wolverine, lynx, wolf, and golden eagle (Sippola, 2002).

Akwé: Kon, operating as part of the UN Convention on Biodiversity after being adopted at the Convention on Biodiversity’s COP-7 (Secretariat of the Convention on Biological Diversity, 2004), is currently the primary management tool used. The guidelines of Akwé: Kon are meant to be applied in the assessment of cultural, environmental and social impacts of projects and plans, which are implemented in the Sámi homeland and which may influence the Sámi culture, livelihoods and cultural heritage. The authority to do this was authorized by Finland’s national parliament, and a special committee to oversee this process was established by the Sámi Parliament (rather than the managing agency Metsähallitus), again demonstrating the unusual nature of and procedures used for properly integrating designated wilderness and traditional cultures.

While the overall picture for wilderness in Finland is positive, concerns exist that are prime case studies in issues that relate to the intersection of traditional culture with contemporary, modern society. For example, modern ways of practicing nature-based livelihoods are part of the Sámi culture. This means that modern technologies are allowed in wilderness areas when they are related to preserving Sami culture, and Metsähallitus has little or no way of controlling this development. In addition, the increase of popularity and frequency of both sled-dog safaris and motorized tourism activities was not anticipated when the Act was adopted, and still needs subsequent legislation and management guidelines (Ahokumpu, 2013).

wellness everywhere, in remote places with subsistence-based economies, these factors are particularly valuable. Subsistence resources and practices are directly connected to food security, familial and community-wide social networks, and relationships, cultural institutions, and mental health (Loring & Gerlach, 2009). Additionally, the harvest and preparation of subsistence resources is often labour intensive and positively contributes to an active ways of life with physical health benefits. All of these factors are drivers and mediators of health and positively contribute to overall wellness (Loring & Gerlach, 2009). Such benefits, when recognized, can help increase the significance of conservation areas and contribute to the sustained protection of wild areas.

Implementation

Subsistence users can be constructive and powerful advocates for wilderness protection and for relationship values of wilderness. To ensure that sound stewardship and inclusive management objectives are accomplished,

efforts should be made to understand the local, traditional land ethic. Non-indigenous decision makers should partner with Indigenous Peoples government decision makers to ensure incorporation of traditional means of livelihood and subsistence within the management of wilderness protected areas. Such partnerships will likely expose shared values for landscape-level protection. These values should be built upon to identify goals for protection and stewardship.

Recommended reading

- Berkes, F. (2012). *Sacred Ecology*. 3rd edition. Routledge, New York.
- Cruikshank, J. (2005). *Do Glaciers Listen? Local Knowledge, Colonial Encounters and Social Imagination*. University of Washington Press, Seattle, WA.
- Duhaylungsod, L. (2011). ‘Interpreting “Indigenous Peoples and Sustainable Resource Use”: The Case of the T’boli in the Southern Philippines’. In Dove, M. R., Sajise, P. E., and Doolittle, A. A., (eds.) *Beyond the Sacred Forest: Complicating Conservation in Southeast Asia*. pp. 216–238. New Ecologies for the Twenty-first Century. Duke University Press, Durham.

Case Study 24

Arctic National Wildlife Refuge, United States

The Arctic National Wildlife Refuge is a 794,026-hectares area managed by the United States Fish and Wildlife Service in northeast Alaska. The refuge protects a vast area and encompasses entire ecosystems, from the peaks of the Brooks Range to coastal areas. In 1980, 2.9-million hectares of the refuge was formally designated as wilderness through the Alaska National Interest Lands Conservation Act. Recently, in January 2015, the United States Fish and Wildlife Service completed a Comprehensive Conservation Plan for the refuge and formally recommended three additional tracts, totaling 4.9 million hectares, to the United States Congress for inclusion within the National Wilderness Preservation System. This recommendation offers a constructive case study for how to advance wilderness area designation while incorporating the involvement, rights, and needs of subsistence users.

The Arctic National Wildlife Refuge is the traditional land of the Inupiat and Gwich'in peoples. One village is located entirely within the refuge's boundaries and six other communities are located outside of the protected area on the south and western sides. These communities, which have populations of a few hundred people, have rich subsistence use, traditional means of livelihood and relationship values to wilderness that include hunting, fishing, and gathering a variety of wild resources from within the refuge. Wild resources include, among many others, caribou, moose, salmon, and various types of berries. Surveys by natural resource managers have found that hundreds of kilograms of wild resources are gathered and consumed by residents of these communities every year (<http://www.adfg.alaska.gov/sb/CSIS/>).

To complete the Comprehensive Conservation Plan and the associated wilderness recommendation, the United States Fish and Wildlife Service went through an extensive public planning process that involved extensive communication and consultation with Alaskan Native entities. Over the course of planning, there were regular government-to-government meetings between sovereign tribal governments and federal agencies of the United States. The management of the refuge will change little with the latest revised Comprehensive Conservation Plan and in the future with formal wilderness designation expansion by Congress. The harvest of fish, wildlife, and other wild resources will still be regulated by the state of Alaska and federal agencies. This includes allowing fishing, hunting, trapping, berry picking, the harvesting of plant materials, and collecting house logs and firewood. Additionally, means of transportation used for subsistence purposes, including snowmobiles and motorboats, will still be permitted.

4.9 Managing wilderness for sacred values

Guiding principles

An examination of the linkage between places of high spiritual or cultural value and nature conservation in a research report by the World Wide Fund for Nature, Equilibrium Research, and the Alliance for Religions and Conservation (Dudley, et

al., 2005), concluded: 'The limited quantitative evidence that does exist suggests that sites protected for their spiritual values can indeed perform a valuable function in protecting wild nature' (p. 120). Because many of these sites are wild lands, all wilderness users and advocates need to be aware of their metaphysical nature and value to some faiths or traditional cultures, and not only refrain from damaging behaviour, but also be supportive of any efforts to protect them from sacrilegious development.

Case study 25

Kachina Wilderness Area, United States

In the United States, the Kachina Wilderness Area incorporates the San Francisco Peaks of Arizona, a volcanic mountain range. The Kachina Wilderness Area is within the Coconino National Forest, which is administered by the United States Forest Service under a policy of multiple use. The designated Kachina Wilderness Area recognizes the sacredness of the area to the Hopi Tribe and the wilderness values of the site. The sacredness of the area and the wilderness values are threatened by encroachment of ski resort development in an adjacent area. At time of publication, these wilderness values and the overall sacredness of the entire massif to 13 Native American tribes has not been sufficient to halt an economically marginal ski resort expansion using wastewater from the city of Flagstaff for artificial snow that threatens the sacred and wilderness values of the site. Lawsuits have been through various levels of courts to halt what is to the tribal coalition a sacrilege, but at present skiing is winning (Benally & Hamilton, 2010).

Case Study 26

Peak Wilderness Park, Sri Lanka

The Peak Wilderness Park (also referred to as Adam's Peak and Sri Pada) of Sri Lanka has high spiritual value to Buddhists, Muslims, Christians and Hindus (Mansourian, 2005). The sacredness and wilderness values of this area have allowed wilderness decision makers to ensure protection against damaging development from mining, forest cutting and clearing, and excessive tourism.

Key considerations

Designation

Sacred natural sites that exhibit both wilderness values and sacredness values should be formally designated as IUCN protected area management Category 1b (see Section 1.7). Many such sacred sites also have high biodiversity and scenic values. Formally designating such sites as Category 1b provides extra protection and stronger barriers against harmful development. Too often the claim for the sanctity of a site comes after a harmful development is well into the planning stage and even into the action stage. It would be better to designate the area as sacred and of high wilderness value before harmful development can begin. An additional international conservation overlay may be warranted for particular wilderness sites with sacred values. Further designation of a site under UNESCO's Biosphere Reserve or the World Heritage Convention can add additional international protection for a wilderness site with sacred values.

The major impediment to this is the secrecy aspect—when custodians of a site fear the loss of significance if outsiders, who do not share the same values, know of the site. Visitors may also abuse this sacred knowledge, exploiting a Sacred Natural Site as a spectacle or a tourist magnet (e.g. Uluru (Ayers Rock), in Australia). Registering a Sacred Natural Site as a formal designation also implies some loss of control to sites that have been protected for years by Indigenous Peoples' elders and leaders. The free, prior and informed consent process is imperative when considering any new designations over indigenous land and sites. Such threats to the sacredness of a site are severe and must be treated as such by the Indigenous Peoples' governments and non-indigenous governments responsible for the management of the site. Management plans should include the appropriate zoning to ensure proper protection and respect. Inclusion in databases such likewise mask actual locations.

Appropriate zoning

Once designated as a wilderness protected area, appropriate zoning within the site is necessary to give extra protection to sacred places. Such zoning may include exclusive access to areas within the wilderness site as part of the management plan. This may include approaches to pilgrimage management or regions that are 'closed areas' to maintain the sacredness and wildness of the site. Custodians of wilderness areas with sacred values must be given the ability to not reveal all their knowledge of a site for cultural and security reasons.

Consultation

If a government or agency managing a site is not familiar with the belief system, then proper and consultation-based interpretation of cultural values should be incorporated into every part of the management and governance of the site.

Personnel

The management of sacred natural sites should be in the form of co-management, self-management or participatory management. Where sacred values are high, special cultural skills are needed in managing the land and associated resources. Management staff should be selected from local people of the belief system, and they should be given special training involving the Elder Traditionalists. Such a policy has been used successfully in some of the wilderness protected areas of Australia (Bauman, et al., 2013).

Implementation

Management of a wilderness area as a sacred natural site can be done by implementing the key considerations of registration, designation, zoning, consultation, and employment mentioned above. All inventory methodology undertaken within a sacred natural site must respect the traditional custodians of the site and their ability to not reveal all knowledge for cultural and security reasons. Such management will likely take the form of co-management between Indigenous Peoples governments and non-indigenous governments or self-management by Indigenous Peoples government agencies.

Recommended reading

- Allendorf, T.D., Brandt, J.S., and Yang, J.M. (2014). 'Local Perceptions of Tibetan Village Sacred Forests in Northwest Yunnan'. *Biological Conservation* 169: 303–310.
- Bernbaum, E. (1997). *Sacred Mountains of the World*. University of California Press, Berkeley.
- Brockman, N.C. (1997). *Encyclopedia of Sacred Places*. ABC-CLIO, Santa Barbara, CA.
- Dove, M.R., Sajise, P.E., and Doolittle, A.A. (eds.) (2011). *Beyond the Sacred Forest: Complicating Conservation in Southeast Asia*. Duke University Press, Durham.
- Dudley, N., Bhagwat, S., Higgins-Zogib, L., Lassen, B., Verschuuren, B., and Wild, R. (2010). 'Conservation of Biodiversity in Sacred Natural Sites in Asia and Africa: A Review of the Scientific Literature'. In *Sacred natural sites: Conserving nature and culture*. pp. 19–32. Earthscan, London.

- Hamilton, L. and McMillan, L. (eds.) (2004). 'The Sacred, Spiritual and Cultural Significance of Mountains'. In *Guidelines for Planning and Managing Mountain Protected Areas*. pp. 25-30. IUCN, Gland, Switzerland.
- Ormsby, A.A. (2011). 'The Impacts of Global and National Policy on the Management and Conservation of Sacred Groves of India'. *Human Ecology* 39(6): 783–793.
- Oviedo, G. and Jenneaud, S. (2007). 'Protecting Sacred Natural Sites of Indigenous and Traditional Peoples'. In *Protected Areas and Spirituality*. pp. 77-99. IUCN, Gland, Switzerland.
- Verschuuren, B. (ed.) (2010). *Sacred Natural Sites: Conserving Nature and Culture*. Earthscan, London.
- Wild, R. and McLeod, C. (eds.) (2008). *Sacred Natural Sites: Guidelines for Protected Area Managers*. IUCN, Gland, Switzerland.

4.10 Variance

Guiding principles

Variance from the protocols discussed within these Guidelines are sometimes permitted within wilderness areas. Variances occur for practical reasons, for political expediency, for the rights of Indigenous Peoples, for competing legislative mandates, and for many other reasons. Permitting variances requires a well-thought-out and thorough approach to appropriately manage them while still meeting the purposes of protecting the wilderness values.

Key considerations

Determining future variance

Any variance allowed within a wilderness protected area requires a principled decision-making process with decisions that can be justified. The process for permitting variance during the establishment of a new wilderness protected area differs from the process of incorporating a variance into the management of an existing wilderness. When considering whether to allow variances when establishing a newly designated wilderness, all decisions should be determined through an informed legislative process. Variances permitted during the establishment of a wilderness area should be decided by the governing body and written into



Subsistence users in Alaskan wilderness are important partners in wilderness protected areas. © Aldo Leopold Wilderness Research Institute

the management plan. Decision makers should permit variances that align with wilderness values. Within a site designated as a wilderness protected area, decisions to allow otherwise non-conforming uses are the responsibility of the manager, but often the permission is elevated to higher levels within the agency. The process to be followed for granting such variances is described below. It is important that any decisions to allow variances should be principled and that there are mechanisms in place to make sure that happens.

Implementation

When granting variances, wilderness decision makers should rely upon a sound, principled, and informed process when considering non-conforming uses. All variances must comply with the IUCN 75 per cent rule in which at least three-fourths of the site adheres to the Category 1b designation and the entirety of the area is managed to uphold wilderness values.

There are several principles that should be applied and two tools that are essential.

Principles:

- Maintain a bias for protection—for sustaining the highest degree of naturalness possible.
- When the reasons for previously allowed variances no longer exist, eliminate the variance.
- Respect other statutes.
- Respect the rights of Indigenous Peoples.
- Respect implications to the cultural and biological systems beyond site-specific decisions.
- Ask, 'Is the variance necessary?' Do not merely ask, 'Is the variance allowed?'

Tools:

Management Plan

A management plan for a protected area gives the manager an overarching framework within which to make decisions. The management plan should ensure the long-term accomplishment of the overall objective of adherence to wilderness values. It should include means to monitor trends towards or away from that objective. It should identify goals and objectives that will then direct site-specific, time-sensitive decisions the manager must make.

Minimum Impact Analysis

Each decision implemented by a manager on a site-specific, activity-specific variance demands a principled, informed decision-making process. A minimum impact analysis should put the manager through a decision-making process that ensures all of the correct variables are considered. The minimum impact analysis should first determine if the variance is necessary. Variances should be given only in instances where they are necessary, not because the variance is legally allowed. Once it has been determined that the variance is not only both legally allowed and necessary, but also does not pose a significant impact to the resources and character of the area, then the minimum impact analysis should follow a process of determining the management method or tool that will cause the least amount of impact.

The factors to consider when determining what method will cause the least impact will vary by location, resources involved, and many other factors. At the least, consideration

should be given to how long the impact will occur, how long the evidence of the impact will remain, and both the physical resources and the experiential qualities of the area. By employing a management plan for the long-term timeline and

utilizing a minimum impact analysis tool whenever a variance is considered, a manager is treating these important variance decisions with the care appropriate for the planet's most protected places.

Case study 27

Alaska National Interest Lands Conservation Act, United States

Specific variances that are allowed on the congressionally designated wilderness areas of federal lands in the state of Alaska are managed differently than other federal wilderness lands in the United States. These variances stem from the Alaska National Interest Lands Conservation Act of 1980, the law that designated federal wilderness areas in Alaska and informs some of their unique elements of management. Central to the variances within the Alaska wilderness context are features that enable access and maintain traditional practices within these large, remote tracts of wildlands.

As discussed in Section 4.8, subsistence practices are a unique and important part of Alaska's wilderness areas. Wildlands that are managed by state and federal natural resource agencies provide rural residents the opportunity to harvest significant quantities of wild resources. These resources include a large variety of fish, game, and berries, and other natural materials, like logs for homes. The importance of these wild resources for cultural purposes and rural life is the primary reason for Alaska's access and structure variances to federal designated wilderness lands that are otherwise governed by the United States Wilderness Act.

Unlike wilderness areas in other parts of the United States, certain motorized access is allowed within Alaska's designated wilderness. Alaska National Interest Lands Conservation Act specifically allows for the use of motorboats, snowmobiles, and fixed-wing aircraft within wilderness tracts for traditional activities, such as hunting and fishing, and for travel to and from villages, homesites, and subsistence cabins. The permissible use of these machines for access can vary among management units and is regulated by specific place-based rules. For example, depending on the national park, national preserve, national forest or wildlife refuge, allowable floatplane landings can be limited to certain bodies of water and snowmobiles are often only permitted during particular times of year, in designated areas, and under certain snow conditions. Permits that allow for recreational and scientific access by motorized transport can also be granted within wilderness areas in Alaska.

