



World Heritage, Wilderness, and Large Landscapes and Seascapes

Cyril F. Kormos, Tim Badman, Tilman Jaeger, Bastian Bertzky,
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Foreword

As the global climate change and biodiversity crises accelerate, the importance of protecting areas with a high degree of ecological integrity becomes ever more apparent for both biodiversity conservation and human wellbeing. On a planet where destruction, degradation and fragmentation of natural habitats are progressing at an alarming rate, wilderness areas are critical for many reasons. They protect extensive carbon stores and some of the highest levels of biodiversity; they provide important services, including clean freshwater, and are most resilient to global climate change. They are also home to Indigenous Peoples and local communities, whose livelihoods and cultures frequently depend on large, ecologically intact areas, and who have protected these wild places, often for thousands of years. In short, wilderness areas provide natural solutions to many of the world's most pressing environmental challenges.

From the Galapagos Islands, Yosemite National Park, Tasmanian Wilderness, Lorentz National Park the World

Heritage Convention has played a major role in protecting many of the world's largest and most iconic wilderness areas. Nevertheless, there is scope for the World Heritage Convention to make an even more significant and systematic contribution to wilderness conservation and large landscapes and seascapes – not just by helping to protect very large, wild areas, but also by recognizing these areas as biocultural landscapes, and, crucially, by upholding the rights of their indigenous and community stewards. This thematic study provides pragmatic guidance to the Convention and its many partners for strengthening protection of wilderness by promoting the profound linkages between culture and wild nature. I sincerely hope that it will serve as a catalyst for helping to further protect wilderness areas of Outstanding Universal Value.

Kathy MacKinnon
Chair, IUCN-WCPA

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We note that IUCN is fully respectful of the primary roles of ICOMOS and ICCROM as Advisory Bodies on cultural heritage; any comments on nature-cultural values in this text are not intended to prejudge where cultural Outstanding Universal Value might be found.

Abbreviations and acronyms

EEZ	Exclusive Economic Zone
ETPMC	Eastern Tropical Pacific Marine Corridor
ICRROM	International Centre for the Study of the Preservation and Restoration of Cultural Property
ICOMOS	International Council on Monuments and Sites
IUCN	International Union for Conservation of Nature
KAZA-TFCA	Kavango-Zambezi Tranfrontier Conservation Area
LoW	Last of the Wild
MEWT	Minister of the Environment, Wildlife and Tourism (Botswana)
NGO	Non-Governmental Organization
NWHS	Natural and Mixed World Heritage Site
OUV	Outstanding Universal Value
PIPA	Phoenix Islands Protected Area
SERNANP	Servicio Nacional de Áreas Naturales Protegidas por el Estado (Peru)
SoOUV	Statement of Outstanding Universal Value
UNEP-WCMC	United Nations Environment Programme World Conservation and Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WDPA	World Database on Protected Areas
WPC	IUCN World Parks Congress
Y2Y	Yellowstone to Yukon Conservation Initiative

Executive summary

This thematic study focuses on the contribution the Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO 1972), commonly known as the World Heritage Convention (“the Convention”), can make to wilderness conservation around the world.

Chapter 1 first reviews the definition of the term “wilderness” and summarizes the reasons why wilderness conservation is a critical conservation objective. Chapter 1 then provides a brief discussion of some of the key aspects of the World Heritage Convention, and suggests that an even more systematic wilderness approach would be important to further some of the Convention’s key objectives, including maintaining the integrity of existing sites in the face of rapid global change, promoting the goal of a credible and representative World Heritage List (UNESCO 2011a, UNESCO 2015), and achieving better integration of natural and cultural heritage.

Chapter 2 highlights the fact that wilderness areas and large landscapes and seascapes are often home to Indigenous Peoples whose survival and cultural integrity are closely linked to these areas. Chapter 2 assesses the important leadership role the Convention can play in shifting conservation thinking and practice with respect to ensuring biocultural integrity and social equity, and in particular recognizing Indigenous Peoples not just as stakeholders but also as rights holders. Chapter 2 also notes the on-going efforts by IUCN, ICOMOS and ICCROM to connect practice and build the capacity of heritage practitioners as a crucial contribution towards creating the space and the tools for integrated and equitable conservation approaches.

Chapter 3 reviews Statements of Outstanding Universal Value (SoOUV) for the numerous natural and mixed World Heritage sites that have been inscribed on the World Heritage List for their wilderness values or where wilderness is key to the conditions of integrity that lead to a site’s Outstanding Universal Value. This chapter reviews the types of sites that the Convention has already recognized as wilderness at a protected area scale, providing a crucial guide for what might qualify for inscription in the future.

Chapter 4 reviews the extent to which natural and mixed World Heritage sites overlap with global-scale terrestrial and marine wilderness. This analysis makes it possible to assess

broad gaps in coverage of global-scale wilderness areas on the World Heritage List, which in turn makes it possible to identify regions where wilderness sites with potential Outstanding Universal Value might be found in the future.

Chapter 5 summarizes the activities that are necessary for implementing a wilderness and large landscape and seascapes approach under the Convention. These include two broad categories of activities. The first category involves assessing existing World Heritage sites to gauge whether they are sufficiently large and/or connected to other protected areas to maintain their integrity into the future, or with a view to expanding sites to better recognize nature-culture linkages. The second category includes nominating new wilderness World Heritage sites to fill gaps in wilderness coverage, while ensuring that these new sites are also sufficiently large and/or connected to other protected areas to maintain their values. Chapter 5 also reviews the tools that are available under the Convention to facilitate these activities and suggests policy innovations that could further facilitate a wilderness and large landscapes and seascapes approach.

Finally, we conclude with five case studies describing indigenous and community relationships with wilderness and large landscapes and seascapes that are partially or completely covered by World Heritage sites. The four sites are the Golden Mountains of Altai in the Russian Federation, Kakadu National Park in Australia, Manú National Park in Peru, the Okavango Delta in Botswana and Papahānaumokuākea in the United States. The purpose of these case studies is to give voice on complex issues relating to biocultural landscapes, World Heritage and protected areas to Indigenous Peoples and communities themselves. A second purpose is to express the profound personal dimension of protecting wild nature: the need for an individual (i.e. not just societal) ethical commitment to conserving wild places, the need for reciprocity between human beings and wild landscapes and seascapes and the profound spiritual dimension of this relationship.