Subsistence cabins are another instance of variance within the Alaska wilderness context. Subsistence cabins that were in existence before the passage of the Alaska National Interest Lands Conservation Act are allowed to remain in the landscape, and in very rare circumstances, subsistence cabins can be constructed in new locations. These structures are generally authorized through a renewable and nontransferable permit system that allows them to be maintained and used by qualified claimants for traditional activities. This exception helps to provide continued access to subsistence resources and ensures human safety within remote places.

Alaska's wilderness areas support important traditional uses that are enabled and managed, among other ways, through motorized transport and the use of small structures. These variances, which are generally strictly enforced, help to ensure that Alaska's unique wilderness values are maintained while allowing traditional activities to continue.

4.11 Incorporating science into management decisions

Guiding principles

The systematic study of testable hypotheses—science—is a necessary tenet of all wilderness management decisions. As more areas are designated as wilderness around the world, society's relationship with these places will change. We anticipate all of society will pay even more attention to the benefits accumulating from wilderness protection. Clean water, wildlife corridors for movement, sources of clean air, filtration of ground water, traditional cultural practices in nature and wilderness-dependent recreation are important to us as a society. Research that is focused on the flow of ecological services is useful to managers by creating understanding of the value of protecting biodiversity, carbon storage reservoirs and sources of high-quality water for off-site benefits. Social

science researchers from the disciplines of anthropology, political ecology and economics provide valuable resources and understanding of wilderness that must be incorporated into management decisions.

Key considerations

Establishing boundaries and baseline conditions

A great deal of wilderness management is focused on protecting the resource. Agencies must often translate legislation into formal boundaries to understand exactly the land (or water) base they are protecting. They should develop signage and policies to ensure that people know it is wilderness and what uses are allowed in wilderness. Managers should begin to inventory trails, identify sites needing restoration, and understand the condition of impacted sites within the wilderness. Therefore, a great deal of science for wilderness involves mapping, inventorying

and monitoring biophysical conditions. Much of this needed science is not specific to wilderness, but involves understanding natural processes protected in wilderness through general hydrology inventories, wildlife and fish inventories, assessment of invasive species, vegetative inventories, air quality, human use impacts assessments, and inventorying and monitoring of cultural heritage sites. This information is important to understand long-term trends in naturalness, establish baseline data, effects of protection decisions, and to establish desired future conditions descriptions.

Social science

An early focus of wilderness science was the need to understand recreation use and the effects of management. Although this is still an important topic, research has contributed also to managers' need to understand general societal attitudes towards wilderness, which extend well beyond recreation values. Current wilderness social science is evolving even further to contribute knowledge on public attitudes towards adaptation practices to address climate change issues, attitudes towards restoration to correct past human influences, the role of technology in wilderness experiences, and the future relevance of wilderness to a changing society and environment (Watson, et al., 2015). Beyond the contributions to public wilderness values research, social science contributes greatly to our understanding of wilderness. The disciplines of anthropology, political ecology, geography and sociology all contribute greatly to the field of wilderness management and produce valuable knowledge pertinent to wilderness decision makers. Management decisions should be based on modern science, indigenous science, and the many disciplines of natural and social science.

Monitoring

Scientists have also contributed to managers' needs to estimate recreation use of all dispersed outdoor recreation sites, including wilderness areas. Researchers have been crucial in helping managers identify use monitoring objectives, the type of monitoring systems that could provide this information, technology and sampling considerations, and data analysis methods (Watson, et al., 2000). A science-based method of measuring use levels, distribution and trends is vital to good stewardship. Both social and natural science should be used in monitoring.

Conflict management

A rich literary history also suggests several insights for managing conflict in wilderness. Research has found that where direct or interpersonal conflict is present, zoning may be an effective management strategy. Educational programmes may also be an effective management approach to conflict that is based on direct or interpersonal sources, and education may be effective where conflict is related to indirect causes such as alternative social values. Educational programmes can be effective in two ways. First, they can help establish a basic etiquette, code of conduct, or other behavioural norms that might lessen both direct and indirect conflict. Second, they can help address indirect or social values-related conflict by increasing tolerance of recreation visitors for other types of groups and activities, perhaps by explaining the reasons behind certain behaviours that might be viewed as objectionable and by emphasizing similarities

that are shared by recreation groups and activities (Ivy, et al., 1992). Most other conflict management solutions, such as management interventions to influence directional flow of travel (e.g. everyone moves in a clockwise direction through a trail system), set activity restrictions (e.g. fines for conflicting behaviours), and timing of conflicting uses (e.g. temporal zoning), are aimed solely at direct or interpersonal conflict sources. Only elimination of one use or the other can completely eliminate conflict, and this, of course, has serious implications for the eliminated group. Science can help determine the level of conflict, suggest ways to manage conflict, provide methods to monitor changes in conflict levels and evaluate the impact of conflict on experiences.

Economic value of wilderness recreation

Scientists have estimated the per-hectare economic value of wilderness recreation and provided a framework for considering allocation of additional public land to wilderness status. Various studies have been done to further illuminate the values attributed to wilderness protection, beyond those of on-site recreation experiences. In part, this advancement originated from the work of natural-resource economists who suggested that on-site recreation visit values captured only a part of the total value of wilderness. The idea that the societal value of wilderness is multidimensional has been widely accepted. For example, research has expanded the definition of wilderness values to include option, existence and bequest values (Walsh & Loomis, 1989).

Fees

Research can also guide managers in decisions related to charging fees (particularly to understand how wilderness use fees might be different from other recreation use fees), considering tradeoffs in setting prices for wilderness access, and distinguishing between day user and overnight user attitudes towards wilderness fees. Generally, research in the United States has found wilderness visitors less supportive of wilderness fees than fees for more developed recreation. Setting fees for wilderness is complex because of social justice issues and difficult-to-describe costs of production issues. Wilderness visitors generally express more support for fees for restoring or maintaining conditions than somehow 'improving' them.

Limits of acceptable change and visitor experience

Research on wilderness recreation carrying capacity led to the concept of 'limits of acceptable change' wilderness planning process, introduced as a way to systematically address recreation carrying capacity in wilderness through a focus on how recreation use threatened social and biophysical attributes of the wilderness environment and how much departure from the ideal was acceptable (Stankey, et al., 1985). Research to define indicators and set standards has involved both qualitative and quantitative research methods. Qualitative approaches, as well as in situ place-based methods, to understanding experiences and identifying threats and contributions to wilderness experiences (Patterson, et al., 1998; Glaspell, et al., 2003; Watson, et al., 2007) have been employed in a number of studies. These studies have asked visitors to define important elements of the wilderness experience and what might threaten or facilitate them. For instance, at Juniper Prairie Wilderness in Florida, United States (Patterson, et al., 1998), management was focusing on numbers of intergroup encounters

(as a surrogate for solitude) as the primary indicator of wilderness character without a full understanding of how these encounters (or other possible indicators) influenced visitor-defined experiences (e.g. way-finding, challenge, and immersion in nature). This research greatly expanded understanding of how management policies, commercial activities, visitor behaviours and numbers of visitors affected a range of experience outcomes. This research was in contrast to many previous studies that either focused narrowly on the experiences believed to be prescribed by legislation (primarily solitude), those experiences investigated in studies at other places (primarily solitude), or upon a single aspect of the setting, such as crowding and its effect on trip satisfaction.

Climate change intervention and visitor perception

There is increasing recognition of the value of wilderness as a baseline of relatively undisturbed landscapes, and as such, wilderness will be subject to more intensive natural-science studies to understand the impacts of climate change. There are new demands on wilderness for installation of ecological measurement devices, more human activity in wilderness to support ecological monitoring in remote locations, and more pressure for wilderness managers to review proposals for achieving the scientific values of wilderness (Carver, et al., 2014). Important questions are also emerging about public attitudes towards the appropriateness of human intervention in wilderness to adapt to climate change influences. Although managers must comply with legislation guidance and policy interpretations, many managers agree that understanding public perceptions of climate change intervention in wilderness may help managers make decisions about intervention and about how to justify either intervention or non-intervention decisions. Decisions about whether to provide water improvements as a result of changes in hydrologic features or weather patterns, whether to introduce new genetic material more resistant to drought and disease in a changing climate, and whether to assist in the migration of plants or animals may be easier to make outside of wilderness. Initial research on this topic among wilderness visitors found strong opposition to these practices in wilderness (Watson, et al., 2015).

Public attitudes towards ecosystem services and restoration

In addition to creating more opportunities for a more diverse public to visit wilderness, our responsibility may be to promote awareness of and commitment to the protection of areas with wilderness characteristics for values other than use. Public wilderness values research has suggested these non-use values are increasingly the values for which society supports wilderness protection. Knowledge has changed about the functions and services provided by protected lands and water, and this knowledge may suggest the need to value the contribution of environmental well-being to human well-being more than in the past (Watson, 2013).

Managers are reporting more need to restore the effects of past human intervention in wilderness ecosystems. Scientists have worked only a small amount in the past to understand public opinion about fire management and fire restoration in wilderness ecosystems. After the large western United States' fires of 1988 and 2000, however, there has been renewed interest, but limited funding, to understand a variety of wildland fire issues relevant to wilderness management. Shortly after the 1988 fires in the Greater Yellowstone ecosystem, research helped uncover differences in public

support levels between the public in the region of the fire and a national sample (Manfredo, et al., 1990). Those who lived in the region of the fires were more supportive of restoration and more knowledgeable about the role of fire in nature. An additional topic explored in wilderness fire social science includes public attitudes towards management-ignited fire in wilderness. For example, support was found for management-ignited fires with no difference between justifying those fires for ecological restoration or for protecting adjacent land resources by reducing hazardous fuels inside wilderness (Knotek, et al., 2008).

Implementation

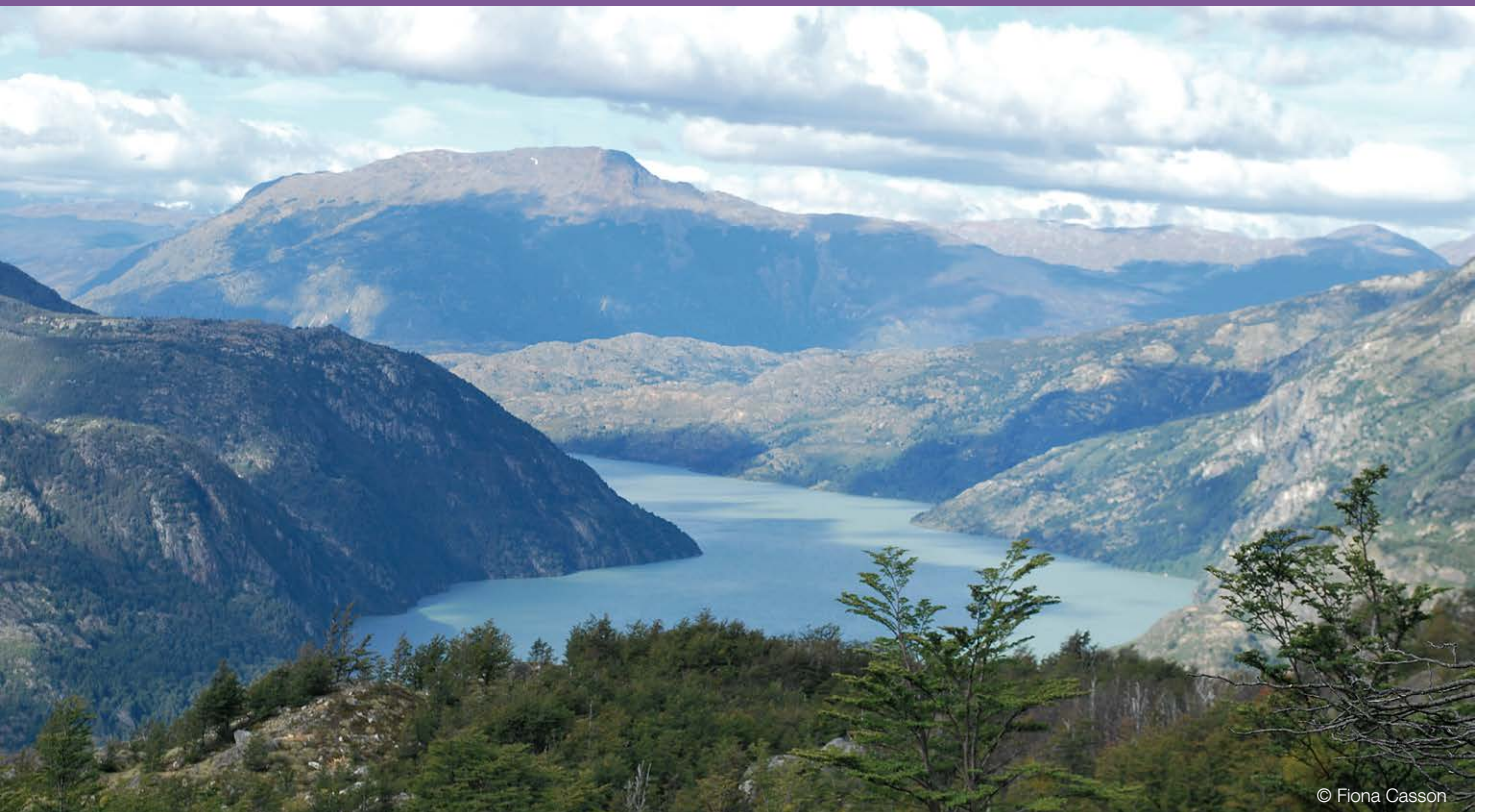
While most wilderness research has occurred to understand wilderness visitors' or potential visitors' experiences and threats to those experiences, research on wilderness values has extended across the United States population. United States wilderness management agencies wanted to know public attitudes towards wilderness protection and indications of public support for designating more federal land as wilderness. This research informs legislators, land management agencies, designation advocates and other stakeholders about public support for wilderness. One early study commissioned in the 1960s (Outdoor Recreation Resources Review Commission, 1962) in the United States highlighted two broad classes of wilderness values—recreation and indirect values. Indirect values were defined to include conservation ethics, scientific uses and the wilderness idea. The 'wilderness idea' established the roots of the concept of existence value; wilderness is valuable to society because it is there and has been designated for protection from development and exploitation.

Recommended reading

- Dove MR and Kammen DM (2015). *Science, Society and the Environment: Applying Anthropology and Physics to Sustainability*. Earthscan Routledge, London.
- Dove MR, Sajise PE and Doolittle AA (eds) (2011). *Beyond the Sacred Forest: Complicating Conservation in Southeast Asia*. Duke University Press, Durham.
- Pope K and Martin S (2011). Visitor perceptions of technology, risk and rescue in wilderness. *International Journal of Wilderness* 17(2): 19–26.
- Vaarzon-Morel P and Edwards G (2012). Incorporating Aboriginal people's perceptions of introduced animals in resource management: insights from the feral camel project: Research Report. *Ecological Management & Restoration* 13(1): 65–71.
- Watson A, Roian M, Waters T, et al. (2008). *Mapping tradeoffs in values at risk at the interface between wilderness and non-wilderness lands. Proceedings: III International Symposium on Fire Economics, Planning, and Policy: Common Problems and Approaches, 29 April – 2 May, 2008. Gen. Tech. Rep. PSW-GTR-227*. US Department of Agriculture, Forest Service, Pacific Southwest Research Station.
- Watson A, Matt R, Knotek K, et al. (2011). Traditional wisdom: protecting relationships with wilderness as a cultural landscape. *Ecology and Society* 16(1): 36.
- Watson AE and Cordell HK (2014). Take a scientist to the sauna! A great way to keep science and stewardship working together for another 50 years. *International Journal of Wilderness* 20(2): 3–13.
- West P (2006). *Conservation is our government now: the politics of ecology in Papua New Guinea*. New Ecologies for the Twenty-first Century. Duke University Press, Durham.