1. The need for a wilderness and large landscapes and seascapes approach under the World Heritage Convention

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Introduction

The 2014 IUCN World Parks Congress (WPC), held in Sydney, Australia provided a once-in-a-decade opportunity to assess progress towards global conservation objectives. The results, summarized in the WPC's declaration, the Promise of Sydney (IUCN 2014), and mirrored in the Convention on Biological Diversity's *Global Biodiversity Outlook 4* (SCBD 2014), were sobering: although more of the planet's land and sea is under conservation management than ever before (UNEP-WCMC and IUCN 2016, Watson et al. 2014), biodiversity loss continues unabated and an increasing number of biologists believe we have now entered Earth's sixth mass extinction crisis, the first to be caused by humans (Ceballos et al. 2015, Dirzo et al. 2014, Wake & Vredenburg 2008). Climate change is accelerating, with significant upward revisions of expected sea level rise by the end of the century if emissions continue unabated (DeConto and Pollard 2016) as well as increased risk of drought and extreme storms (Hansen et al. 2015). Invasive alien species are also a major threat in both marine and terrestrial environments, a problem which is exacerbated by climate change (SCBD 2014). Humans have now seriously modified at least half the terrestrial Earth (Venter et al. 2016), not only clearing habitat but also degrading and fragmenting what remains (Brinck et al. 2017, Ibisch et al. 2016, Haddad et al. 2015). Some scientists warn that we have destroyed, degraded and fragmented our natural environment so extensively that we may be approaching a global "state-shift" (Barnosky 2012, Ostberg et al. 2014), an ecological transformation which could exceed the changes brought about by the end of the last ice age. Meanwhile, some geologists are suggesting that the systematic degradation of our planet has propelled us into a new geological epoch called the Anthropocene (Waters et al. 2016). Much of this change is brought about by industrial activity, including oil and gas extraction, mining, industrial logging, agriculture, transportation infrastructure and large hydropower projects (MA 2005, Laurance et al. 2014, Mackey et al. 2014). The scale of this degradation and loss of biodiversity, if unchecked, threatens our planet's life support systems (Newbold et al. 2016, Steffen et al. 2015, Rockstrom et al. 2009).

Fortunately, solutions are at hand. There is increasingly strong consensus that conserving significantly more of the planet in protected areas of all governance types, whether established and managed by governments, communities, Indigenous Peoples

or private entities, or some combination thereof, is necessary to address both the biodiversity and climate change crises (Dinerstein et al. 2017, Wilson 2016, Houghton et al. 2015). The evidence also indicates that when protected areas of all governance types have sufficient funding, political support and management capacity, as well as support from local communities, they are effective at conserving biodiversity (Gray et al. 2016, Beaudrot et al. 2016, Bradshaw et al. 2015, Coetzee et al. 2014, Watson et al. 2014, Hoffman et al. 2010). Biodiversity protection through protected areas in turn underpins climate change mitigation and adaptation: protected areas provide natural solutions to the climate change crisis by storing large, and often increasing stocks of carbon (Melillo et al. 2015), providing opportunities for adaptation (Soares-Filho et al. 2010, Ricketts et al. 2010) and contributing to disaster risk reduction (Dudley et al. 2013).

In addition to providing solutions to the climate change and biodiversity crises, protected areas also provide a wide range of other essential ecosystem services (Figgis et al. 2015, MA 2005). For example, they often play a major role in regulating the quality and flow of freshwater (Figgis et al. 2015). They also help safeguard cultural integrity and diversity as well as livelihoods and food security (Maffi 2002, Turner et al. 2012, Sobrevilla 2008). Protected areas (and more broadly, spending time in wild nature) are also increasingly recognized for their contribution to physical, mental and spiritual health, from reduced risks from disease to lower stress levels (Worboys et al. 2015, Myers et al. 2013).

Recognition of these extensive benefits has resulted in many recent calls for a significant scaling up of the global protected areas estate (Wilson 2016, Dinerstein et al. 2017, Butchart et al. 2015, IUCN 2014, Noss et al. 2012, CBD 2010). However, a global protected areas strategy must also include more large and intact areas of land and sea, including wilderness, before they vanish, and these areas should be interconnected to the extent possible (Wilson 2016, Watson et al. 2016, Wuerthner et al. 2015, Worboys et al. 2010). These larger, more ecologically intact areas are vitally important as they provide greater biodiversity and ecosystem service benefits than smaller and more disturbed areas, including urgently needed to help address the climate change crisis (Martin and Watson 2016).

This thematic study focuses on the contribution the Convention Concerning the Protection of the World Cultural

and Natural Heritage (UNESCO 1972), commonly known as the World Heritage Convention (“the Convention”), can make to wilderness conservation around the world. In this introductory chapter we briefly review the definition of the term “wilderness” and summarize the reasons why wilderness conservation is a critical conservation objective. We then provide a brief discussion of some of the key aspects of the World Heritage Convention and suggest that although the Convention already makes a very substantial contribution to conservation of wilderness and large landscapes and seascapes globally, an even more systematic wilderness approach under the Convention would be important to further some of the Convention’s key objectives. In particular, a more systematic wilderness approach would help maintain the integrity of existing sites in the face of rapid global change, would promote the goal of establishing a credible and representative World Heritage List (UNESCO 2011a, UNESCO 2015) and would help achieve better integration of natural and cultural heritage, which in many wilderness areas are closely linked (Kormos et al. 2015).

Chapter 2 of this guidance addresses the crucial issues of nature-culture linkages in natural, mixed and even many cultural World Heritage sites, and the need for rights-based approaches in all aspects of implementation of the Convention. In Chapter 3 we assess key attributes of wilderness under each of the four “natural” criteria under the Convention and review the Statements of Outstanding Universal Value of existing natural and mixed World Heritage sites to identify sites with globally important wilderness values at a protected area scale. In Chapter 4 we use recent global datasets of human impact on terrestrial and marine environments to map global-scale wilderness areas and we overlay these maps of wilderness areas on the existing World Heritage network to help identify broad gaps in wilderness coverage at global scales. Chapter 5 concludes with a brief review of existing tools and policy innovations under the Convention that could enable a wilderness approach. Finally, we also include five case studies to illustrate the importance of nature-culture linkages in large, highly biologically intact World Heritage sites around the world.

Wilderness defined

We use the term wilderness to describe landscapes and seascapes that are biologically and ecologically largely intact, with a low human population density and that are mostly free of industrial infrastructure (Kormos et al. 2015, Kormos 2008, Watson et al. 2009, Mittermeier et al. 2003, Watson et al. 2016). The term “wilderness” is therefore not exclusive of people, but rather of human uses resulting in significant biophysical disturbance. As a result, wilderness quality is often defined in terms of remoteness from urban settlements and modern infrastructure and the degree of ecological impacts from industrial activity (Kormos et al. 2015, Venter et al. 2016, Mittermeier et al. 2003). However, the term is not meant to suggest an area must be completely “pristine” or “untouched” as there are few places on Earth that meet this standard in an

era of climate change and global pollution (Venter et al. 2016, Halpern et al. 2016). However, wilderness areas should be largely ecologically intact, and, as noted in Chapter 3, several World Heritage sites are recognized for being in some of the most remote and pristine locations on the planet.

It is also critical to recognize that for many Indigenous Peoples and local communities the term “wilderness” is problematic. For most, and perhaps all, indigenous cultures, wild nature is not a space separate or distinct from humanity, but rather forms an integral part of customary world views, territories and practices. The term “wilderness” has also been associated with exclusion of Indigenous Peoples and local communities from their customary lands – or with restrictions on customary practices and livelihoods. We emphasize that our use of the term is to indicate large, mainly biologically intact landscapes and seascapes which do not exclude people, but rather limit certain, mainly industrial, uses that would cause significant disturbance. We further emphasize, as noted in Chapter 2 and the case studies at the conclusion of this document, that the term as we use it is entirely consistent with customary ownership, uses, values and practices, that many wilderness areas remain intact because of indigenous and community stewardship and that in many cases wilderness areas are also essential for maintaining bio-cultural integrity and customary livelihoods. Finally, we note that, in terms of the World Heritage Convention, this analysis further reinforces the essential need for IUCN, ICOMOS and ICCROM to work together to unite approaches to natural and cultural heritage conservation.

Why wilderness protection is necessary

Wilderness is fast disappearing around the world (Potapov et al. 2017, Watson et al. 2016, Mittermeier et al. 2003): we urgently need to create larger protected areas in places that are still mainly ecologically intact and to ensure these still wild areas are interconnected to the extent possible (Wilson 2016, Wuerthner et al. 2015). Conservation of these remaining large wilderness areas is important for many reasons. They are crucial for biodiversity because smaller areas tend to lose much of their biodiversity over time, in particular wide-ranging mammals and migratory species that need large, intact areas to persist and require wildlife corridors to travel across large landscapes (Wuerthner et al. 2015, Noss et al. 2012, Worboys et al. 2010, Laliberte & Ripple 2004, Berger 2004, Soulé and Terborgh 1999). Larger areas are also important to maximize ecosystem services, for example to protect globally significant carbon stocks (Martin and Watson 2016) or to ensure a high quality freshwater supply (Watson et al. 2016). Wilderness areas are also important as “control” areas, i.e. as benchmarks for natural ecological processes, to understand what an intact ecosystem should contain, and as a foundation for restoring degraded areas (Dawson and Hendee 2009). As seen in Chapter 2, and in the case studies at the conclusion of this document, in many cases, wilderness areas, and secure tenure rights to wilderness areas, also help maintain cultural integrity and

sustain livelihoods. Last but not least, respect for life on Earth and protecting intact, wild areas is fundamentally important from an ethical standpoint: respect for the integrity of life on Earth is deeply rooted across cultures and belief systems – and an ethical responsibility at an individual level. Wilderness conservation must not fall victim to short-term development planning and globalizing lifestyles and consumption patterns.

The good news is that dozens of large-scale connectivity conservation initiatives are moving forward around the world, across borders and often at continental scales – from the Yellowstone to Yukon Conservation Initiative (Y2Y) in North America to the Eastern Tropical Pacific Marine Corridor (ETPMC or CMAR in Spanish) between Costa Rica, Panama, Colombia and Ecuador to the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA) in Botswana, Namibia, Angola, Zambia and Zimbabwe. The Kurupukari Plan of Action was agreed in 2014 to help protect the most intact tropical rain forest left on Earth covering large portions of Suriname, Guyana, and Venezuela, the French overseas department of French Guiana and the northernmost parts of the Brazilian Amazon (GSF 2014).

An interesting common feature of these large-scale connectivity conservation initiatives is that they all include large wilderness protected areas that are also some of the planet's most iconic natural World Heritage sites: from Canaima National Park in the Guiana Shield, to the Okavango Delta in the KAZA TFCA, to Yellowstone National Park and Waterton-Glacier International Peace Park (the first peace park in the world) in Y2Y to the Galapagos Islands in the ETPMC. Many of these initiatives also include large areas of indigenous and community conservation, demonstrating the importance of combining the conservation of wilderness with social equity and biocultural integrity. Thus, the Convention is already making a vital contribution to both wilderness conservation and continental-scale connectivity conservation initiatives.

The World Heritage Convention in a nutshell

The Convention protects cultural and natural heritage of “Outstanding Universal Value” (OUV) around the world (UNESCO 1972). Sites with OUV are defined in the Convention's Operational Guidelines as places “so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity” (UNESCO 2015). The Operational Guidelines identify ten criteria for defining OUV, of which four address natural sites. These natural criteria include aesthetic value (vii), geological value (viii), ecological and biological processes (ix) and biodiversity (x). The Operational Guidelines also require that potential World Heritage sites demonstrate both “integrity”, meaning that the natural values for which they are nominated must be intact and must contain all the elements needed to represent their OUV, as well as good protection and management, meaning the nominating States Parties must demonstrate their willingness and capacity to maintain

OUV in perpetuity. The World Heritage criteria, integrity, and protection and management requirements constitute the three pillars of OUV.

Sites with OUV are inscribed on the World Heritage List (“the List”) and the Convention's Global Strategy (UNESCO 2011a), as well as its Operational Guidelines (UNESCO 2015), call on States Parties to develop a “balanced, representative and credible” List of the world's cultural and natural heritage. However, inscribing sites on the World Heritage List is not the primary objective of the Convention. Crucially important is that all States Parties to the Convention incur a collective responsibility to cooperate in the protection of all World Heritage sites to ensure that their OUV is sustained (or enhanced) in perpetuity. Thus, the core of the Convention is protection and conservation of heritage, rather than inscription on the World Heritage List.

The need for a more systematic approach to wilderness conservation under the World Heritage Convention

Looking at a global map of World Heritage sites, it is apparent that many sites are among the largest and wildest protected areas on Earth. From the Central Amazon Conservation Complex (over 5 million hectares, an area larger than Switzerland) in Brazil to the Kluane / Wrangell-St. Elias / Glacier Bay / Tatshenshini-Alsek complex shared by the United States and Canada (almost 10 million hectares, roughly the size of South Korea) to the Air and Ténéré Natural Reserves (almost 8 million hectares) in Niger, many of the world's largest terrestrial protected areas are on the World Heritage List. Several marine sites are even more impressive in scale. The Phoenix Islands Protected Area (PIPA) of Kiribati, at almost 41 million hectares, is the largest World Heritage site on Earth. Papahānaumokuākea in the United States is over 36 million hectares and the Great Barrier Reef in Australia is almost 35 million hectares. Many large sites, for example in North America (Canadian Rocky Mountain Parks) and in Africa (Selous Game Reserve, Tanzania) have areas within them that are legally designated as wilderness within their respective protected area systems (Kormos 2008).

At the same time, as one of only two site-based global environmental conventions (the other is the Ramsar Convention), the Convention could make an even more methodical contribution to wilderness conservation around the world. There are many reasons why a wilderness and large landscape and seascape approach to the World Heritage Convention is important for the good implementation of the Convention. These are detailed further below.

Gaps in coverage: Towards a more balanced, credible and representative World Heritage List

As detailed in Chapter 4, there are still large wilderness areas with potential Outstanding Universal Value that have few or no

World Heritage sites. Filling these gaps on the World Heritage List is necessary to ensure a balanced, credible and representative List as called for by the Convention's Global Strategy (UNESCO 2011a) and Operational Guidelines (UNESCO 2015). This is also becoming increasingly urgent as intact areas around the world are rapidly becoming scarcer because of degradation, destruction and fragmentation (Potapov et al. 2017, Watson et al. 2016, Venter et al. 2016, Haddad et al. 2015, Mittermeier et al. 2003). Adding additional wilderness areas to the World Heritage List should therefore be a priority.