Evaluating Effectiveness of IUCN Protected Area Management Category 1b Sites

5



5.1 Evaluating effectiveness of IUCN protected area management Category 1b sites

Guiding principles

Wilderness decision makers should evaluate the ability of a wilderness protected area to conserve the site's wilderness attributes and values. It is crucial to know if a site can meet its ecological and social objectives. Wilderness decision makers should use best-practices tools and robust monitoring frameworks to evaluate whether the full range of wilderness attributes are being protected (Ferraro & Pressey, 2015). To understand and protect wilderness areas, managers need to be able to measure what they are trying to conserve (Stem, et al., 2005; Watson, et al., 2014). Evaluating the ecological and social effectiveness of wilderness areas allows wilderness decision makers to better facilitate appropriate, targeted management action at both local and national levels to improve efficiency and effectiveness of conservation action (including future site designation). Evaluation of wilderness areas' effectiveness provides opportunities to learn from and respond to conservation successes, failures or inadequacies (Gaston, et al., 2006).

Key considerations

Frameworks

The IUCN Protected Area Management Effectiveness (PAME) framework is commonly used by wilderness decision makers (Coad, et al., 2015; Hockings, et al., 2015). Hockings, et al. (2015), provides detailed discussion on the implementation of PAME. The most widely applied PAME methodologies include the Management Effectiveness Tracking Tool (Stolton, et al., 2007) and Rapid Assessment and Prioritisation of Protected Area Management (Ervin, 2003b; Hockings, et al., 2015). Many protected area agencies have adapted common methodologies or developed specific applications of PAME to fit their needs, including South Africa (Timko & Satterfield, 2003), Iran (Kolahi, et al., 2013), Tasmania, Australia (Tasmania Parks and Wildlife Service, 2013), Siberia (Anthony & Shecstockova, 2015), Brazil (Carannza, et al., 2014), and New South Wales, Australia (Hockings, et al., 2009).

Sufficient data collection

Data collection through monitoring can require significant investment of staff resources and funds, and collection of these data requires a long-term commitment to the assessment programme (Stoll-Kleeman, 2010; Hockings, 2015). Without this long-term commitment, the shortness of time series for measuring occupancy and abundance will limit the ability to detect both directional changes and more complex social and ecological dynamics (Gaston, et al., 2008; Soulé, et al., 2003). Where possible, such data should be collected over multiple years, informed by multiple academic disciplines and indigenous science, and comprised of both qualitative and quantitative data (Cummings, et al., 2015).

Assessment timelines

Site-level assessments are typically based on quantitative, fine-scale monitoring data (Ervin, 2003a), which are collected

over a period of time (e.g. 5-10 years). The quickest and cheapest assessments use established assessment methodologies, relying largely on literature research and the informed opinions of site managers (Hocking, et al., 2015). Assessments of social effectiveness are typically multi-year endeavours that are undertaken by the individuals and institutions that have the mandate and responsibility to perform such an evaluation.

Evaluating for ecological effectiveness

Protecting the integrity of ecological systems and the species occurring therein is a primary goal in all wilderness areas. Wilderness decision makers can look to evaluations of the effectiveness of protected areas in protecting ecosystems and species, for example in South Africa (Timko & Satterfield, 2008), the United Kingdom (Gaston, et al., 2006), and Brazil (Pfaff, et al., 2015). Wilderness decision makers can also look to evaluation frameworks used by Canada and the United States.

Tools for ecological evaluation

In an examination of Canadian wilderness protected areas, Woodley (2010) summarizes the history of and methods used for monitoring ecological integrity, which are formally described in a report by Environment Canada (2012). Trend information is compiled for reporting across the system of Canadian Parks to be used for decision-making at the level of the park and for assessing the effectiveness of national policies for managing parks and wilderness.



Evaluation of ecological effectiveness of wilderness areas is achieved by working with evaluation tools to monitor site conditions.
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In the United States, various frameworks have been used to evaluate ecological integrity in designated wilderness and other protected areas. These frameworks can be adapted to be used in other countries' wilderness protected areas to evaluate protection of ecosystems and biodiversity. The National Park Service developed the vital signs monitoring programme to assess trends in natural resources, and this programme is applied to designated wilderness managed by the Park Service (<http://science.nature.nps.gov/im/monitor/>). The organization NatureServe has developed methods and resources to assess ecological integrity across a variety of ecosystems and these could be readily applied to wilderness (<http://www.natureserve.org/conservation-tools/ecological-integrity-assessment>). Unnasch, et al. (2008), developed a conceptual framework for monitoring the trend in ecological integrity for the National Park Service, which could be applied to designated wilderness.

Theobald (2013) mapped threats to ecological integrity in the United States, and these methods could be readily applied at a finer spatial scale to wilderness. Last, Parrish, et al. (2003), provided a framework for monitoring ecological integrity on privately protected areas that could be adopted for wilderness.

Baseline measurements

Ecological effectiveness assessments can employ different baselines, depending on the combination of measure, biological organization and spatial scale. Data should be collected to inform wilderness decision makers on trends in the biodiversity, ecosystem functions, landscape and geology, and climate change resilience of the wilderness protected area (Dietz, et al., 2015; Hockings, et al., 2015). Inventory assessments can focus on occurrence, coverage, and abundance of particular biological organizations at different spatial scales (Gaston, et al., 2008). Condition assessments can focus on how the state of features have changed within one or more sites through time, how the state of features within sites compares with that outside them, or how the state of features has changed within sites compared with how it has changed outside them (Gaston, et al., 2008).

Evaluating for social effectiveness

All wilderness protected areas should be evaluated for their social effectiveness (Ervin, 2003b; West, et al., 2006; Hockings, et al., 2015). Ideally, wilderness decision makers should be composed of and employ a multidisciplinary team (Singleton & Straits, 2010; Brosius, et al., 2005; West & Brockington, 2006). Evaluations should consider the site's protection of Indigenous Peoples' rights, recreation uses, science and educational uses, community engagement, and human health and well-being (Hockings, et al., 2015, p. 908). Evaluations should consider a range of social users and assess the site's ability to uphold wilderness values in light of these social users.

Tools for social evaluation

Cultural anthropologists and political ecologists are best trained to conduct social evaluations of wilderness protected areas (West, 2006; Izurieta, et al., 2013). Wilderness decision makers, including Indigenous Peoples, should either be trained in these disciplines themselves or work closely with such professionals. Research tools used in social evaluations of wilderness protected areas should include ethnographic research, social network analysis, triangulation evaluation, and participatory action research (Mack, et al., 2005; Timko & Satterfield, 2008; Singleton & Straits, 2010).

Indigenous Peoples as true partners

Where applicable, members of any relevant Indigenous Peoples communities and/or Tribes should have leading roles in social effectiveness evaluations (Stevens, 2014). Social scientists such as cultural anthropologists—not just natural scientists—should be full members of any decision-making team of a wilderness protected area. In wilderness protected areas that include Indigenous Peoples as partners, any decision-making team created without proper Indigenous Peoples representation and inclusion of social scientists will be unable to produce worthwhile evaluations. Where applicable, adherence to the United Nations Declaration on the Rights of Indigenous Peoples is required of all wilderness protected areas. Part of recognizing the rights of Indigenous



Social effectiveness is essential for a wilderness protected area to achieve management and governance objectives. Social evaluations require long timelines and working with a multitude of conservation partners. © Aldo Leopold Wilderness Research Institute

Peoples is the acknowledgement of the value of indigenous science in all areas of management (Stevens, 2014). Such acknowledgement requires recognizing indigenous methods and including indigenous science in all management activities from planning to implementation, enforcement, modern science studies and the use of technology (Peterson, et al., 2010). The management and governance of a wilderness protected area should be analyzed to ensure such recognition and implementation is in place.

Free, prior and informed consent is a key indicator to the social effectiveness of a site and should be used wherever relevant (see Section 1.6). Management procedures and practices should be analyzed to ensure that free, prior and informed consent is always sought and given.

Recommended reading

- Aycrigg, J.L., Tricker, J., Belote, R., Dietz, M.S., Duarte, L., and Aplet, G.H. (2015). 'The Next 50 Years: Opportunities for Diversifying the Ecological Representation of the National Wilderness Preservation System within the Contiguous United States'. *Journal of Forestry*.
- Brosius, J.P., Tsing, A.L., and Zerner, C. (eds.) (2005). *Communities and Conservation: Histories and Politics of Community-Based Natural Resource Management*. Globalization and the environment. AltaMira Press, Walnut Creek, CA.
- Gaston, K.J., Jackson, S.F., Cantú-Salazar, L., and Cruz-Piñón, G. (2008). 'The Ecological Performance of Protected Areas'. *Annual Review of Ecology, Evolution, and Systematics* 39: 93–113.
- Geldmann, J., Coad, L., Barnes, M., Craigie, I.D., Hockings, M., Knights, K., Leverington, F., Cuadros, I.C., Zamora, C., Woodley, S., and Burgess, N.D. (2015). 'Changes in Protected Area Management Effectiveness over Time: A Global Analysis'. *Biological Conservation* 191: 692–699.
- Greve, M., Chown, S.L., van Rensburg, B.J., Dallimer, M., and Gaston, K.J. (2010). 'The Ecological Effectiveness of Protected Areas: A Case Study for South African Birds'. *Animal Conservation* 14: 295–305.
- Hockings, M., Leverington, F., and Cook, C. (2015). 'Protected Area Management Effectiveness'. In *Protected Area Governance and Management*. pp. 889–928. ANU Press, Canberra, Australia.

- Leverington, F., Lemos Costa, K., Pavese, H., Lisle, A., and Hockings, M. (2010a). 'A Global Analysis of Protected Area Management Effectiveness'. *Environmental Management*. 46: 685-698.
- Leverington, F., Costa, K.L., Courrau, J., Pavese, H., and Nolte, C. (2010b). *Management Effectiveness Evaluation in Protected Areas: A Global Study*. Second. University of Queensland, IUCN- WCPA, TNC, WWF, St Lucia, Australia.
- West, P., Igoe, J., and Brockington, D. (2006). 'Parks and People: The Social Impact of Protected Areas'. *Annual Review of Anthropology* 35: 251–277.



Wilderness areas, such as those in Tasmania, are evaluated for their effectiveness through the IUCN PAME framework. © Nik Lopoulehine

References and further reading

- 10th World Wilderness Congress (2013). *WILD10 Statement from Salamanca, Spain*.
- Abrams, P., Borrini-Feyerabend, G., Gardner, J., and Heylings, P. (2003). Evaluating Governance--A Handbook to Accompany a Participatory Process for a Protected Area. *Report for Parks Canada and CEESP/CMWG/TILCEPA*.
- Adger, W.N. (2000). 'Social and Ecological Resilience: Are They Related?' *Progress in Human Geography* 24(3): 347–364. <http://dx.doi.org/10.1191/030913200701540465>
- Adger, W.N., Barnett, J., Brown, K., Marshall, N., and O'Brien, K. (2012). 'Cultural Dimensions of Climate Change Impacts and Adaptation'. *Nature Climate Change* 3: 112–117. <http://dx.doi.org/10.1038/nclimate1666>
- Ahokumpu, A. (2013). *A Successful Tool to Conserve the North Together with People*. Available online from <http://wild10.org/wp-content/uploads/2013/12/AhokumpuArto_WILD10_5Oct_Session3-2-pdf.pdf>.
- Alaska National Interest Lands Conservation Act (ANILCA) (1980). *Public Law 96-487*. Title 16, US Code, Chapter 51.
- Alessa, L. and Watson, A. (2002). 'Growing Pressures on Circumpolar North Wilderness'. In *Wilderness in the Circumpolar North: Searching for Compatibility in Traditional, Ecotourism, and Ecological Values*. Proceedings RMRS-P-26. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Anchorage, AK.
- Allendorf, T.D., Brandt, J.S., and Yang, J.M. (2014). 'Local Perceptions of Tibetan Village Sacred Forests in Northwest Yunnan'. *Biological Conservation* 169: 303–310. <http://dx.doi.org/10.1016/j.biocon.2013.12.001>
- Anderies, J.M., Janssen, M.A., and Ostrom, E. (2004). 'A Framework to Analyze the Robustness of Social-ecological Systems from an Institutional Perspective'. *Ecology and Society* 9 (1): 18.
- Anthony, B.P. and Shestackova, E. (2015). 'Do Global Indicators of Protected Area Management Effectiveness Make Sense? A Case Study from Siberia'. *Environmental Management* 56: 176–192. <http://dx.doi.org/10.1007/s00267-015-0495-z>
- Araújo, M.B., Alagador, D., Cabeza, M., Nogués-Bravo, D., and Thuiller, W. (2011). 'Climate Change Threatens European Conservation Areas'. *Ecology Letters* 14(5): 484–492. <http://dx.doi.org/10.1111/j.1461-0248.2011.01610.x>
- Armatas, C., Venn, T.J., McBride, B.B., Watson, A.E., and Carver, S.J. (2016). 'Opportunities to Utilize Traditional Phenological Knowledge to Support Adaptive Management of Social-Ecological Systems Vulnerable to Changes in Climate and Fire Regimes'. *Ecology and Society* 21(1): 16. <http://dx.doi.org/10.5751/ES-07905-210116>
- Arthur Carhart National Wilderness Training Center, Aldo Leopold Wilderness Research Institute, and Wilderness Institute at University of Montana (2016). *Wilderness Management Planning Toolbox*. <<http://www.wilderness.net/planning>>.
- Ashley, P. (2012). 'Confirming the Spiritual Values of Wilderness'. *International Journal of Wilderness* 18(1): 4–7.
- Ashley, P., Kaye, R., and Tin, T. (2015). 'Direct and Mediated Experiences of Wilderness Spirituality: Implications for Wilderness Managers and Advocates'. In *Science and Stewardship to Protect and Sustain Wilderness Values: Tenth World Wilderness Congress Symposium 2013, 4-10 October, Salamanca, Spain*, pp. 109-115. Proceedings RMRS-P-74. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Australian Conservation Foundation (1999). *Policy Statement No. 64. Wilderness and Indigenous Cultural Landscapes in Australia*.
- Aycrigg, J.L., Davidson, A., Svancara, L.K., Gergely, K.J., McKerrow, A., and Scott, J.M. (2013). 'Representation of Ecological Systems within the Protected Areas Network of the Continental United States'. *PLoS ONE* 8: e54689. <http://dx.doi.org/10.1371/journal.pone.0054689>
- Aycrigg, J.L., Tricker, J., Belote, R., Dietz, M.S., Duarte, L., and Aplet, G.H. (2015). 'The next 50 Years: Opportunities for Diversifying the Ecological Representation of the National Wilderness Preservation System within the Contiguous United States'. *Journal of Forestry*.
- Babidge, S., Greer, S., Henry, R., and Pam, C. (2007). 'Management Speak: Indigenous Knowledge and Bureaucratic Engagement'. *Social Analysis* 51(3): 148–164. <http://dx.doi.org/10.3167/sa.2007.510307>
- Bacon, J., Roche, J., Elliot, C., and Nicholas, N. (2006). 'VERP: Putting Principles into Practice in Yosemite National Park'. *George Wright Forum* 23(2): 73–83.
- Barr, B.W. (2007). 'Ocean Wilderness: Interesting Idea or Ecological Imperative?' in *The Wild Planet Project, a Special Publication of the WILD Foundation in Cooperation with the International Journal of Wilderness*. Fulcrum Publishing, Golden, Colorado.
- Barr, B.W. (2012). *Ocean Wilderness in Theory and Practice*. University of Alaska, Fairbanks, AK.
- Bauman, T., Haynes, C., Lauder, G., and Australian Institute of Aboriginal and Torres Strait Islander Studies (2013). *Pathways to the Co-Management of Protected Areas and Native Title in Australia*. Native Title Research Unit, AIATSIS, Canberra.
- Benally, J. and Hamilton, L. (2010). 'Sacred versus Secular in the San Francisco Peaks, Arizona, USA'. In *The Sacred Dimensions of Protected Areas*. IUCN, Gland, Switzerland.
- Berkes, F. (2012) *Sacred Ecology*. 3rd edition, Routledge, New York, N.Y.
- Bernbaum, E. (1997). *Sacred Mountains of the World*. University of California Press, Berkeley.
- Billmire, M.G., Daimler, J.L., Wong, W.R., and Yi, J.Y. (2008). *Future Management Strategies for El Yunque National Forest*. University of Michigan, Ann Arbor.
- Bingham, R.D. and Felbinger, C.L. (2000). *Evaluation in Practice: A Methodological Approach*. Chatham House Publishers, New York.