Integrity: The need for large sites and ensuring connectivity

In many cases, meeting the Convention's requirement that sites maintain their integrity will likely necessitate expanding World Heritage sites and/or adding, consolidating or expanding their buffer zones or adding new components. It will also require ensuring connectivity between World Heritage sites and other protected areas (including potentially other World Heritage sites), because the integrity of many sites is linked to biodiversity and functioning ecological processes that require large, inter-connected areas for their conservation. For example, wide-ranging mammals such as grizzly bear in North American World Heritage sites must be able to move freely between areas of suitable habitat to sustain viable populations (Chester et al. 2012, Berger 2004). The absence of large predators can change community composition, dynamics, and vegetation structure (Ripple et al. 2014), which in turn can degrade a site's Outstanding Universal Value. Wilderness areas also help maintain ecologically effective populations of keystone and other highly interactive species at regional scales (Soulé et al. 2004). Similarly, marine World Heritage sites may be compromised unless connected to other terrestrial or marine conservation areas. The Eastern Tropical Pacific Marine Corridor, for example, links several coastal and marine World Heritage sites and other protected areas to help protect wide-ranging or migratory species and to ensure the integrity of key processes, such as larvae dispersal, and to address land-based threats to the marine environment (Ervin et al. 2010).

Great animal migrations and aggregations are spectacular natural phenomena and form the basis for the Outstanding Universal Value of numerous World Heritage sites. These phenomena are integral elements of large-scale ecological processes, making major contributions to resource fluxes, transport, predator-prey interactions and food-web structure within and among ecosystems (Bauer et al. 2014) and often playing an essential role in customary livelihoods. However, they are in serious decline globally (Wilcove 2008) and are often insufficiently protected by World Heritage and other protected areas (Berger 2004).

As in most, if not all protected areas, the integrity of World Heritage tends to be linked to areas to which they are not directly physically connected. Degradation of these areas can lead to species loss and compromised ecological processes in World Heritage sites. For example, Lake Natron in Tanzania, itself not on the List, is the breeding and nesting site of the

lesser flamingo, and thus critical for the integrity of the Kenya Lake System in the Great Rift Valley World Heritage site (UNESCO 2011b). However, the World Heritage Committee noted in 2014 (Decision 38 COM 7B.91) that Lake Natron is threatened by soda ash mining.

Integrity: Responding to climate change

Maintaining the integrity of many World Heritage sites will also require adapting to rapid climate change (Osipova et al. 2014a, UNESCO 2014). Species have adapted to past climate change events using four strategies: dispersal; phenotypic plasticity; micro-evolution; and retreat to refugia (Mackey et al. 2008). From the standpoint of protected areas and protected area networks, conserving large intact landscapes and seascapes (Magris et al. 2014) is therefore an essential response to climate change (Hilty et al. 2012, Watson et al. 2013) because they can protect multiple source populations across the environmental gradients occupied by the species, and maximize intra-species genetic diversity and thus options for local adaptation and phenotypic plasticity (Mackey et al. 2008). It will also ensure that features such as topography or geology are protected, which may facilitate dispersal or retreat to refugia (Watson et al. 2009, Shoo et al. 2011). Protecting large intact areas and ensuring connectivity between them will also sustain large-scale ecological processes, such as disturbance regimes, that in turn sustain habitat resources, constitute selective forces to which species are adapted, or otherwise influence community composition (Soulé et al. 2004). Finally, large, intact ecosystems, such as primary forests, tend to be more resilient to climate change impacts as well as many other threats compared to disturbed areas (Thompson et al. 2009).

Some World Heritage sites are taking steps to incorporate climate change adaptation into site design. For example, the boundaries of Mount Kenya National Park / Natural Forest in Kenya were expanded to include the Lewa Wildlife Conservancy and Ngare Ndare Forest, as well as a corridor to these new areas to allow elephants and other species to disperse (UNESCO 2014). Similarly, the Guanacaste Conservation Area in Costa Rica was expanded to link coastal areas to mountain ranges (UNESCO 2014). However, most sites have not yet taken similar measures (UNESCO 2014).

On the other hand, many World Heritage sites are becoming more important as providers of nature-based solutions to climate change, including disaster risk reduction through coastal protection and flood regulation. This is particularly true in the regions which are predicted to become more vulnerable to cyclones and other severe weather events, as is the case in the Sundarbans region where two World Heritage sites – The Sundarbans in Bangladesh and Sundarbans National Park in India – protect areas of the largest mangrove forest in the world (Osipova et al. 2014b).

Integrity: Preventing threats from development pressures

The integrity requirement also plays a key role in helping to minimize development impacts and pressures and threats

to World Heritage sites. The Convention was established in response to international concern that some of the most extraordinary places around the world were being destroyed or were threatened with destruction (UNESCO 1972). As a result, sites inscribed on the World Heritage List have long been considered no-go zones for industrial extractive activity and other large-scale industrial projects, a point that has been reinforced in numerous World Heritage Committee decisions and industry commitments (see IUCN 2013 for a useful overview). Although many sites are nonetheless under threat despite their World Heritage status, the no-go principle for extractive activities is increasingly adhered to and respect for the Convention and its conservation objectives have led to many exemplary decisions by States Parties in recent years (IUCN 2013). Governments have canceled extractive concessions in nominated sites to ensure World Heritage listing (e.g. in the Okavango Delta in Botswana), made explicit no-go commitments for inscribed sites (e.g. the Tasmanian Wilderness in Australia) and canceled concessions outside of World Heritage sites that might nonetheless impact World Heritage sites (e.g. Waterton-Glacier International Peace Park shared by Canada and the United States). Companies are foregoing concessions in World Heritage sites, recognizing that these should not have been awarded, industry groups are recognizing World Heritage sites as no-go zones as a matter of policy, companies are refusing products sourced in World Heritage sites and banks are refusing to fund projects in World Heritage sites. The Convention is therefore an effective mechanism to reduce or eliminate threat and maintain the ecological integrity of large areas.

Nature-culture linkages

Another element that makes the Convention particularly well suited for conservation of wilderness and large landscapes and seascapes is that it is the only international agreement which focuses on both nature and culture. As described in Chapter 2, these two elements are still to a large extent treated separately within the Convention's work, although this is changing through growing collaboration of IUCN, ICOMOS and ICCROM. Some wilderness areas were thus nominated without recognizing longstanding cultural relationships and values. However, progress is being made in identifying linkages and synergies to realize the considerable potential for recognizing and conserving both nature and culture together.

In many cases, cultural practices have co-evolved with a wilderness landscape or seascape, so that the natural and cultural values have been mutually shaped and defined. Even where this may not be the case, culture and nature may be inextricably linked where indigenous cultures have been long-standing stewards of the land, ensuring an area's ecological integrity. Indeed, Indigenous Peoples and local communities make enormous contributions to protecting the planet's biodiversity and ecosystem services. The individual areas under protection by Indigenous Peoples and communities, such as the Kayapó Indigenous Territory in the southern Brazilian Amazon which covers 11.5 million hectares, are often large and biologically intact areas. Though frequently under threat, these areas have

nonetheless remained in good condition precisely because they are controlled by Indigenous Peoples whose cultures and traditional lifestyles are inseparable from the wild lands they have long inhabited, for centuries or millennia. These lands – or parts of them – are often sacred or hold special spiritual value, which further contributes to their conservation and recognizing and respecting this dimension is therefore essential. The often-indissoluble links between nature and culture, and in particular Indigenous Peoples and local communities, is a new and important area of focus for the Convention. These activities are apparent in capacity building and research activities undertaken by the Advisory Bodies to address nature-culture interlinkages (Leitão & Badman 2014, Larsen & Wijesuriya 2015, Buckley et al. 2016) as well as a Committee decision in 2013 (Decision 37 COM 8B.19) relating to the nomination of the very large, intact and indigenous managed Pimachiowin Aki area in Canada.

However, much more can and must be done to support Indigenous Peoples and local communities in their conservation efforts and to implement rights-based approaches to conservation. A wilderness approach under the Convention could make an important contribution to recognizing these linkages as discussed in more depth in Chapter 2 and in the case studies.

A more systematic approach to wilderness and landscape and seascape conservation would be helpful to ensure that the World Heritage List includes sufficient coverage of Earth's most exceptional wilderness areas and other large and intact landscapes and seascapes, to sustain the integrity of existing sites in such areas more effectively and to achieve greater integration of natural and cultural values under the Convention. Such an approach should involve three key elements: (1) expanding the List by adding new sites to better represent wilderness areas with Outstanding Universal Value; (2) improving the integrity of existing sites by ensuring their effective conservation and management, expanding and/or buffering them, and promoting connectivity between World Heritage sites, between World Heritage sites and other protected areas, or both; and (3) equitably engaging and supporting customary stewardship (Kormos et al. 2015).

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2. People and wilderness conservation

Peter Bille Larsen & Tilman Jaeger

Recognizing people and diversity in wilderness

Wilderness means something different to different people reflecting a wide variety of values and interests. Some appreciate it because they may regularly or occasionally visit wilderness areas for recreation or inspiration. Others may value the existence of vast natural places regardless of whether they may or may not ever personally visit them. Numerous Indigenous Peoples and local communities directly depend on large and intact natural areas for their survival. The latter stakeholders, increasingly recognised also as rights-holders, are the focus of this chapter. Although there has been a long history of conflict between nature conservation and people who call nature home, it is increasingly recognized that there are major common interests in the face of growing external pressure on the planet's remaining wilderness areas. Wilderness debates, however, have often been framed as mutually exclusive choices between conservation and development, often leading to restrictions on customary presence and use, and missed opportunities for collaboration.

Nature conservation science and practice increasingly recognise that a diversity of relationships, interests and cultural values are integral to wilderness. Wilderness may, for example, constitute the home of Indigenous Peoples and local communities inhabiting, living from and/or maintaining longstanding relationships with an area. In some cases, as in Amazonia, historical ecology is even documenting surprisingly high past population densities, domesticated landscapes and sophisticated forms of land-use (Erickson 2008). Today, these areas offer healthy lands, spiritual fulfillment, livelihood security as well new economic opportunities for its inhabitants. Wilderness landscapes and seascapes therefore do not prompt a choice between conservation *or* development, but rather the need for careful decisions about the nature and quality of development and conservation, while also raising the question of who is to be involved in such decision-making. There is a vast difference between recognizing ancient connections between Indigenous Peoples and their homelands, on one hand, and industrial exploitation of wilderness on the other. Development decisions are often made under immense pressures for short-term economic gain, neglecting the value of long-term conservation and alternative development paths.

The characterization of wilderness as a wasted, untapped natural resource ignores the role of intact wilderness landscapes for Indigenous Peoples and local communities.

Many wilderness areas, including but not limited to formally designated protected areas, overlap with indigenous territories and local community lands. Whether or not land rights are formally recognised in these areas, they are a source of identity, livelihoods and cultural significance. Recognizing overlaps, nuances and differences among actors and their world views and values is critical for the design of effective and equitable conservation approaches. Indigenous and local values and perspectives on wilderness cannot be taken for granted. In different parts of the Arctic, for example, Indigenous Peoples have alternately supported wilderness conservation and resource extraction projects (Nuttall 2010). The estimated 200 Indigenous Peoples in voluntary isolation in remote parts of South America's Amazon and the Great Chaco (IACHR 2013) face different conditions and threats compared to other Indigenous Peoples and local communities. Whereas territorial and rights protection and the prevention of involuntary contact is crucial in the former case, the latter case requires more direct forms of consultation and engagement. In Africa, livelihood practices in wilderness areas also vary considerably between and among hunter-gatherers, farmer communities and more or less mobile pastoralists. Wilderness may be inhabited, used and be a source of livelihoods, and uses may be complicated by variations provoked by droughts, policy impacts or social change. The following sections shed light on the varying nature of such linkages.

Recognizing nature – culture linkages: the significance of biocultural integrity

Wilderness areas recognized under the World Heritage Convention for their Outstanding Universal Value (OUV) typically harbor inextricable and changing cultural values and practices, which over centuries or longer have co-evolved with the natural environment both generally through connection and stewardship, as well as through specific uses, such as livestock grazing, fire management, selective hunting, fishing and harvesting as well as the promotion of preferred species and ecological conditions. The resulting linkages and

interdependencies between ecological and cultural diversity (Larsen and Wijesuriya 2015) may be thought of as biocultural diversity forming parts of what has been labelled the “true web of life”¹. For some “Country is a place that gives and receives life... it is lived in and lived with” (Rose 1996). It is this lived-in dimension which wilderness conservation needs to recognize, understand, support and nurture.

The importance of the overlap between areas of high biological and cultural diversity is well-established (Maffi et al. 2000, Loh & Harmon 2005, Maffi and Woodley 2010, Gorenflo et al. 2012). However, such connections are at times overlooked or misunderstood in wilderness conservation. Between the two extremes of idealizing cultural practices as always supportive of biodiversity or excluding the human factor from the wilderness equation completely, far more attention is needed to better understand and assess how biological and cultural diversity are linked in practice in diverse ways. This becomes ever more important as we are rapidly moving towards a loss of large intact landscapes and seascapes and wilderness areas, thereby often also undermining customary connections and livelihoods. The recognition of linkages is paramount to the integrity of wilderness landscapes and seascapes as well as from the perspective of social equity. We propose to frame the recognition of such linkages in terms of ensuring biocultural integrity.

Shifting towards the approach of ensuring biocultural integrity recognises the historical and present role of stewardship, cultural values and practices in forming part of and sustaining wilderness landscapes and seascapes and underpins the need to carefully consider desirable future relationships between such places and humans. From a management perspective, it entails rethinking linkages as key elements of OUV as well as retracing the boundaries and recognized human features as part of wilderness landscapes and seascapes. Without recognizing embedded cultural values and longstanding human relationships and interactions with their natural environment, essential elements of what in the World Heritage context constitutes the ‘wholeness and intactness of the natural and/or cultural heritage and its attributes’ may be disregarded, jeopardizing OUV. This does not mean that all cultural practices *per se* sustain wilderness conservation, but rather that biocultural linkages need to be taken into account from the outset.