- Blackwell, J.L. (2015). *Influences of Hand-Held Information and Communication Technology on Risk Behavior and the Experience of Wilderness Visitors*. Master's Thesis. Humboldt State University.
- Blaikie, P. (1985.) *The Political Economy of Soil Erosion in Developing Countries*. John Wiley and Sons, Inc., New York.
- Bohensky, E.L. and Maru, Y. (2011). 'Indigenous Knowledge, Science, and Resilience: What Have We Learned from a Decade of International Literature on "integration"'. *Ecology and Society* 16(4): 6. <http://dx.doi.org/10.5751/ES-04342-160406>
- Borealbirds (2007). *Boreal Scientists' Letter Ottawa, Canada: Canadian Boreal Initiative*. Available online from <borealbirds.org/scienceletter.shtml>.
- Borrie, W.T., McCool, S.F., and Stankey, G.H. (1998). 'Protected Area Planning Principles and Strategies'. In *Ecotourism: A Guide for Planners and Managers*. vol. 2., pp. 133-154. The Ecotourism Society, North Bennington, VT.
- Borrini-Feyerabend, G., Dudley, N., Jaeger, T., Lassen, B., Broome, N.P., Phillips, A., and Sandwith, T. (2013). *Governance of Protected Areas: From Understanding to Action*. IUCN, Gland, Switzerland.
- Borrini-Feyerabend, G. and Hill, R. (2015). 'Governance for the Conservation of Nature'. In Worboys, G., Lockwood, M., Kothari, A., Feary, S., and Pulsford, I. (eds.) *Protected Area Governance and Management* pp.169–206. ANU Press, Canberra.
- Borrini-Feyerabend, G., Kothari, A., Oviedo, G., and Bassi, M. (2004). *Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation*. vol. 11., IUCN, Gland, Switzerland.
- Boxall, P., Englin, J., and Adamowicz, W. (2002). 'The Contribution of Aboriginal Rock Paintings to Wilderness Recreation Values in North America'. In *Valuing Cultural Heritage: Applying Environmental Valuation Techniques to Historic Buildings, Monuments, and Artifacts*, pp. 105–117. Edward Elgar Publishing, Cheltenham, UK. <http://dx.doi.org/10.4337/9781843765455.00017>
- Brewer, G.D. (1973). *Politicians, Bureaucrats and the Consultant: A Critique of Urban Problem Solving*. Basic Books, New York, NY.
- Brockman, N.C. (1997). *Encyclopedia of Sacred Places*. ABC-CLIO, Santa Barbara, CA.
- Brosius, J.P., Tsing, A.L., and Zerner, C. (eds.) (2005). *Communities and Conservation: Histories and Politics of Community-Based Natural Resource Management*. *Globalization and the Environment*. AltaMira Press, Walnut Creek, CA.
- Brown, G., Koth, B., Kreag, G., and Weber, D. (2006). *Managing Australia's Protected Areas: A Review of Visitor Management Models, Frameworks and Processes (Technical Report)*. Cooperative Research Centre for Sustainable Tourism, Griffith University, Gold Coast, Queensland.
- Brown, P.J., Driver, B.L., and McConnell, C. (1978). 'The Opportunity Spectrum Concept and Behavioral Information in Outdoor Recreation Resource Supply Inventories: Background and Application'. In *Integrated Inventories of Renewable Natural Resources: Proceedings of the Workshop*. Gen. Tech. Rep. RM-55, pp. 73-84. US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
- Cajune, J., Martin, V., and Tanner, T. (eds.) (2008). *Protecting Wild Nature on Native Lands: Case Studies by Native Peoples from around the World*. vol. 1. Fulcrum Publishing, Golden, Colorado.
- Carlsson, L. and Berkes, F. (2005). "http://dx.doi.org/10.1016/j.jenvman.2004.11.008 'Co-Management: Concepts and Methodological Implications'. *Journal of Environmental Management* 75(1): 65–76. <http://dx.doi.org/10.1016/j.jenvman.2004.11.008>
- Carranzo, T., Manica, A., Kapos, V., and Balmford, A. (2014). 'Mismatches between Conservation Outcomes and Management Evaluation in Protected Areas: A Case Study in the Brazilian Cerrado'. *Biological Conservation* 173, 10–16. <http://dx.doi.org/10.1016/j.biocon.2014.03.004> <http://dx.doi.org/10.1016/j.biocon.2014.03.004>
- Cartron, J.-L.E., Ceballos, G., and Felger, R.S. (eds.) (2005). *Biodiversity, Ecosystems, and Conservation in Northern Mexico*. Oxford University Press, London.
- Carver, S. and Fritz, S. (2016). *Mapping Wilderness: Concepts, Techniques and Applications*. Springer, Netherlands. <http://dx.doi.org/10.1007/978-94-017-7399-7>
- Carver, S., McCool, S., Krenova, Z., Fisher, M., and Woodley, S. (2014). 'Fifty Years of Wilderness Science: An International Perspective'. *International Journal of Wilderness* 20: 36–42.
- Carver, S., Tricker, J., and Landers, P. (2013). 'Keeping It Wild: Mapping Wilderness Character in the United States'. *Environmental Management* 131: 239–255. <http://dx.doi.org/10.1016/j.jenvman.2013.08.046>
- Casson, S.A. (2015). 'Socially-Just and Scientifically Sound: Re-Examining Co-Management of Protected Areas'. *IK: Other Ways of Knowing* 1(2): 32–64
- Chavez, D.J., Winter, P.L., and Absher, J.D. (2008). *Recreation Visitor Research: Studies of Diversity*. General Technical Report PSW-GTR-210. US Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA.
- Clark, P.A. (2003). *Where the Ancestors Walked: Australia as an Aboriginal Landscape*. Allen and Unwin, Crows Nest NSW, Australia.
- Clark, R.N. and Stankey, G.H. (1979). *The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research*. Gen. Tech. Report PNW-98. US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.
- Clifton, J. (2003). 'Prospects for Co-Management in Indonesia's Marine Protected Areas'. *Marine Policy* 27: 389–395. [http://dx.doi.org/10.1016/S0308-597X\(03\)00026-5](http://dx.doi.org/10.1016/S0308-597X(03)00026-5)
- Coad, L., Leverington, F., Knights, K., Geldmann, J., Eassom, A., Kapos, V., Kingston, N., de Lima, M., Zamora, C., Cuadros, I., Nolte, C., Burgess, N.D., and Hockings, M. (2015). 'Measuring Impact of Protected Area Management Interventions: Current and Future Use of the Global Database of Protected Area Management Effectiveness'. *Philosophical Transactions of the Royal Society of Biological Sciences*. <http://dx.doi.org/10.1098/rstb.2014.0281>
- Cohen, M.P. (1984). *The Pathless Way: John Muir and the American Wilderness*. University of Wisconsin Press, Madison.
- CONANP (2008). *Certificado Por El Que Se Reconoce Como Área Natural Protegida, Co La Categoría de Área Destinada Voluntariamente a La Conservacion*. Tierra Silvestre Cañón del Diablo.

- Congressional Record (2005). *Caribbean National Forest Act of 2005*. United States Government Publishing Office. available from <<https://www.gpo.gov/fdsys/pkg/CREC-2005-09-13/html/CREC-2005-09-13-pt1-PgH7828.htm>>.
- Cole, D. (1994). *The Wilderness Threats Matrix: A Framework for Assessing Impacts*. Research Paper INT-RP-475. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.
- Cole, D. (2009). 'Ecological Impacts of Wilderness Recreation and Their Management'. In *Wilderness Management: Stewardship and Protection of Resources and Values*. 4th edition. pp. 395–436. Fulcrum Publishing, Golden, Colorado.
- Cole, D.N. (2010). *Beyond Naturalness: Rethinking Park and Wilderness Stewardship in an Era of Rapid Change*. Island Press, Washington, DC.
- Cole, D.N. and Hall, T.E. (2006). 'Wilderness Zoning: Should We Purposely Manage to Different Standards'. In *People, Places, and Parks: Proceedings of the 2005 George Wright Society Conference on Parks, Protected Areas, and Cultural Sites*. pp.33–38.
- Cole, D.N. and Landres, P. (1996). 'Threats to Wilderness Ecosystems: Impacts and Research Needs'. *Ecological Applications* 6(1): 168–184 <http://dx.doi.org/10.2307/2269562>
- Cole, D.N. and McCool, S.F. (1998). 'Limits of Acceptable Change and Natural Resources Planning: When Is LAC Useful, When Is It Not?' In *Proceedings—limits of Acceptable Change and Related Planning Processes: Progress and Future Directions*. Gen. Tech. Rep. INT-GTR-371. pp. 69-71. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Cole, D.N. and Stankey, G. (1997). 'Historical Development of Limits of Acceptable Change: Conceptual Clarifications and Possible Extensions'. In *Proceedings - Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions: From a Workshop Held at the University of Montana's Lubrecht Experimental Forest*. Gen. Tech. Rep. INT-GTR-371. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Cole, D.N., Watson, A.E., Hall, T.E., and Spillie, D.R. (1997). *High Use Destinations in Wilderness: Social and Biophysical Impacts, Visitor Responses, and Management Options*. Research Paper INT-RP-496. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.
- Cole, D.N. and Wright, V. (2003). *Wilderness Visitors and Recreation Impacts: Baseline Data Available for Twentieth Century Conditions*. General Technical Report RMRS-GTR-117. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Colorado Natural Areas Program (2000). *Creating an Integrated Weed Management Plan: A Handbook for Owners and Managers of Lands with Natural Values*. Colorado Natural Areas Program, Colorado State Parks, Colorado Department of Natural Resources; and Division of Plant Industry, Colorado Department of Agriculture, Denver, CO.
- Confederated Salish and Kootenai Tribes (2005). *Mission Mountains Tribal Wilderness: A Case Study*. Native Lands and Wilderness Council.
- Conover, M.R. (2002). *Resolving Human-Wildlife Conflicts: The Science of Wildlife Damage Management*. Lewis Publishers, New York.
- Cordell, H.K. (2012). *Outdoor Recreation Trends and Futures: A Technical Document Supporting the Forest Service 2010 RPA Assessment*. General Technical Report SRS-150. US Department of Agriculture, Forest Service, Southern Research Station, Asheville, NC.
- Cordell, H.K., Betz, C.J., and Green, G.T. (2008). 'Nature-Based Outdoor Recreation Trends and Wilderness'. *International Journal of Wilderness* 14: 7–13.
- Cordell, H.K., Tarrant, M.A., and Green, G.T. (2003). 'Is the Public Viewpoint of Wilderness Shifting?' *International Journal of Wilderness* 9: 27–32.
- Cruikshank, J. (2005). *Do Glaciers Listen? Local Knowledge, Colonial Encounters and Social Imagination*. University of Washington Press, Seattle, WA.
- Cumming, G.S., Allen, C.R., Ban, N.C., Biggs, D., Biggs, H.C., Cumming, D.H.M., De Vos, D., Epstein, G., Etienne, M., Maciejewski, K., Mathevet, R., Moore, C., Nenadovic, M., and Shoon, M. (2015). 'Understanding Protected Area Resilience: A Multi-Scale, Social-Ecological Approach'. *Ecological Applications* 25: 299–319. <http://dx.doi.org/10.1890/13-2113.1>
- Davis, M., Naumann, S., McFarland, K., Graf, A., and Evans, D. (2014). *Literature Review, the Ecological Effectiveness of the Natural 2000 Network*. ETC/BD Report to the EEA.
- Dawson, C., Cordell, K., Watson, A.E., Ghimire, R., and Green, G.T. (2015). 'The US Wilderness Managers Survey: Charting a Path for the Future'. *Journal of Forestry* 114.
- Dawson, C.P. and Hendee, J.C. (2009). *Wilderness Management: Stewardship and Protection of Resources and Values*. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Day, J., Dudley, N., Hockings, M., Holmes, G., Stolton, S., and Wells, S. (2012). *Guidelines for Applying the IUCN Protected Area Management Categories to Marine Protected Areas*. Best practice protected area guidelines series 19. IUCN, Gland, Switzerland.
- Deville, A. and Harding, R. (1997). *Applying the Precautionary Principle*. The Federation Press, Sydney, Australia.
- Deinet, S., Ieronymidou, C., McRae, L., Burfield, I.J., Foppen, R.P., Collen, B., and Böhm, M. (2013). *Wildlife Comeback in Europe: The Recovery of Selected Mammal and Bird Species*. Zoological Society of London.
- Dietz, M.S., Belote, R.T., Aplet, G.H., and Aycrigg, J.L. (2015). 'The World's Largest Wilderness Protection Network after 50 Years: An Assessment of Ecological System Representation in the U.S. National Wilderness Preservation System'. *Biological Conservation* 184: 431–438. <http://dx.doi.org/10.1016/j.biocon.2015.02.024>
- Dove, M.R. (2005). 'Knowledge and Power in Pakistani Forestry: The Politics of Everyday Knowledge'. In *Political Ecology Across Spaces, Scales, and Social Groups*. ed. by Paulson, S. and Gezon, L. Rutgers University Press, New Brunswick NJ.
- Dove, M.R. (2006). <http://dx.doi.org/10.1146/annurev.anthro.35.081705.123235> 'Indigenous People and Environmental Politics'. *Annual Review of Anthropology* 35(1): 191–208. <http://dx.doi.org/10.1146/annurev.anthro.35.081705.123235>