Terms like “authentic”, “traditional” and “acceptable” practices have sometimes been used in wilderness conservation and related fields when addressing biocultural linkages. However, the notion of “authentic culture”, albeit applied in other World Heritage contexts, is anthropologically problematic. Similarly, “traditional” and “acceptable” are by no means straightforward terms and concepts. Excluding certain contemporary practices, technologies and values as *culturally* inauthentic ignores the reality of – and rights to – socio-cultural change. In contrast, wilderness conservation may involve distinguishing between long-term cultural practices and ecological relationships integral and adaptive to the specific wilderness context versus new and emerging practices, which pose a potential threat

to the biocultural integrity of wilderness. The latter are not inauthentic, but may prompt the need for equitable dialogues about possible responses and solutions to secure long-term biocultural integrity. A further layer of complexity concerns the need for dialogue about changing policies affecting size, access and barriers to customary practices.

Recognizing the diversity of interlinkages

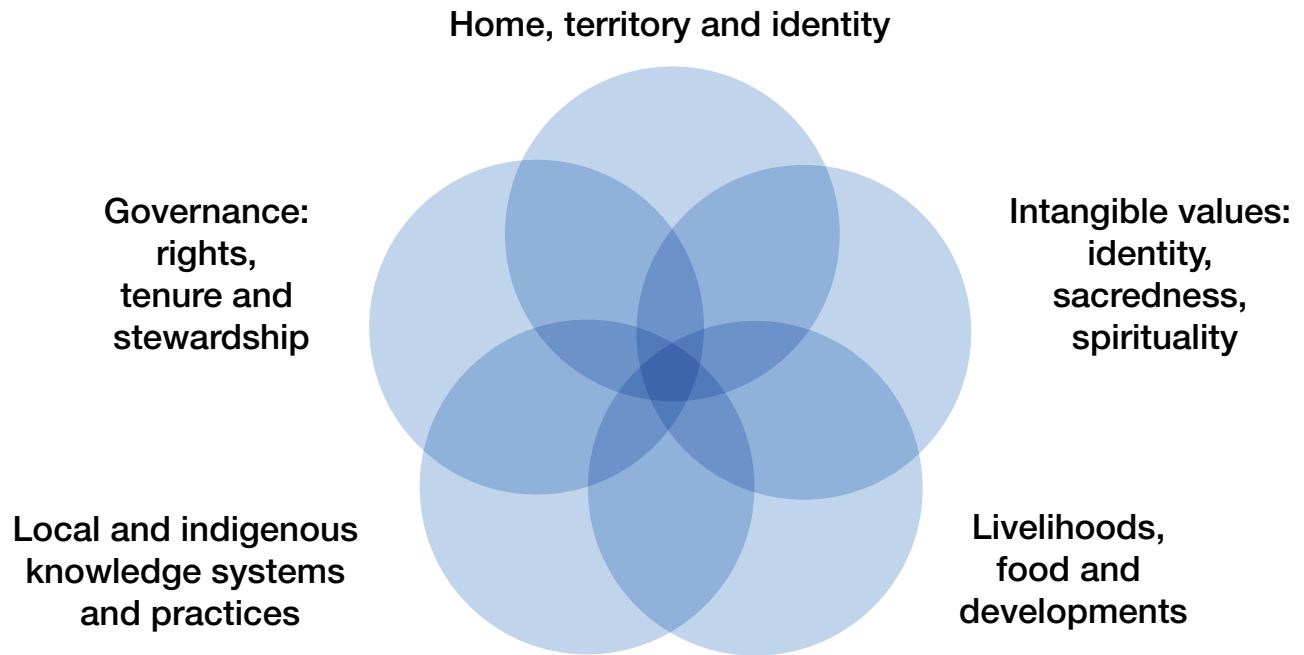
What then are the forms of nature-culture linkages to take into account? There is no universal pattern of nature-culture linkages or “indigenous or local connections” to wilderness areas. Rather, they cover a vast range of dynamic relationships formed by distinct histories, ecologies, cosmologies and livelihoods, but also diverse religious and political conditions. While the following categories are presented separately for the sake of illustration, they are often interconnected in practice. Customary livelihoods, for example, cannot be understood in isolation from notions of territory, indigenous and local knowledge and wider cultural values.

Some of the linkages described below are directly visible in processes occurring in wilderness for example, through co-evolving livelihoods, landscapes and species composition. Others are indirect, arising from values, ancestral connections and stewardship practices. These linkages often depend on intact ecosystems and protected wilderness in order to be sustained. The typology proposed here, summarized in Figure 1 below, is not exhaustive, but is rather an attempt to illustrate the diversity of linkages to guide wilderness conservation.

Wilderness as home, territory and identity

Wilderness areas may constitute home, both literally as the area where people live and make a living as well as in a broader historical and relational sense, as a place where people feel they belong or are attached to through ancestors, identity or kinship. Engagement with wilderness may also involve considerable geographical coverage far beyond conventionally understood settlement areas. Aboriginal paths, or song-lines as they are called in Australia, cover extensive landscapes, just as traditional pastoralist migration routes, traditional hunting areas or historical settlements in different parts of the world demonstrate the diversity of indigenous and local forms of attachment. A common risk faced by Indigenous Peoples and local communities involves the neglect or non-recognition of wilderness as a lived and used space: burial, pilgrimage and sacred sites distant to settlements, fallow cultivation areas, seasonal pasture lands or intangible connections to place such as the diversity of sacred lands, seascapes and waterways. It is common to find indigenous perceptions, cultural toponyms and notions of territory absent in official maps and management documents. Where visitors may experience wilderness as a visually pleasing landscape, indigenous owners may see the same place as loaded with features and cultural meaning. Such connections may have been rendered invisible through

¹ terralingua.org/biocultural-diversity/

Figure 1: Indigenous Peoples and local community linkages in wilderness landscapes

histories of colonialism, religious conversion or heritage policy. Furthermore, Indigenous Peoples may for different reasons refrain from rendering sites of cultural significance public. For example, sharing information about sacred sites may be particularly sensitive. Nonetheless, on-going discussions and attempts to better address the role of cultural values in natural World Heritage sites in Australia, for example, demonstrate the potential to re-open the debate about initial statements of significance and OUV, recognize the cultural dimension in natural sites and rework governance arrangements.

Intangible values and sacredness

Whereas sacredness in the context of wilderness may be understood as the practice of setting aside sacred spaces for non-use, or at least non-consumptive use, notions of sacredness are far more diverse. They may range from intimate connections and encounters with god and self, such as those found in major religions and Western concepts of wilderness, to a sacred relationship to all beings as well as large sea and landscapes as wholes. Wilderness in many indigenous conceptions, as a sense of place, goes well beyond the individual experience of naturalness and retreat as framed in Western traditions. It may link to collective identities, gender distinctiveness, ancestral attachment and longstanding cultural practices, kin connections, and stories of origin.