- Dove, M.R. and Kammen, D.M. (2015). *Science, Society and the Environment: Applying Anthropology and Physics to Sustainability*. Earthscan Routledge, London.
- Dove, M.R., Sajise, P.E., and Doolittle, A.A. (eds.) (2011). *Beyond the Sacred Forest: Complicating Conservation in Southeast Asia*. Duke University Press, Durham. <http://dx.doi.org/10.1215/9780822393078>
- Dudley, N. and Stolton, S. (eds.) (2008). *Defining Protected Areas: An International Conference in Almeria, Spain*. IUCN, Gland, Switzerland.
- Dudley, N. (ed.) (2013). *Guidelines for Applying Protected Area Management Categories*. IUCN, Gland, Switzerland.
- Dudley, N., Schlaepfer, N., Jackson, W., Jeanrenaud, J., and Stolton, S. (2006). *Forest Quality: Assessing Forests at a Landscape Scale*. Earthscan, London.
- Dudley, N., Bhagwat, S., Higgins-Zogib, L., Lassen, B., Verschuuren, B., and Wild, R. (2010). 'Conservation of Biodiversity in Sacred Natural Sites in Asia and Africa: A Review of the Scientific Literature'. In *Sacred Natural Sites: Conserving Nature and Culture*, pp. 19-32. Earthscan, London and Washington DC.
- Dudley, N., Higgins-Zogib, L., Mansourian, S., World Wildlife Fund, Equilibrium, and Alliance of Religions and Conservation (2005). *Beyond Belief: Linking Faiths and Protected Areas to Support Biodiversity Conservation: A Research Report*. WWF, United Kingdom.
- Dudley, N., Kormos, C., Locke, H., and Martin, V. (2012). 'Defining Wilderness in the IUCN'. *International Journal of Wilderness* 18(1): 9–14.
- Duhaylungsod, L. (2011). 'Interpreting "Indigenous Peoples and Sustainable Resource Use": The Case of the T'Boli in the Southern Philippines'. In *Beyond the Sacred Forest: Complicating Conservation in Southeast Asia*, pp. 216-238. New ecologies for the twenty-first century. Duke University Press, Durham. <http://dx.doi.org/10.1215/9780822393078-008>
- Dunbar-Ortiz, R. (2014). *An Indigenous Peoples' History of the United States*. Beacon Press, Boston.
- Dvorak, R.G., Watson, A.E., Christensen, N., Borrie, W.T., and Schwaller, A. (2012) *The Boundary Waters Canoe Area Wilderness: Examining Changes in Use, Users, and Management Challenges*. Res. Pap. RMRS-RP-91. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Edgar, G.J., Stuart-Smith, R.D., Willis, T.J., Kininmonth, S., Baker, S.C., Banks, S., Barrett, N.S., Becerro, M.A., Bernard, A.T.F., Berkhout, J., Buxton, C.D., Campbell, S.J., Cooper, A.T., Davey, M., Edgar, S.C., Försterra, G., Galván, D.E., Irigoyen, A.J., Kushner, D.J., Moura, R., Parnell, P.E., Shears, N.T., Soler, G., Strain, E.M.A., and Thomson, R.J. (2014). 'Global Conservation Outcomes Depend on Marine Protected Areas with Five Key Features'. *Nature* 506(7487): 216–220. <http://dx.doi.org/10.1038/nature13022>
- Eidsvik, H.K. (1989). 'The Status of Wilderness: An International Overview'. *Natural Resources Journal* 29: 57–82.
- Eidsvik, H.K. (1990). 'Wilderness Classification and the World Conservation Union'. *Paper presented to Society of American Foresters National Convention*, San Francisco, CA.
- Ezemvelo KZN Wildlife (2011). *Wilderness Management Plan: uKhahlamba Drakensberg Park World Heritage Site*. Ezemvelo KZN Wildlife, Pietermaritzburg, South Africa.
- Ezemvelo KZN Wildlife (2012). *uKhahlamba Drakensberg Park World Heritage Site: Integrated Management Plan*. Ezemvelo KZN Wildlife, Pietermaritzburg, South Africa.
- Ezemvelo KZN Wildlife (2013). *Wilderness Management Plan 2013-2018: uKhahlamba Drakensberg Park World Heritage Site*. Ezemvelo KZN Wildlife, Pietermaritzburg, South Africa.
- Ens, E.J., Finlayson, M., Preuss, K., Jackson, S., and Holcombe, S. (2012). 'Australian Approaches for Managing "country" Using Indigenous and Non-Indigenous Knowledge'. *Ecological Management & Restoration* 13(1): 100–107. <http://dx.doi.org/10.1111/j.1442-8903.2011.00634.x>
- Environment Canada (2012). *Data Sources and Methods for the Park Ecological Integrity Indicator*.
- Erämaalaki: Act on Wilderness Reserves (1991). No. 62.
- Ervin, J. (2002). *WWF Rapid Assessment and Prioritization of Protected Area Management (RAPAM) Methodology*. World Wildlife Fund, Gland, Switzerland.
- Ervin, J. (2003a). 'Protected Area Assessments in Perspective'. *BioScience* 53(9): 819–822. [http://dx.doi.org/10.1641/0006-3568\(2003\)053\[0819:PAAIP\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2003)053[0819:PAAIP]2.0.CO;2)
- Ervin, J. (2003b). 'Rapid Assessment of Protected Area Management Effectiveness in Four Countries'. *BioScience* 53(9): 833–842. [http://dx.doi.org/10.1641/0006-3568\(2003\)053\[0833:RAOPAM\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2003)053[0833:RAOPAM]2.0.CO;2)
- European Commission, Directorate-General for the Environment, Alterra, Eurosite, and PAN Parks Foundation (2013). *Guidelines on Wilderness in Natura 2000 Management of Terrestrial Wilderness and Wild Areas within the Natura 2000 Network*. Publications Office, Luxembourg.
- European Wilderness Society (2015). *European Wilderness Quality Standard and Audit System* [online] Verison 1.8. available from <http://wilderness-society.org/european-wilderness-quality-standard/>.
- Faridah-Hanum, I., Latiff, A., Hakeem, K.R., and Ozturk, M. (eds.) (2014). *Mangrove Ecosystems of Asia: Status, Challenges and Management Strategies*. Springer Science+Business Media, New York. <http://dx.doi.org/10.1007/978-1-4614-8582-7>
- Farrington, J.D. (2005). 'The Impact of Mining Activities on Mongolia's Protected Areas: A Status Report with Policy Recommendations'. *Integrated Environmental Assessment and Management* 1(3): 283–289. <http://dx.doi.org/10.1897/2004-008R.1>
- Ferraro, P.J. and Pressey, R.L. (2015). 'Measuring the Difference Made by Conservation Initiatives: Protected Areas and Their Environmental and Social Impacts'. *Philosophical Transactions of the Royal Society of Biological Sciences* 370(1681). <http://dx.doi.org/10.1098/rstb.2014.0270>
- Folke, C. (2004). 'Traditional Knowledge in Social-Ecological Systems'. *Ecology and Society* 9(3):7.
- Fox, S., Phillippe, C., Hoover, V., and Lambert, L. (2015). *Celebrating the 50th Anniversary of the Wilderness Act*. October 15-19. Albuquerque, NM. Proceedings of the National Wilderness Conference.

- Franklin, J.F. and Aplet, G.H. (2009). 'Wilderness Resources, Values and Threats to Them'. In *Wilderness Management: Stewardship and Protection of Resources and Values*. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Fraser, C. (2010). 'In Scotland's Search for Roots, A Push to Restore Wild Lands'. *Yale E360* [online] available from <http://e360.yale.edu/feature/in_scotlands_search_for_roots_a_push_to_restore_wild_lands/2319/>.
- Frissell, S.S. and Stankey, G.H. (1972). 'Wilderness Environmental Quality: Search for Social and Ecological Harmony'. In *Proceedings of the Society of American Foresters*, pp. 170-183. Society of American Foresters, Hot Springs, AR.
- Gaston, K.J., Charman, K., Jackson, S.F., Armsworth, P.R., Bonn, A., Briers, R.A., Callaghan, C.S.Q., Catchpole, R., Hopkins, J., Kunin, W.E., Latham, J., Opdam, P., Stoneman, R., Stroud, D., and Tratt, R. (2006). 'The Ecological Effectiveness of Protected Areas: The United Kingdom'. *Biological Conservation* 132: 76-87. <http://dx.doi.org/10.1016/j.biocon.2006.03.013>
- Gaston, K.J., Jackson, S.F., Cantú-Salazar, L., and Cruz-Piñón, G. (2008). 'The Ecological Performance of Protected Areas'. *Annual Review of Ecology, Evolution, and Systematics* 39: 93-113. <http://dx.doi.org/10.1146/annurev.ecolsys.39.110707.173529>
- Garcia, A. (2009). *El Carmen Wilderness: An Expanded Commitment*. [online] available from <<https://vimeo.com/8200122>>.
- Geldmann, J., Coad, L., Barnes, M., Craigie, I.D., Hockings, M., Knights, K., Leverington, F., Cuadros, I.C., Zamora, C., Woodley, S., and Burgess, N.D. (2015). 'Changes in Protected Area Management Effectiveness over Time: A Global Analysis'. *Biological Conservation* 191: 692-699. <http://dx.doi.org/10.1016/j.biocon.2015.08.029>
- Giifford, M.E. and Kozak, K.H. (2012). 'Islands in the Sky or Squeezed at the Top? Ecological Causes of Elevational Range Limits in Montane Salamanders'. *Ecography* 35(3): 193-203. <http://dx.doi.org/10.1111/j.1600-0587.2011.06866.x>
- Gissibl, B. (2014). A Laboratory for the Implementation of 'Wilderness' in Central Europe—The Bavarian Forest National Park. Arcadia. Environment & Society Portal. vol. 4. *Rachel Carson Center for Environment and Society*.
- Glaspell, B., Watson, A., Kneeshaw, K., and Pendergrast, D. (2003). 'Selecting Indicators and Understanding Their Role in Wilderness Experience Stewardship at Gates of the Arctic National Park and Preserve'. *George Wright Forum* 20(3): 59-71.
- Graber, D.M. (2003). 'Ecological Restoration in Wilderness: Natural versus Wild in National Park Service Wilderness'. *George Wright Forum* 30(3).
- Greve, M., Chown, S.L., van Rensburg, B.J., Dallimer, M., and Gaston, K.J. (2010). 'The Ecological Effectiveness of Protected Areas: A Case Study for South African Birds'. *Animal Conservation* 14: 295-305. <http://dx.doi.org/10.1111/j.1469-1795.2010.00429.x>
- Gunderson, K. and Cook, C. (2007). 'Wilderness, Water, and Quality of Life in the Bitterroot Valley'. In *Science and Stewardship to Protect and Sustain Wilderness Values: Eighth World Wilderness Congress Symposium: September 30–October 6, 2005; Anchorage, AK*. Proceedings RMRS-P-49, pp. 537-544. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Gundersen, V., Tangeland, T., and Kaltenborn, B.P. (2015). 'Planning for Recreation along the Opportunity Spectrum: The Case of Oslo, Norway'. *Urban Forestry and Urban Greening* 14: 210-217. <http://dx.doi.org/10.1016/j.ufug.2015.01.006>
- Hamilton, L. and McMillan, L. (eds.) (2004). 'The Sacred, Spiritual and Cultural Significance of Mountains'. In *Guidelines for Planning and Managing Mountain Protected Areas*. pp. 25-30. IUCN, Gland, Switzerland.
- Hanna, P. and Vanclay, F. (2013). 'Human Rights, Indigenous Peoples and the Concept of Free, Prior and Informed Consent'. *Impact Assessment and Project Appraisal* 31(2): 146-157.
- Hathaway, M.J. (2013). 'Making an Indigenous Space'. In *Environmental Winds*. pp. 116-151. University of California Press, Berkeley. <http://dx.doi.org/10.1525/california/9780520276192.003.0004>
- Hauer, F.R., Baron, J.S., Campbell, D.H., Fausch, K.D., Hostetler, S.W., Leavesley, G.H., Leavitt, P.R., McKnight, D.M., and Stanford, J.A. (1997). 'Assessment of Climate Change and Freshwater Ecosystems of the Rocky Mountains, USA and Canada'. *Hydrological Processes* 11(8): 903-924. [http://dx.doi.org/10.1002/\(SICI\)1099-1085\(19970630\)11:8<903::AID-HYP511>3.0.CO;2-7](http://dx.doi.org/10.1002/(SICI)1099-1085(19970630)11:8<903::AID-HYP511>3.0.CO;2-7)
- Heck, N., Dearden, P., McDonald, A., and Carver, S. (2011). 'Stakeholder Opinions on the Assessment of MPA Effectiveness and Their Interests to Participate at Pacific Rim National Park Reserve, Canada'. *Environmental Management* 47(4) 603-613. <http://dx.doi.org/10.1007/s00267-010-9609-9>
- Heintzman, P. (2015). 'Spirituality and the Outdoors'. In *Routledge International Handbook of Outdoor Studies*. Routledge, New York.
- Heller, N.E. and Zavaleta, E.S. (2009). 'Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations'. *Biological Conservation* 142(1) 14-32. <http://dx.doi.org/10.1016/j.biocon.2008.10.006>
- Hendee, J. and Stankey, G.H. (1973). 'Biocentricity in Wilderness Management'. *BioScience* 23(9): 535-538. <http://dx.doi.org/10.2307/1296482>
- Hendee, J., Stankey, G.H., and Lucas, R.C. (1990). *Wilderness Management*. Fulcrum Publishing, Golden, Colorado.
- Hill, R., Grant, C., George, M., Robinson, C.J., Jackson, S., and Abel, N. (2012). 'A Typology of Indigenous Engagement in Australian Environmental Management: Implications for Knowledge Integration and Social-Ecological System Sustainability'. *Ecology and Society* 17: 1-17. <http://dx.doi.org/10.5751/ES-04587-170123>
- Hill, R., Walsh, F., Davies, J., and Sandford, M. (2011). *Our Country Our Way: Guidelines for Australian Indigenous Protected Area Management Plans*. CSIRO Ecosystem Sciences and Australian Government Department of Sustainability, Environment, Water, Population and Communities.
- Hilty, J.A., Chester, C.C., and Cross, M.S. (eds.) (2012). *Climate and Conservation: Landscape and Seascape Science, Planning, and Action*. Island Press, Washington, D.C. <http://dx.doi.org/10.5822/978-1-61091-203-7>
- Hockings, M., Cook, C.N., Carter, R.W., and James, R. (2009). 'Accountability, Reporting, or Management Improvement? Development of a State of the Parks Assessment System in New South Wales, Australia'. *Environmental Management* 43: 1013-1025.

- Hockings, M., Leverington, F., and Cook, C. (2015). 'Protected Area Management Effectiveness'. In *Protected Area Governance and Management*. pp. 889-928. ANU Press, Canberra, Australia.
- Hockings, M., Stolton, S., Leverington, F., Dudley, N., and Courrau, J. (2006). *Evaluating Effectiveness: A Framework for Assessing Management Effectiveness of Protected Areas*. 2nd edition. IUCN, Gland, Switzerland. <http://dx.doi.org/10.1007/s00267-009-9277-9>
- Hodgson, J.A., Thomas, C.D., Wintle, B.A., and Moilanen, A. (2009). 'Climate Change, Connectivity and Conservation Decision Making: Back to Basics'. *Journal of Applied Ecology* 46 (5): 964-969. <http://dx.doi.org/10.1111/j.1365-2664.2009.01695.x>
- Huffard, C.L., Erdmann, M.V., and Gunawan, T. (eds.) (2012). *Geographic Priorities for Marine Biodiversity Conservation in Indonesia*. Coral Triangle Initiative.
- International Indigenous Commission (1991). *Indigenous Peoples' Traditional Knowledge and Management Practices: A Report Prepared for the United Nations Conference on Environment and Development*. International Indigenous Commission.
- IUCN (1978). *Categories, Objectives and Criteria: Final Report of the Committee and Criteria of the CNPPA/IUCN*. Morges: IUCN.
- IUCN (2012). *Resolution 5.094 Respecting, Recognizing, and Supporting Indigenous Peoples' and Community Conserved Territories and Areas*. 5th World Conservation Congress, Jeju, South Korea.
- IUCN World Parks Congress (2014). *Promise of Sydney*. IUCN, Gland, Switzerland.
- IUCN and UNEP-WCMC (2016). *The World Database on Protected Areas (WDPA)*. available from <<http://protectedplanet.net>>.
- IUCN Species Survival Commission (2013). *Guidelines for Reintroduction and Other Conservation Translocations*. IUCN, Gland, Switzerland.
- Ivy, M., Stewart, W., and Lue, C. (1992). 'Exploring the Role of Tolerance in Recreational Conflict'. *Journal of Leisure Research* 24: 348-360.
- Izurieta, A., Petheram, L., Stacey, N., and Garnett, S.T. (2013). 'Costs of Participatory Monitoring and Evaluation of Joint Management of Protected Areas in the Northern Territory, Australia'. *Journal of Environmental Management* 20: 21-33. <http://dx.doi.org/10.1080/14486563.2012.726130>
- Johns, D. (2016). 'Rewilding'. In *Reference Module in Earth Systems and Environmental Sciences*. Elsevier. <http://dx.doi.org/10.1016/B978-0-12-409548-9.09202-2>
- Johnson, C.Y., Bowker, J.M., Bergstrom, J.C., and Cordell, H.K. (2004). 'Wilderness Values in America: Does Immigrant Status or Ethnicity Matter?' *Society and Natural Resources* 17: 611-628. <http://dx.doi.org/10.1080/08941920490466585>
- Johnson, R. (1996). 'Grandfather Mountain: A Private U.S. Wilderness Experiment'. *International Journal of Wilderness* 2(3): 10-13.
- Jonas, H., Makagon, J.E., Booker, S., and Shrumm, H. (2012). *Report No 1. In An Analysis of International Law, National Legislation, Judgements, and Institutions as They Interrelate with Territories and Areas Conserved by Indigenous Peoples and Local Communities*. Delhi: Natural Justice and Kalpavriksh.
- Karieva, P. and Marvier, M. (2012). 'Conservation in the Anthropocene'. *Breakthrough Institute* [online] available from <<http://thebreakthrough.org/index.php/journal/past-issues/issue-2/conservation-in-the-anthropocene>>.
- Kato, K. (2006). 'Community, Connection and Conservation: Intangible Cultural Values in Natural Heritage—the Case of the Shirkami-sanchi World Heritage Area'. *International Journal of Heritage Studies* 12(5): 458-473. <http://dx.doi.org/10.1080/13527250600821670>
- Keenleyside, K., *International Union for Conservation of Nature and Natural Resources, and World Commission on Protected Areas* (2012). *Ecological Restoration for Protected Areas Principles, Guidelines and Best Practices*. IUCN, Gland, Switzerland.
- Knotek, K., Watson, A.E., Borrie, W.T., Whitmore, J.G., and Turner, D. (2008). 'Recreation Visitor Attitudes towards Management-Ignited Prescribed Fires in the Bob Marshall Wilderness Complex, Montana'. *Journal of Leisure Research* 40(4): 608-618.
- Kolahi, M., Sakai, T., Moriya, K., Makhdom, M.F., and Koyama, L. (2013). 'Assessment of the Effectiveness of Protected Area Management in Iran: Case Study in Khojir National Park'. *Environmental Management* 52: 514-530. <http://dx.doi.org/10.1007/s00267-013-0061-5>
- Kormos, C.F. (2011). 'We Need to Scale Up Marine Wilderness Protection'. *International Journal of Wilderness* 17(3): 12-15.
- Kormos, C.F. (ed.) (2008). *A Handbook on International Wilderness Law and Policy*. Fulcrum Publishing, Golden, Colorado.
- Kormos, C.F., Bertzky, B., Jaeger, T., Shi, Y., Badman, T., Hilty, J.A., Mackey, B.G., Mittermeier, R.A., Locke, H., Osipova, E., and Watson, J.E.M. (2015). 'A Wilderness Approach under the World Heritage Convention: World Heritage and Wilderness'. *Conservation Letters*.
- Kormos, C.F. and Mittermeier, R.A. (2014). 'World Heritage and Wilderness'. *World Heritage* 73.
- Kothari, A., Corrigan, C., Jonas, H., Neumann, A., Shrumm, H., and Secretariat of the Convention on Biological Diversity (2012). *Recognising and Supporting Territories and Areas Conserved by Indigenous Peoples and Local Communities: Global Overview and National Case Studies*.
- Kowari, I. (2013). 'Cities and Wilderness'. *International Journal of Wilderness* 19(3): 32-36.
- Krahe, D. (2005). *Last Refuge: The Uneasy Embrace of Indian Lands by the National Wilderness Movement, 1937-1965*. Washington State University.
- Landres, P., Barns, C., Boutcher, S., Devine, T., Dratch, P., Lindholm, A., Merigliano, L., Roeper, N., and Simpson, E. (2015). *Keeping It Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character across the National Wilderness Preservation System*. Gen. Tech. Rep. RMRS-GTR-340. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Landres, P., Barns, C., Dennis, J.G., Devine, T., Geissler, P., McCasland, C.S., Merigliano, L., Seastrand, J., and Swain, R. (2008). *Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character across the National Wilderness Preservation System*. Gen. Tech. Rep. RMRS-GTR-212. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