In fact, indigenous notions of sacred sites may only superficially, or in a minority of cases, coincide with Western concepts of non-use. For many Indigenous Peoples and local communities, sacred and cultural values are integral to rather than apart from livelihood practices connected to seasonal movements and livelihoods such as grazing routes and hunting sites. Whether concerning fishing among Maori, pastoralism or hunting among Indigenous Peoples in the Russian Far East or sacred groves in Ghana (CAFF and RAIPON 2004, IUCN 2008b), the sacred dimension entails specific rituals,

respect and good practice in relation to livelihoods, not simply nature conservation *per se*. Cultural practices may – or may not – correspond to mainstream conservation standards or respect conventional protection boundaries, but do in any case constitute an integral and important part of the social and cultural fabric of wilderness.

Livelihoods, food, and development

Wilderness areas are a crucial source of livelihoods for many Indigenous Peoples and local communities across the world. They may, from this perspective, be considered crucial productive landscapes both in terms of subsistence and potential commercial activities. Activities such as hunting, gathering, shifting cultivation, pastoralism and fishing are highly adapted to, and dependent upon healthy ecosystems. Consequently, trends such as habitat loss and fragmentation resulting from infrastructure development, deforestation, poaching, encroachment, land privatization and protected area creation ignoring customary tenure present multiple threats to traditional food and livelihood security (Kuhnlein, Erasmus et al. 2013).

Halting and where possible reversing such trends is therefore intimately tied to rights to access and control traditional resources, livelihoods and territories through recognition, title and other means. Many customary livelihoods are under threat today not only due to shrinking wilderness landscapes, but also due to lack of legal recognition, stigma and the perpetuation of colonial policies. Pastoralist livelihoods, for example, are often threatened by multiple forms of land fragmentation, migration barriers, limited or lacking public recognition, inadequate titling arrangements and investment in extension services. Furthermore, policies to promote private or State management of wilderness may, for example, undermine, substantially reduce, or even prohibit customary grazing practices and seasonal movements. Recognition of customary

grazing rights as part of a biocultural wilderness approach, may in turn enable and reinforce the co-existence of natural and cultural values.

Local and indigenous knowledge systems and practices

Local and indigenous knowledge systems and practices reflect another crucial linkage and cultural value. Indigenous Peoples and local communities have built up highly sophisticated knowledge systems over time about species and their interactions, ecosystems and area specific observations. Such knowledge is not limited to natural environments, but concerns livelihoods, social and even political processes.

These knowledge systems and practices are important assets both in terms of understanding the biocultural integrity of the wilderness landscape or seascape, as well as helping to craft locally relevant wilderness management responses. This is increasingly recognized in protected area management: across the world, resource managers conducting impact assessments, climate change adaptation plans, ecosystem restoration, connectivity conservation and control of invasive alien species etc. are starting to understand the importance and potential of engaging with such knowledge systems and practices. This recognition is also occurring in the World Heritage context, creating the potential to better understand and manage the OUV of wilderness areas. In Lapponia, for example, Sami concepts and practices are used for World Heritage management decision-making and knowledge sharing (Reimersson 2013).

However, many knowledge systems and practices are under threat, as evidenced by rapidly declining linguistic diversity globally (Maffi 2002, Gorenflo et al. 2012). Adopting an approach that not only seeks to learn from, but also supports the maintenance, protection, development and equitable access and benefit-sharing arrangements from such knowledge systems – and the customary practices it supports and enables – is fundamental. This also involves the recognition and application of relevant “community protocols”² in wilderness conservation efforts.

Governance, management and stewardship

Indigenous Peoples and local communities in most cases have longstanding and customary tenure systems, management and stewardship practices tied to resource use and the landscape or seascape. These may be more or less formalized as systems, may appear as “informal” practices, or both. They might also be intentionally hidden to avoid legal conflicts where these tenure arrangements and stewardship practices are not recognized, including in some protected areas. Whatever the case may be, these governance and local management practices constitute a crucial linkage in the wilderness landscape or seascape which should be recognized and ideally strengthened through

careful planning and implementation of conservation and development plans, including in World Heritage processes. Indigenous Peoples and local communities may share a strong interest with conservationists in strengthening governance and management arrangements to prevent further access and penetration in wilderness landscapes or seascapes by external actors and resource users. This offers a crucial common ground for building equitable and effective conservation approaches, as detailed in the next section.

Many early protected area designations neglected or ignored the cultural values, ancestral connections and practices of Indigenous Peoples and local communities as an integral part of the landscape. In some cases, this may have been unintended, reflecting characteristics such as low-intensity use, intangibility of some local values, seasonality and informality of local and indigenous practices. In other cases, the marginal role of indigenous and local voices in designation processes and the lack of legal recognition of customary presence was a more or less openly stated policy. For one author, speaking from an Australian perspective, the persistent use of wilderness to characterize cultural landscapes of Aboriginal Peoples reflected a “a continuing colonial assumption this land is not really inhabited and governed, or at least not competently” (Langton 1998). At the extreme end of the spectrum, this also led to forced relocation, undermining community rights and putting in place top-down management with no or very limited space for community stewardship, customary rights and decision-making (Colchester 2003). Yet, in other cases, wilderness approaches offer a reconciled space that can acknowledge the common grounds between indigenous land use and conservationist land use priorities. Many wilderness approaches in Australia, for example, increasingly acknowledge the role of Aboriginal Country, cultural values and practices in transforming over millennia what is today seen as wilderness (ACF 1999, Australian Government 2008). From this perspective, wilderness landscapes and seascapes co-exist with and even depend on cultural practices and active management.

How are World Heritage approaches aligned to such realities? The World Heritage system has in practice tended to separate rather than combine natural and cultural values, and State Parties to have more often than not focused on either “nature” or “culture” in nominating and managing sites³ despite the fact that the Convention in principle provides the opportunity to recognized both together. Recent years, have seen an upsurge of collaborative activities by the Advisory Bodies to explore the linkages between nature and culture (Leitão & Badman 2014, Larsen & Wijesuriya 2015, Buckley et al. 2016) through capacity building, institutional dialogue, and site-level assessments.

Efforts to “adopt general policies to give the heritage a function in the life of the community” (UNESCO 2015) might

² See for example work done on community protocols in other contexts: www.unep.org/communityprotocols/protocol.asp.

³ Today’s World Heritage criterion (vii), which highlights areas of exceptional natural beauty and “superlative phenomena and areas”, until 1992 specifically also referred to “exceptional combinations of natural and cultural elements”. The then criterion (iii), equally contained wording man’s interactions with his natural environment”. These connections were deleted upon the creation of the cultural landscape category in practice limiting the question of nature-culture linkages to a sub-set of sites. It is clear, however, that all properties have cultural and a natural dimensions.

involve, as a first step, to recognize the role of community life and nature-culture linkages in sustaining and taking part in the stewardship of wilderness. Such recognition currently varies considerably both within and among countries. Today, policy requirements and good practice in the World Heritage and the broader protected area arena increasingly suggest far more direct involvement of Indigenous Peoples and local communities in employment, decision-making, economic benefits and accommodating broader sets of rights and concerns. Good practice previously mainly entailed State designation, adequate management and resourcing and core governance questions. Today good practice increasingly considers with whom and how to engage in participatory and consent-based value identification, designation and management design and eventually who is involved in decision-making and speaking for places. While the recognition of values, practices and community stewardship continues to vary considerably across different wilderness landscapes and seascapes, the debate has clearly entered the World Heritage arena.