- Landres, P., Barr, B., and Kormos, C.F. (2008). 'The Matrix: A Comparison of International Wilderness Laws'. In *A Handbook on International Wilderness Law and Policy*. Fulcrum Publishing, Golden, CO.
- Landres, P., Boutcher, S., Merigiano, L., Barns, C., Davis, D., Hall, T., Henry, S., Hunter, B., Janiga, P., Laker, M., McPherson, A., Powell, D., Rowan, M., and Sater, S. (2005). *Monitoring Selected Conditions Related to Wilderness Character: A National Framework. General Technical Report RMRS-GTR-151*. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Landres, P., Marsh, S., Merigiano, L., Ritter, D., and Norman, A. (1998). 'Boundary Effects on Wilderness and Other Natural Areas'. In *Stewardship Across Boundaries*. pp. 117-139. Island Press, Covelo, CA.
- Leiner, S. (2012). *Protecting Wilderness in Europe*. European Parliament Forum.
- Leopold, A. (1949). *A Sand County Almanac and Sketches Here and There*. Oxford University Press, London.
- Leung, Y.F. and Marion, J.L. (2000). 'Recreation Impacts and Management in Wilderness: A State-of-Knowledge Review'. *Wilderness Science in a Time of Change Conference 5*: 23–48.
- Leverington, F., Lemos Costa, K., Pavese, H., Lisle, A., and Hockings, M. (2010a). 'A Global Analysis of Protected Area Management Effectiveness'. *Environmental Management*. 46:685-698. <http://dx.doi.org/10.1007/s00267-010-9564-5>
- Leverington, F., Costa, K.L., Courrau, J., Pavese, H., and Nolte, C. (2010b). *Management Effectiveness Evaluation in Protected Areas: A Global Study*. Second. University of Queensland, IUCN- WCPA, TNC, WWF, St Lucia, Australia.
- Lindberg, K., McCool, S., and Stankey, G. (1997). 'Rethinking Carrying Capacity'. *Annals of Tourism Research* 24(2): 461–465. [http://dx.doi.org/10.1016/S0160-7383\(97\)80018-7](http://dx.doi.org/10.1016/S0160-7383(97)80018-7)
- Li, T.M. (2001). 'Masyarakat Adat, Difference, and the Limits of Recognition in Indonesia's Forest Zone'. *Modern Asian Studies* 35(3): 645–676. <http://dx.doi.org/10.1017/S0026749X01003067>
- Locke, H. (2012). 'Transboundary Cooperation to Achieve Wilderness Protection and Large Landscape Conservation'. *Park Science* 28(3): 24–28.
- Locke, H. (2013). 'Nature Needs Half: A Necessary and Hopeful New Agenda for Protected Areas'. *Parks* 19(2): 9–18. <http://dx.doi.org/10.2305/IUCN.CH.2013.PARKS-19-2.HL.en>
- Locke, H. and Heuer, K. (2015). 'Yellowstone to Yukon: Global Conservation Innovations Through the Years'. In *Protecting the Wild: Parks and Wilderness, the Foundation for Conservation*. pp. 120-130. Island Press, Washington, DC. http://dx.doi.org/10.5822/978-1-61091-551-9_14
- Lockwood, M., Worboys, G., and Kothari, A. (eds.) (2006). *Managing Protected Areas: A Global Guide*. Earthscan, London.
- Loring, P.A. and Gerlach, S.C. (2009). 'Food, Culture, and Human Health in Alaska: An Integrative Health Approach to Food Security'. *Environmental Science and Policy* 12: 466–478. <http://dx.doi.org/10.1016/j.envsci.2008.10.006>
- Ludwig, D., Hilborn, R., and Walters, C. (1993). 'Uncertainty, Resource Exploitation, and Conservation: Lessons from History'. *Science* 260: 17–36. <http://dx.doi.org/10.1126/science.260.5104.17>
- Mack, N., Woodsong, C., MacQueen, K., Guest, G., and Namey, E. (2005). *Qualitative Research Methods: A Data Collector's Field Guide*. North Carolina: Family Health International USAID.
- Maharashtra (2015). *Guidelines Regarding Establishing Community Nature Conservancy*. Government of Maharashtra. Mantralaya Mumbai: Revenue and Forest Department Government Circular No.: WLP 0315/ CR 56/F-1.
- Maloti Drakensberg Transfrontier Programme (2012). *Maloti Drakensberg Transfrontier Park: uKhahlamba Drakensberg Park World Heritage Site / Sehlabathebe National Park: Joint Management Plan*.
- Maloti Drakensberg Transfrontier Project (2008). *20 Year (2008-2028) Conservation & Development Strategy for the Maloti Drakensberg Transfrontier Conservation Area*.
- Manfredo, M.J., Fishbein, M., Haas, G.E., and Watson, A.E. (1990). 'Attitudes toward Prescribed Fire Policies: The Public Is Widely Divided in Its Support'. *Journal of Forestry* 88(7): 19–23.
- Manning, R. (2001). 'Visitor Experience and Resource Protection: A Framework for Managing the Carrying Capacity of National Parks'. *Journal of Park and Recreation Administration* 19(1): 93–108.
- Manning, R.E. (1997). 'Social Carrying Capacity of Parks and Outdoor Recreation Areas'. *Parks and Recreation* 32: 32–38.
- Manning, R.E. (2004). 'Recreation Planning Frameworks'. In *Society and Natural Resources: A Summary of Knowledge*. pp. 83-96. Modern Litho, Jefferson, MO.
- Mansourian, S. (2005). 'Peak Wilderness Park, Sri Lanka'. In *Beyond Belief: Linking Faiths and Protected Areas to Support Biodiversity Conservation*. World Wildlife Fund, Gland, Switzerland.
- Marlon, J.R., Bartlein, P.J., Walsh, M.K., Harrison, S.P., Brown, K.J., Edwards, M.E., Higuera, P.E., Power, M.J., Anderson, R.S., Briles, C., Brunelle, A., Carcaillet, C., Daniels, M., Hu, F.S., Lavoie, M., Long, C., Minckley, T., Richard, P.J.H., Scott, A.C., Shafer, D.S., Tinner, W., Umbanhowar, Jr., C.E., and Whitlock, C. (2009). 'Wildfire Responses to Abrupt Climate Change in North America'. *Proceedings of the National Academy of Sciences* 2519-2524(106): 8. <http://dx.doi.org/10.1073/pnas.0808212106>
- Marris, E. (2011). *The Rambunctious Garden: Saving Nature in a Post-Wild World*. Bloomsbury, New York.
- Martin, G.J., Benavides, C.I.C., García, C.A.D.C., Fonseca, S.A., Mendoza, F.C., and Ortíz, M.A.G. (2011). 'Indigenous and Community Conserved Areas in Oaxaca, Mexico'. *Management of Environmental Quality: An International Journal* 22(2): 250–266. <http://dx.doi.org/10.1108/14777831111113419>
- Martin, V. (ed.) (1982). *Wilderness*. Findhorn Press, Scotland.
- Martin, V. and Inglis, M. (eds.) (1984). *Wilderness, the Way Ahead*. Findhorn Press, Scotland.
- Martin, V.G. and Robles Gil, P. (2009). *Wilderness*. Voces de la Tierra, Sierra Madre.
- Martin, V. and Sarathy, P. (eds.) (2001). *Wilderness and Humanity—The Global Issue: Proceedings of the 6th World Wilderness Congress*. Fulcrum Publishing, Golden, CO.

- Martin, V. and Sloan, S.S. (2012). *Protecting Wild Nature on Native Lands: Case Studies by Native Peoples from around the World*. vol. 2. The Native Lands and Wilderness Council, Boulder, CO.
- Martin, V. and Watson, A. (2009). 'International Wilderness'. In *Wilderness Management: Stewardship and Protection of Resources and Values*. pp. 50-88. 4th edition. Fulcrum Publishing, Golden, Colorado.
- Martin, V.G. (1990). 'International Wilderness: Adapting to Developing Nations'. In *Managing America's Enduring Wilderness Resource*. Conference proceedings; September 11-17, 1989. pp. 252-266. University of Minnesota Extension Service, St. Paul.
- Mason, R.J. (2015). 'Preservation and Preemption in Japan's Shirakami Sanchi World Heritage Area'. *Management of Environmental Quality: An International Journal* 26(3): 448-465. <http://dx.doi.org/10.1108/MEQ-11-2014-0159>
- Mazel, A. (2008). 'Presenting the San Hunter-Gatherer Past to the Public: A View from the uKhahlamba-Drakensberg Park, South Africa'. *Conservation and Management of Archaeological Sites* 10(1): 41-51. <http://dx.doi.org/10.1179/175355208X404330>
- Mazel, A. (2013). 'Paint and Earth: Constructing Hunter-Gather History in the uKhahlamba-Drakensberg, South Africa'. *Time and Mind: The Journal of Archaeology, Consciousness and Culture* 6(1): 49-58. <http://dx.doi.org/10.2752/175169713X13500468476565>
- McCool, S.F., Clark, R.N., and Stankey, G.H. (2007). *An Assessment of Frameworks Useful for Public Land Recreation Planning*. Gen. Tech. Rep Report PNW-GTR-705. USDA Forest Service Pacific Northwest Research Station, Seattle, WA.
- McCool, S.F. and Cole, D.N. (eds.) (1998). *Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions: Proceedings of a Workshop May 20-22 1997, Missoula, MT*. Gen. Tech. Rep. INT-GTR-371. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- McCool, S.F., Freimund, W.A., and Breen, C. (2015). 'Benefiting from Complexity Thinking'. In *Protected Area Governance and Management*. pp. 291-326. ANU Press, Canberra, Australia.
- McCool, S.F. and Lime, D.W. (2001). 'Tourism Carrying Capacity: Tempting Fantasy or Useful Reality?' *Journal of Sustainable Tourism* 9(5): 372-388. <http://dx.doi.org/10.1080/09669580108667409>
- McCool, S.F., Nkhata, B., Breen, C., and Freimund, W. (2013). 'A Heuristic Framework for Reflecting on Protected Areas and Their Stewardship in the 21st Century'. *Journal of Outdoor Recreation and Tourism* 1(1-2): 9-17. <http://dx.doi.org/10.1016/j.jort.2013.03.002>
- McKelvey, K.S., Copeland, J.P., Schwartz, M.K., Littell, J.S., Aubry, K.B., Squires, J.R., Parks, S.A., Elsner, M.M., and Mauger, G.S. (2011). 'Climate Change Predicted to Shift Wolverine Distributions, Connectivity, and Dispersal Corridors'. *Ecological Applications* 21(8): 2882-2897. <http://dx.doi.org/10.1890/10-2206.1>
- Mech, L.D. and Boitani, L. (eds.) (2010). *Wolves: Behavior, Ecology, and Conservation*. University of Chicago Press, Chicago.
- Menzies, C.R. (ed.) (2006). *Traditional Ecological Knowledge and Natural Resource Management*. University of Nebraska Press, Omaha, Nebraska.
- Merigliano, L. and Krumpel, E. (1986). 'Scientists Identify, Evaluate Indicators to Monitor Wilderness Conditions'. *Park Science* 6(3): 19-20.
- Millar, C.I., Stephenson, N.L., and Stephens, S.L. (2007). 'Climate Change and Forests of the Future: Managing in the Face of Uncertainty'. *Ecological Applications* 17(8): 2145-2151. <http://dx.doi.org/10.1890/06-1715.1>
- Meyer, S.S. (2000). 'Legislative Interpretation as a Guiding Tool for Wilderness Management'. In *Wilderness Science in a Time of Change. Conference May 23- 27, 2000; Missoula, MT. Volume 5: Wilderness Ecosystems, Threats, and Management. Proceedings RMRS-P-15-VOL-5*. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Millennium Ecosystem Assessment (MEA) (2005). *Ecosystems and Human Well-Being: Current State and Trends*. Findings of the Conditions and Trends Working Group. Millennium Ecosystem Assessment Series. vol. 1. Island Press, London.
- Miller, C. (2014). 'The Contribution of Natural Fire Management to Wilderness Fire Science'. *International Journal of Wilderness* 20(2): 20-25.
- Miller, K.A. (ed.) (2008). 'A Commentary on the Origins of the Category System'. In *Defining Protected Areas: An International Conference in Almeria, Spain, May 2007*. 18-20.
- Minimum Requirement Decision Guide (MRDG) (2014). *Online Instructions for Minimum Requirement Analysis*. Arthur Carhart National Wilderness Training Center. available from <<http://www.wilderness.net/MRA>>.
- Mittermeier, R.A., Mittermeier, C.G., Brooks, T.M., Pilgrim, J.D., da Fonseca, G.A.B., and Kormos, C.F. (2003). 'Wilderness and Biodiversity Conservation'. *PNAS* 100(18): 10309-10313. <http://dx.doi.org/10.1073/pnas.1732458100>
- Monbiot, G. (2015). *Feral: Rewilding the Land, the Sea, and Human Life*. University of Chicago Press, Chicago.
- Moore, S.A. and Hockings, M. (2013). 'Australian Protected Areas and Adaptive Management: Contributions by Visitor Planning Frameworks and Management Effectiveness Assessments'. *Australasian Journal of Environmental Management* 20(4): 270-284. <http://dx.doi.org/10.1080/14486563.2013.833487>
- Moore, S.A., Smith, A., and Newsome, D. (2003). 'Environmental Performance Reporting for Natural Area Tourism: Contributions by Visitor Impact Management Frameworks and Their Indicators'. *Journal of Sustainable Tourism* 11(4): 348-375. <http://dx.doi.org/10.1080/09669580308667211>
- Morton, J.F. (2007). 'The Impact of Climate Change on Smallholder and Subsistence Agriculture'. *Proceedings of the National Academy of Sciences* 104(50): 19680-19685. <http://dx.doi.org/10.1073/pnas.0701855104>
- Nadasdy, P. (1999). 'The Politics of TEK: Power and the "Integration" of Knowledge'. *Arctic Anthropology* 36(1-2): 1-18.
- Nadasdy, P. (2003). *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal-State Relations in the Southwest Yukon*. University of British Columbia Press, Vancouver, BC.
- Nadasdy, P., Goldman, M., and Turner, M. (eds.) (2011). *Knowing Nature: Conversations at the Intersection of Political Ecology and Science Studies*. University of Chicago Press, Chicago.

- Nash, R. (1982). *Wilderness and the American Mind*. 3rd edition. Yale University Press, New Haven, CT.
- National Parks Board of Singapore (2016). *A Guide to Walking Trail at the TreeTop Walk*. Singapore.
- Natural Resources Law Center (2004). *Special Use Provisions in Wilderness Legislation*. University of Colorado School of Law.
- Navarro, L. and Pereira, H. (2012). 'Rewilding Abandoned Landscapes in Europe'. *Ecosystems* 15(6): 900–912. <http://dx.doi.org/10.1007/s10021-012-9558-7>
- NAWPA Committee (2010). *Joint Statement on Cooperative Action for Conservation in the Big Bend/Rio Bravo Region*. available from <<http://nawpaccommittee.org/wp-content/uploads/2012/05/46-Big-Bend-Rio-Bravo-Area-of-Binational-Interest.pdf>>.
- Nelson, D.M. (2004). 'Anthropologists Discovers Legendary Two-Faced Indian!: Margins, the State, and Duplicity in Postwar Guatemala'. In *Anthropology in the Margins of the State*. pp. 117–140. School of American Research Press, Santa Fe.
- Newsome, D., Moore, S.A., and Dowling, R.K. (2013). *Natural Area Tourism: Ecology, Impacts and Management*. Channel View Publications, Clevedon, England.
- Nickas, G. and Proescholdt, K. (2005). 'Keeping the Wild in Wilderness: Minimizing Nonconforming Uses in the National Wilderness Preservation System'. *International Journal of Wilderness* 11(3): 13–18.
- Nie, M. (2008). 'The Use of Co-Management and Protected Land-Use Designations to Protect Tribal Cultural Resources and Reserved Treaty Rights on Federal Lands'. *Nat. Resources J.* 48: 585.
- Nilsen, P. and Tayler, G. (1997). 'A Comparative Analysis of Protected Area Planning and Management Frameworks'. In *Proceedings – Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions. General Technical Report INT-GTR-371*. pp. 49–57. Rocky Mountain Research Station, USDA Forest Service, Ogden, UT.
- Noss, R. (1992). 'The Wildlands Project Land Conservation Strategy'. *Wild Earth* 1: 10–25.
- Ormsby, A.A. (2011). 'The Impacts of Global and National Policy on the Management and Conservation of Sacred Groves of India'. *Human Ecology* 39(6): 783–793. <http://dx.doi.org/10.1007/s10745-011-9441-8>
- Outdoor Recreation Resources Review Commission (ORRRC) (1962). *Wilderness and Recreation—a Report on Resources, Values and Problems*. U.S. Government Printing Office, Washington, D.C.
- Oviedo, G. and Jenrenaud, S. (2007). 'Protecting Sacred Natural Sites of Indigenous and Traditional Peoples'. In *Protected Areas and Spirituality*. pp. 77–99. IUCN, Gland, Switzerland.
- Papworth, S.K., Rist, J., Coad, L., and Milner-Gulland, E.J. (2009). 'Evidence for Shifting Baseline Syndrome in Conservation'. *Conservation Letters* 2(2): 93–100. <http://dx.doi.org/10.1111/j.1755-263x.2009.00049.x>
- Parker, K.A. (2008). 'Translocations: Providing Outcomes for Wildlife, Resource Managers, Scientists, and the Human Community'. *Restoration Ecology* 16(2): 204–209. <http://dx.doi.org/10.1111/j.1526-100X.2008.00388.x>
- Parks Canada (2010). *Nahanni National Park Reserve of Canada Park Naha Dehé Management Plan*.
- Parrish, J.D., Braun, D.P., and Unnasch, R.S. (2003). 'Are We Conserving What We Say We Are? Measuring Ecological Integrity within Protected Areas'. *BioScience* 53(9): 851–860. [http://dx.doi.org/10.1641/0006-3568\(2003\)053\[0851:AWCWWS\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2003)053[0851:AWCWWS]2.0.CO;2)
- Patterson, M.E., Watson, A.E., Williams, D.R., and Roggenbuck, J.R. (1998). 'An Hermeneutic Approach to Studying the Nature of Wilderness Experiences'. *Journal of Leisure Research* 30(4): 423–452.
- Pauly, D. (1995). 'Anecdotes and the Shifting Baseline Syndrome of Fisheries'. *Trends in Ecology & Evolution* 10(10): 430. [http://dx.doi.org/10.1016/S0169-5347\(00\)89171-5](http://dx.doi.org/10.1016/S0169-5347(00)89171-5)
- Pearce, F. (2015). *The New Wild: Why Invasive Species Will Be Nature's Salvation*. Beacon Press, Boston.
- Pease, J.L. (2015). 'Parks and Underserved Audiences: An Annotated Literature Review'. *Journal of Interpretation Research* 20(1): 11–56.
- Peloquin, C. and Berkes, F. (2009). 'Local Knowledge, Subsistence Harvests, and Social-Ecological Complexity in James Bay'. *Human Ecology* 37: 533–545. <http://dx.doi.org/10.1007/s10745-009-9255-0>
- Peres, C.A. (2000). 'Effects of Subsistence Hunting on Vertebrate Community Structure in Amazonian Forests'. *Conservation Biology* 14(1): 240–253. <http://dx.doi.org/10.1046/j.1523-1739.2000.98485.x>
- Peterson, R.B., Russell, D., West, P., and Brosius, J.P. (2010). 'Seeing (and Doing) Conservation Through Cultural Lenses'. *Environmental Management* 45(1): 5–18. <http://dx.doi.org/10.1007/s00267-008-9135-1>
- Pfaff, A., Robalina, J., Sandoval, C., and Herrera, D. (2015). 'Protected Area Types, Strategies and Impacts in Brazil's Amazon: Public Protected Area Strategies Do Not Yield a Consistent Ranking of Protected Area Types by Impact'. *Philosophical Transactions of the Royal Society of Biological Sciences* 370. <http://dx.doi.org/10.1098/rstb.2014.0273>
- Phillips, A. (ed.) (2008). 'A Short History of the International System of Protected Areas Management Categories'. In *Defining Protected Areas: An International Conference in Almeria, Spain, May 2007*. 13–17.
- Pierotti, R. and Wildcat, D. (1997). 'Evolution, Creation and Native Traditions'. *Winds of Change* 12(2): 73–77.
- Poole, D. (2011). 'Mestizaje, Distinction and Cultural Recognition: The View from Oaxaca'. In *Histories of Race and Racism: The Andes and Mesoamerica from Colonial Times to the Present*. pp. 170–230. Duke University Press, Durham. <http://dx.doi.org/10.1215/9780822394334-008>
- Pope, K. and Martin, S. (2011). 'Visitor Perceptions of Technology, Risk and Rescue in Wilderness'. *International Journal of Wilderness* 17(2): 19–26.
- Pöschl, U., Martin, S.T., Sinha, A., Chen, Q., Gunthe, S.S., Huffman, J.A., Bormann, S., Farmer, D.K., Garland, R.M., Helas, G., Jimenez, J.L., King, S.M., Manzi, A., Mikhailov, E., Pauliquevis, T., Petters, M.D., Prenni, A.J., Roldin, P., Rose, D., Schneider, J., Su, H., Zorn, S.R., Artaxo, P., and Andreae, M.O. (2010). 'Rainforest Aerosols as Biogenic Nuclei of Clouds and Precipitation in the Amazon'. *Science* 329: 1513–1516. <http://dx.doi.org/10.1126/science.1191056>

- Reichel-Domatoff, G. (1976). 'Cosmology as Ecological Analysis: A View from the Rain Forest'. *Man* 11(3): 307–318. <http://dx.doi.org/10.2307/2800273>
- Ripple, W.J. and Beschta, R. (2003). 'Wolf Reintroduction, Predation Risk, and Cottonwood Recovery in Yellowstone National Park'. *Forest Ecology and Management* 184(1): 299–313. [http://dx.doi.org/10.1016/S0378-1127\(03\)00154-3](http://dx.doi.org/10.1016/S0378-1127(03)00154-3)
- Robles Gil, P. (2006). 'El Carmen: The First Wilderness Designation in Latin America'. *International Journal of Wilderness* 12(2): 36–40.
- Robles Gil, P., Martin, V.G., and Rojo, J. (2009). *Resolution 33a: Transboundary Parks and Wilderness Areas in Mexico*. 9th World Wilderness Congress. available from <<http://www.tbpa.net/page.php?ndx=74>>.
- Roggenbuck, J.W. and Watson, A.E. (1993). 'Defining Acceptable Conditions in Wilderness'. *Environmental Management* 17(2): 187–197. <http://dx.doi.org/10.1007/BF02394689>
- Sahgal (2016). *Private Concept Paper and Personal Comment to Vance G. Martin* [Sanctuary Asia].
- Salerno, F., Viviano, G., Manfredi, E.C., Caroli, P., Thakuri, S., and Tartari, G. (2013). 'Multiple Carrying Capacities from a Management-Oriented Perspective to Operationalize Sustainable Tourism in Protected Areas'. *Journal of Environmental Management* 128: 116–125. <http://dx.doi.org/10.1016/j.jenvman.2013.04.043>
- Salmón, E. (2000). 'Kincentric Ecology: Indigenous Perceptions of the Human-Nature Relationship'. *Ecological Applications* 10(5): 1327–1332.
- Savory, A. and Butterfield, J. (1999). *Holistic Management: A New Framework for Decision Making*. Island Press, Washington, DC.
- Schmiegelow, F.K.A., Cumming, S.G., Harrison, S., Leroux, S., Lisgo, K., Noss, R., Olsen, B. (2006). 'Conservation Beyond Crisis Management: A Conservation-Matrix Model' *BEACONS Discussion Paper* (1): 1-7.
- Schwartzman, S., Boas, A.V., Ono, K.Y., Fonseca, M.G., Doblas, J., Zimmerman, B., Junqueira, P., Jerozolimski, A., Salazar, M., Junqueira, R.P., and Torres, M. (2013). 'The Natural and Social History of the Indigenous Lands and Protected Areas Corridor of the Xingu River Basin'. *Philosophical Transactions of the Royal Society B: Biological Sciences* 368(1619): 20120164–20120164. <http://dx.doi.org/10.1098/rstb.2012.0164>
- Scott, J. (1998). *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Yale University Press, New Haven, CT.
- Secretariat of the Convention on Biological Diversity (2004). *Akwé: Kon Voluntary Guidelines for the Conduct of Cultural, Environmental and Social Impact Assessment Regarding Developments Proposed to Take Place On, or Which Are Likely to Impact On, Sacred Sites and on Lands and Waters Traditionally Occupied or Used by Indigenous and Local Communities*. CBD Guideline Series. available from <<https://www.cbd.int/doc/publications/akwe-brochure-en.pdf>>.
- Shultis, J. and Heffner, S. (2016). 'Hegemonic and Emerging Concepts of Conservation: A Critical Examination of Barriers to Incorporating Indigenous Perspectives in Protected Area Conservation Policies and Practice'. *Journal of Sustainable Tourism* 1: 1–16. <http://dx.doi.org/10.1080/09669582.2016.1158827>
- Simpson, L. (2005). 'Traditional Ecological Knowledge among Aboriginal Peoples in Canada'. In *Encyclopedia of Religion and Nature*. Thoemmes Continuum, London and New York.
- Singleton, R.A. and Straits, B.C. (2010). *Approaches to Social Research*. 5th edition. Oxford University Press, London.
- Sippola, A. (2002). 'Biodiversity in Finnish Wilderness Areas: Historical and Cultural Constraints to Preserve Species and Habitats'. In *Wilderness in the Circumpolar North: Searching for Compatibility in Ecological, Traditional, and Ecotourism Values*. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Anchorage, AK.
- Smith, D.W., Peterson, R.O., and Houston, D.B. (2003). 'Yellowstone after Wolves'. *BioScience* 53(4): 330–340. [http://dx.doi.org/10.1641/0006-3568\(2003\)053\[0330:YAW\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2003)053[0330:YAW]2.0.CO;2)
- Sobrevilla, C. (2008). *The Role of Indigenous Peoples in Biodiversity Conservation: The Natural but Often Forgotten Partners*. The World Bank, Washington, DC.
- Society for Ecological Restoration (2004). *The SER International Primer on Ecological Restoration*. Version 2. International Science and Policy Working Group.
- Soulé, M.E., Estes, J.A., Berger, J., and Del Rio, C.M. (2003). 'Ecological Effectiveness: Conservation Goals for Interactive Species'. *Conservation Biology* 17(5): 1238–1250. <http://dx.doi.org/10.1046/j.1523-1739.2003.01599.x>
- Soulé, M. and Noss, R. (1998). 'Rewilding and Biodiversity as Complementary Goals for Continental Conservation'. *Wild Earth* 22.
- Stankey, G.H. (1984). 'Limits of Acceptable Change: A New Framework for Managing the Bob Marshall Wilderness Complex'. *Western Wildlands* 10(3): 33–37.
- Stankey, G.H. and Clark, R.N. (1996). 'Frameworks for Decision Making in Management'. In *Proceedings of the 1996 World Congress on Coastal and Marine Tourism*. University of Oregon, Eugene, OR.
- Stankey, G.H., Cole, D.N., Lucas, R.C., Petersen, M.E., and Frissell, S.S. (1985). *The Limits of Acceptable Change (LAC) System for Wilderness Planning*. United States Department of Agriculture: Forest Service. <http://dx.doi.org/10.5962/bhl.title.109310>
- Stem, C., Margoluis, R., Salafsky, N., and Brown, M. (2005). 'Monitoring and Evaluation in Conservation: A Review of Trends and Approaches'. *Conservation Biology* 19: 195–309. <http://dx.doi.org/10.1111/j.1523-1739.2005.00594.x>
- Stevenson, M.G. (2006). 'The Possibility of Difference: Rethinking Co-Management'. *Human Organization* 65: 167–180. <http://dx.doi.org/10.17730/humo.65.2.b2dm8thgb7wa4m53>
- Stevens, S. (2010). 'Implementing the UN Declaration on the Rights of Indigenous Peoples and International Human Rights Law through the Recognition of ICCAs'. *Policy Matters* 17: 181–194.
- Stevens, S. (2014). *Indigenous Peoples, National Parks, and Protected Areas*. The University of Arizona Press, Tucson, AZ.
- Stevens, S. and De Lacy, T. (eds.) (1997). *Conservation through Cultural Survival: Indigenous Peoples and Protected Areas*. Island Press, Washington, DC.
- Stevens, S. and Pathak-Broome, N. (2014). *Appropriate Recognition and Respect for Indigenous Peoples' and Community Conserved*

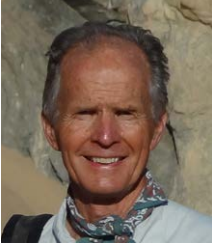
- Territories and Areas Which Overlap Protected Areas*. Draft manuscript for the ICCA Consortium.
- Stoll-Kleemann, S. (2010). 'Evaluation of Management Effectiveness in Protected Areas: Methodologies and Results'. *Basic and Applied Ecology* 11: 377–382. <http://dx.doi.org/10.1016/j.baae.2010.06.004>
- Stolton, S., Hockings, M., Dudley, N., MacKinnon, K., and Whitten, T. (2007). *Reporting Progress in Protected Areas A Site-Level Management Effectiveness Tracking Tool*. 2nd Edition. World Wildlife Fund, Gland, Switzerland.
- Stumpff, L.M. (2013). 'Living Waters: Linking Cultural Knowledge, Ecosystem Services, and Wilderness'. *International Journal of Wilderness* 19: 21–25.
- Survival International (2014). *On the 'wild', Human Imagination and Tribal Peoples*. available online at <<http://www.survivalinternational.org/articles/3174-wilderness-the-human-imagination-and-tribal-peoples>>.
- Sylvén, M., Martin, V., and Schenck, C. (2014). 'A Vision for a Wilder Europe'. *International Journal of Wilderness* 20(1).
- Tan, B.C., Chong, A., Lao, C., Tan-Takako, M., Shih-Tung, N., Tay, A., and Von Bing, Y. (2014). 'The Urban Pteridophyte Flora of Singapore'. *Journal of Tropical Biology and Conservation* 11: 13–26.
- Tarlock, A.D. (2003). 'Slouching Toward Eden: The Eco-Pragmatic Challenges of Ecosystem Revival'. In *Symposium, The Pragmatic Ecologist: Environmental Protection as Jurisdynamic Experience*. 97. Minn. L. Rev. 1173.
- Tasmania Parks and Wildlife Service (2013). *Evaluating Management Effectiveness: The Monitoring and Reporting System for Tasmania's National Parks and Reserves*. Hobart, Tasmania: Department of Primary Industries, Parks, Water and Environment.
- Tejpal, C. (2015). 'Searching for Arcadia: Private Nature Reserves and the Promise That They Hold'. *Sanctuary Asia* [online] 35 (10). <<http://www.sanctuaryasia.com/magazines/features/10099-searching-for-arcadia-private-nature-reservesand-the-promise-that-they-hold.html>>.
- The Deh Cho First Nations, The Government of Canada, and The Government of the Northwest Territories (2001a). *The Deh Cho First Nations Framework Agreement*.
- The Deh Cho First Nations, The Government of Canada, and The Government of the Northwest Territories (2001b). *The Deh Cho First Nations Interim Measures Agreement*.
- The Nature Conservancy (2014). *The Nature Conservancy Australia Conservation Review*. available from <<https://www.natureaustralia.org.au/wp-content/uploads/2015/01/Conservation-Review-2014.pdf>>.
- Theobald, D.M. (2013). 'A General Model to Quantify Ecological Integrity for Landscape Assessments and US Application'. *Landscape Ecology* 28: 1859–1874. <http://dx.doi.org/10.1007/s10980-013-9941-6>
- Thirgood, S., Mosser, A., Tham, S., Hopcraft, G., Mwangomo, E., Mlengeya, T., Kilewo, M., Fryxell, J., Sinclair, A.R.E., and Borner, M. (2004). 'Can Parks Protected Migratory Ungulates? The Case of the Serengeti Wildebeest'. *Animal Conservation* 7: 113–120.
- Thomas, L. and Middleton, J. (2003). *Guidelines for Management Planning of Protected Areas*. IUCN, Gland, Switzerland.
- Timko, J. and Satterfield, T. (2008). 'Criteria and Indicators for Evaluating Social Equity and Ecological Integrity in National Parks and Protected Areas'. *Natural Areas Journal* 28(3): 307–319. [http://dx.doi.org/10.3375/0885-8608\(2008\)28\[307:CAIFES\]2.0.CO;2](http://dx.doi.org/10.3375/0885-8608(2008)28[307:CAIFES]2.0.CO;2)
- Tsing, A. (2005). 'This Earth, This Island Borneo'. In *Friction*. pp. 155–170. Princeton University Press, Princeton, NJ.
- Turner, J.M. (2002). 'From Woodcraft to "Leave No Trace": Wilderness, Consumerism and Environmentalism in Twentieth-Century America'. *Environmental History* 7(3): 462–484. <http://dx.doi.org/10.2307/3985918>
- Turner, W.R., Nakamura, T., and Dinetti, M. (2004). 'Global Urbanization and the Separation of Humans from Nature'. *BioScience* 54(6): 585–590. [http://dx.doi.org/10.1641/0006-3568\(2004\)054\[0585:GUATSO\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2004)054[0585:GUATSO]2.0.CO;2)
- UNESCO (2005). *The Precautionary Principle: A Report by the World Commission on Ethics of Scientific Knowledge and Technology*.
- UNESCO World Heritage Committee (1993). *Convention Concerning the Protection of the World Cultural and Natural Heritage: Report of the Rapporteur*.
- UNESCO World Heritage Committee (1998). *Convention Concerning the Protection of the World Cultural and Natural Heritage: Report of the Rapporteur*.
- UNESCO World Heritage Committee (2000). 'uKhaqlamba / Drakensberg'. *Report on the 24th Session of the Committee, Cairns, Australia*.
- UNESCO World Heritage Committee (2011). 'Nahanni National Park North West Territories, Canada'. *Report on the 26th Session of the Committee, Paris*.
- UNESCO World Heritage Committee (2015a). *Convention Concerning the Protection of the World Cultural and Natural Heritage: Report of the Rapporteur*.
- UNESCO World Heritage Committee (2015b). 'Maloti-Drakensberg Park (Lesotho / South Africa)'. *Report on the 39th Session of the Committee, Bonn, Germany*.
- UN General Assembly (2007). 'United Nations Declaration on the Rights of Indigenous Peoples'. *United Nations*.
- United Nations (2013). *World Population Ageing. Department of Economic and Social Affairs, Population Division, New York*.
- United Nations (2014). *World Urbanization Prospects: The 2014 Revision, Highlights*. World Urbanization Prospects: The 2014 Revision, Highlights. (ST/ESA/SER.A/352).
- United States Fish and Wildlife Service, Arctic National Wildlife Refuge (2015). *Revised Comprehensive Conservation Plan*. Final Environmental Impact Statement, Executive Summary.
- United States Forest Service (2006). *Fact Sheet: El Toro Wilderness*. International Institute of Tropical Forestry.
- Unnasch, R.S., Braun, D.P., Comer, P.J., and Eckert, G.E. (2008). *The Ecological Integrity Assessment Framework: A Framework for Assessing the Ecological Integrity of Biological and Ecological Resources of the National Park System*. Report to the National Park Service.

- U.S. Department of the Interior (1993). *Visitor Impact and Resource Protection: A Process for Addressing Visitor Carrying Capacity in the National Park Service System*. National Park Service, Denver.
- U.S. Department of the Interior (1997). VERP: A Summary of the Visitor Experience and Resource Protection (VERP) Framework. National Park Service, Denver.
- Vaarzon-Morel, P. and Edwards, G. (2012). 'Incorporating Aboriginal People's Perceptions of Introduced Animals in Resource Management: Insights from the Feral Camel Project: RESEARCH REPORT'. *Ecological Management & Restoration* 13(1): 65–71. <http://dx.doi.org/10.1111/j.1442-8903.2011.00619.x>
- Van Wieren, G. and Kellert, S.R. (2013). 'The Origins of Aesthetic and Spiritual Values in Children's Experience of Nature'. *Journal for the Study of Religion, Nature and Culture* 7(3): 243–264. <http://dx.doi.org/10.1558/jsrnc.v7i3.243>
- Verschuuren, B. (ed.) (2010). *Sacred Natural Sites: Conserving Nature and Culture*. Earthscan, London.
- Walsh, R.G. and Loomis, J.B. (1989). 'The Non-Traditional Public Valuation of Wilderness'. In *Proceedings of the Wilderness Benchmark 1988. General Technical Report SE 61*. Asheville, NC.
- Wadzinski, L. (2007). 'Wild Cemeteries?' In *Science and Stewardship to Protect and Sustain Wilderness Values: Eighth World Wilderness Congress Symposium; September 30-October 6, 2005; Anchorage, AK*. Proceedings RMRS-P-49. pp. 59-64. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Watson, A. (2013). 'The Role of Wilderness Protection and Societal Engagement as Indicators of Well-Being: An Examination of Change at the Boundary Waters Canoe Area Wilderness'. *Soc Indic Res* 110: 597–611. <http://dx.doi.org/10.1007/s11205-011-9947-x>
- Watson, A. and Borrie, W. (2003). 'Applying Public Purpose Marketing in the USA to Protect Relationships with Public Land'. In *Nature-Based Tourism, Environment and Land Management*. pp. 25-33. CABI Publishing, Cambridge, Massachusetts. <http://dx.doi.org/10.1079/9780851997322.0025>
- Watson, A. and Borrie, W. (2006). 'Monitoring the Relationship between the Public and Public Lands: Application to Wilderness Stewardship in the U.S.'. In *Monitoring Science and Technology Symposium: Unifying Knowledge for Sustainability in the Western Hemisphere Proceedings RMRS-P-42CD*. pp. 287-293. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Watson, A., Alessa, L., and Glaspell, B. (2003). 'The Relationship between Traditional Ecological Knowledge, Evolving Cultures and Wilderness Protection in the Circumpolar North'. *Conservation Ecology* 8(1): 1–13.
- Watson, A., Carver, S., Matt, R., Gunderson, K., and Davis, B. (2013). 'Place Mapping to Protect Cultural Landscapes on Tribal Lands'. In *Place-Based Conservation*. Springer Netherlands, 211–222. http://dx.doi.org/10.1007/978-94-007-5802-5_16
- Watson, A. and Cole, D.N. (1992). *LAC Indicators: An Evaluation of Progress and List of Proposed Indicators*. USDAFS, Recreation, Cultural Resources and Wilderness Management Staff, Washington, D.C.
- Watson, A., Cordell, H.K., Manning, R., and Martin, S. (2015). 'The Evolution of Wilderness Social Science and Future Research to Protect Experiences, Resources, and Societal Benefits'. *Journal of Forestry*.
- Watson, A.E., Cole, D.N., Turner, D.L., and Reynolds, P.S. (2000). *Wilderness Recreation Use Estimation: A Handbook of Methods and Systems*. Gen. Tech. Rep. RMRS-GTR-56. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Watson, A.E. and Cordell, H.K. (2014). 'Take a Scientist to the Sauna! A Great Way to Keep Science and Stewardship Working Together for Another 50 Years'. *International Journal of Wilderness* 20(2): 3–13.
- Watson, A.E., Patterson, M., Christensen, N., Puttkammer, A., and Meyer, S. (2004). 'Legislative Intent, Science and Special Provisions in Wilderness: A Process for Navigating Statutory Compromises'. *International Journal of Wilderness* 10(1): 22–26.
- Watson, A., Glaspell, B., Christensen, N., Lachapelle, P., Sahanatian, V., and Gertsch, F. (2007). 'Giving Voice to Wildlands Visitors: Selecting Indicators to Protect and Sustain Experiences in the Eastern Arctic of Nunavut'. *Environmental Management* 40: 880–888. <http://dx.doi.org/10.1007/s00267-007-9019-9>
- Watson, A., Martin, S., Christensen, N., Fauth, G., and Williams, D. (2015c). 'The Relationship between Perceptions of Wilderness Character and Attitudes toward Management Intervention to Adapt Biophysical Resources to a Changing Climate and Nature Restoration at Sequoia and Kings Canyon National Parks'. *Environmental Management* 56: 653–663. <http://dx.doi.org/10.1007/s00267-015-0519-8>
- Watson, A., Martin, V., and Lin, C.C. (2009). 'Wilderness: An International Community Knocking on Asia's Door'. *Journal of National Park* 19(4): 1–9.
- Watson, A., Matt, R., Knotek, K., Williams, D.R., and Yung, L. (2011). 'Traditional Wisdom: Protecting Relationships with Wilderness as a Cultural Landscape'. *Ecology and Society* 16(1): 36.
- Watson, A., Roian, M., Waters, T., Gunderson, K., Carver, S., and Davis, B. (2008). *Mapping Tradeoffs in Values at Risk at the Interface between Wilderness and Non-Wilderness Lands*. Proceedings: III International Symposium on Fire Economics, Planning, and Policy: Common Problems and Approaches, 29 April – 2 May, 2008. Gen. Tech. Rep. PSW-GTR-227. US Department of Agriculture, Forest Service, Pacific Southwest Research Station, Carolina, Puerto Rico.
- Watson, A., Schwaller, A., Dvorak, R.G., Christensen, N., and Borrie, W.T. (2013b). 'Wilderness Managers, Wilderness Scientists, and Universities: A Partnership to Protect Wilderness Experiences in the Boundary Waters Canoe Area Wilderness'. *International Journal of Wilderness* 19(1): 41–42.
- Watson, A., Stumpff, L.M., and Meidinger, J. (2012). 'Traditional Wisdom and Climate Change: Contribution of Wilderness Stories to Adaptation and Survival'. *International Journal of Wilderness* 18(2): 21–25.
- Watson, J.E.M., Shanahan, D.F., DiMarco, M., Allan, J., Laurance, W.F., Sanderson, E.W., Mackey, B., and Venter, O. (2016). 'Catastrophic Declines in Wilderness Areas Undermine Global Environment Targets'. *Current Biology* 26(1-6). <http://dx.doi.org/10.1016/j.cub.2016.08.049>
- Watson, J.E.M., Dudley, N., Segan, D.B., and Hockings, M. (2014). 'The Performance and Potential of Protected Areas'. *Nature* 515: 67–73. <http://dx.doi.org/10.1038/nature13947>

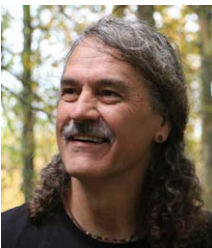
- Watson, J.E.M., Iwamura, T., and Butt, N. (2013). 'Mapping Vulnerability and Conservation Adaptation Strategies in a Time of Climate Change'. *Nature Climate Change* 3: 989–994. <http://dx.doi.org/10.1038/nclimate2007>
- Weaver, P.L. (2011). 'El Toro Wilderness, Luquillo Experimental Forest, Puerto Rico'. In *Science and Stewardship to Protect and Sustain Wilderness Values*, '9th World Wilderness Congress symposium'. held 2011 at Meridan, Yucatan, Mexico. Proceedings RMRS-P-64. pp. 95-108. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Weick, K. (1995). *Sensemaking in Organizations*. Sage Publications, Thousand Oaks, CA.
- West, P. (2006). *Conservation Is Our Government Now: The Politics of Ecology in Papua New Guinea*. New ecologies for the twenty-first century. Duke University Press, Durham. <http://dx.doi.org/10.1215/9780822388067>
- West, P. and Brockington, D. (2006). 'An Anthropological Perspective on Some Unexpected Consequences of Protected Areas'. *Conservation Biology* 20(3): 609–616. <http://dx.doi.org/10.1146/annurev.anthro.35.081705.123308>
- West, P., Igoe, J., and Brockington, D. (2006). 'Parks and People: The Social Impact of Protected Areas'. *Annual Review of Anthropology* 35: 251–277. <http://dx.doi.org/10.1146/annurev.anthro.35.081705.123308>
- Whiting, A. (2004). 'The Relationship between Qikiktagrugmiut (Kotzebue Tribal Members) and the Western Arctic Parklands, Alaska, United States'. *International Journal of Wilderness* 10(2): 28–31.
- Wild, R. and McLeod, C. (eds.) (2008). *Sacred Natural Sites: Guidelines for Protected Area Managers*. IUCN, Gland, Switzerland. <http://dx.doi.org/10.2305/iucn.ch.2008.pag.16.en>
- Wild Europe Initiative (2013). *A Working Definition of European Wilderness and Wild Areas*. Wild Europe Initiative, London.
- Wilderness Act (1964). *Public Law 88-577* (16 USC 1131-1136). 88th Congress, 2nd Session.
- Wilderness Watch (2009). *Wilderness Stewardship Concepts & Principles*. available from <<http://wildernesswatch.org/stewardship-concepts>>.
- Wilson, E.O. (2016). *Half-Earth: Our Planet's Fight for Life*. W. W. Norton, New York.
- Woodley, S. (2010). 'Ecological Integrity and Canada's National Parks'. *George Wright Forum* 27: 151–160.
- Worboys, G., Francis, W., and Lockwood, M. (eds.) (2010). *Connectivity Conservation Management: A Global Guide*. Earthscan, London.
- Worboys, G.L., Ament, R., Day, J.C., Locke, H., McClure, M., Tabor, G., and Woodley, S. (eds.) (2015a). *Consultation Draft, Guidelines for Connectivity Conservation: Part One, Definition: Connectivity Conservation Area*. IUCN, Gland, Switzerland.
- Worboys, G.L., Ament, R., Day, J.C., McClure, M., Pittock, J., Tabor, G., and Woodley, S. (eds.) (2015b). *Consultation Draft, Guidelines for Connectivity Conservation: Part Two, Connectivity Conservation Area Types; Criteria for Establishment; and, Governance*. IUCN, Gland, Switzerland.
- Worboys, G.L., Lockwood, M., Kothari, A., Feary, S., and Pulsford, I. (eds.) (2015). *Protected Area Governance and Management*. ANU press, Canberra.
- World Wildlife Fund (2015). *Protected Areas: Natural Solutions to Climate Change; Living Amazon Initiative Project, Policy Brief*. Amazon Vision: Protected Areas Natural Solutions to Climate Change.
- Wuerthner, G., Crist, E., and Butler, T. (eds.) (2014). *Keeping the Wild: Against the Domestication of Earth*. Island Press, London. <http://dx.doi.org/10.5822/978-1-61091-559-5>
- Zinn, H.C. and Graefe, A.R. (2007). 'Emerging Adults and the Future of Wild Nature'. *International Journal of Wilderness* 13(3): 16–22.



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