From natural allies to governance specifics and rights

Recognizing nature-culture linkages should not be the sole justification for engaging with indigenous or community stewardship. There is a risk of creating “first-class” indigenous or local stewards where a protection ethos is considered in place, and neglecting others whose practices may be considered higher-impact or intrusive. Working with the diversity of culture-nature relationships is first and foremost about acknowledging connection and then following a rights-based approach, and where relevant a title-based approach. Whereas early nature conservationists had hoped somewhat simplistically and unilaterally for natural alliances between what one author called “ecosystem people” (Dasmann 1973) and wilderness conservation, it has become clear that alliance-building must be based on dialogue rather than prior assumptions. When dealing with socio-cultural diversity, the identification of values or management design, World Heritage designation today triggers a need for culturally sensitive and equitable decision-making processes. This is very much in the spirit of the Operational Guidelines (UNESCO 2015), which call for:

- A partnership approach to nomination, management and monitoring (paragraphs 39 and 40)
- An approach to management, which takes into account cultural context (paragraph 81)
- The recognition of uses that are ecologically and culturally sustainable (paragraph 119)
- Participation as a basis for sustainable management (paragraphs 119, 123)
- to enhance the function of World Heritage in the life of the community (paragraph 212)

As of 2015, there is also specific language in Article 123 of the Operational Guidelines calling for nominations to be prepared with the “widest possible participation of stakeholders” and

with the “free, prior and informed consent of indigenous peoples” which has been obtained “through, inter alia, making the nominations publicly available in appropriate languages and public consultations and hearings” (UNESCO 2015).

As a growing number of wilderness approaches demonstrate, governance and management can be designed to respect and reflect the rights of Indigenous Peoples and local communities. Adequate governance arrangements need to reflect particular rights to participation and consent in decision-making processes. Equitable management requires involvement in the adaptive design to the particular social context. Such intensive planning processes may in turn trigger the involvement of new actors, but also trigger intense debates and different opinions among local stakeholders and rights-holders about the relevance and objectives of wilderness conservation, the nature of benefits and much more. This requires careful attention to a complex and sensitive issues, some of which are discussed below.

Recognizing Indigenous Peoples’ and local community rights as a basis for wilderness protection

The recognition of indigenous and local community title, land and tenure rights is a basic condition for equitable wilderness protection. Whereas existing title, land and/or access rights may already constitute the starting point for wilderness protection in some countries, fragmented, unrecognized and threatened tenure security is still common around the world. Even where formal recognition exists on paper, tenure may be systematically undermined in practice. As a result, wilderness designation could complicate or even undermine unresolved land claims and tenure rights. Conversely, there is an opportunity to incorporate land rights and tenure security as founding principles for new wilderness conservation, including but not limited to World Heritage. The early identification of unresolved land claims, customary tenure rights and conflicts over ownership as elements of comprehensive and participatory situation analyses can allow the World Heritage processes to contribute or even facilitate their resolution or put in place processes and agreements to support conservation.

By recognizing customary land and resource rights, even where there is lack of or limited level of formal recognition (as is the case for example in large parts of Africa), World Heritage processes can contribute towards more equitable wilderness conservation approaches and provide a far more stable and socially legitimate basis for long-term conservation planning. This would be consistent with the spirit of both UNESCO and the Convention: World Heritage designation should not only entail effective management, but should also promote peace and social reconciliation. Many Indigenous Peoples and local communities have experienced (sometimes forceful) displacement and marginalization and are therefore highly suspicious that externally promoted conservation initiatives will result in further violation of rights. Whether directly related to specific conservation measures or not, such legacies and politics inevitably form part of the social reality to address

within a rights-based approach to wilderness conservation. Whether concretizing in specific processes of dialogue, land restitution or other measures, World Heritage has the potential to contribute to processes of reconciliation.

Governance mechanisms

Who ultimately makes decisions regarding World Heritage nominations and management of existing sites, when and how and on what basis? Who is entitled to participate? Decisions about with whom and how to engage in governance processes requires a clear understanding of the social complexity at stake, and an effort to give indigenous and local representatives their rightful say in the process. Whereas governance design may emphasize linkages with regional and national political and administrative authorities, downwards accountability to local stewards and engagement with informal power brokers is equally important. “One-size-fits-all” approaches, such as participatory meetings or consultative bodies, may not capture the full range of voices and perspectives. The dynamic diversity of groups, histories of cooperation, conflict or deep-seated inequalities require adaptive approaches tailored to local realities. Needs, rights and perceptions may differ between, for example and among hunter-gatherers, neighbouring farmers and pastoralists.

There is much to gain from engaging with and strengthening customary governance systems and practices – while also recognizing evolving dynamics. The Great Barrier Reef, for example, involves engagement with a wide range of traditional user groups of varying size and nature, just as it involves engagement with commercial operators and private interest groups. Wilderness conservation in Amazonia may also involve a range of different rights contexts from Indigenous Peoples in voluntary isolation towards working with titled territories, settlers and indigenous federations creating a need for a mosaic of management responses. Transboundary conservation may involve working in politically contested or even militarized settings prompting attention to political sensitivities and security questions when crafting governance responses. Beneath grand narratives of working at the landscape or seascape level, wilderness conservation in practice often involves working in smaller areas, establishing certain forms of partnership and facilitating vertical integration (Hastings 2015). Maintaining an adaptive and equitable approach to governance is time and resource-intensive but many scholars and practitioners have come to the conclusion that it is a wise investment to secure more sustainable arrangements (Borrini-Feyerabend et al. 2004).

Identifying and prioritizing cultural values and practices in wilderness

Whereas working in large-scale conservation sometimes implies defining conservation objectives based on science and biogeographical approaches alone, the rights-based approach suggests comprehensive engagement with rights-holders in the identification of conservation priorities. Some encouraging experiences in Canada and Australia have demonstrated the

possibility of framing the objectives of wilderness areas as one of contributing to the protection of both natural and cultural values. Addressing linkages involves more than a list of static cultural values. Merely identifying cultural values as an “add-on” to existing wilderness values does not do justice to the complexity at stake, yet may at least offer a starting point for engagement. For example, the identification of sacred sites in the Russian Arctic or cultural values in Australian wilderness sites have indeed offered entry-points for further debate, yet have also raised questions about how such values and their material manifestations are being managed and by whom (CAFF and RAIPON 2004, Grant 2014). The recognition of biocultural integrity as part of the OUV of wilderness is a promising way forward. This encompasses not merely recognizing associated cultural values, spiritual or otherwise, but more fundamentally recognizing how wilderness landscapes or seascapes may have been shaped through biocultural diversity. Furthermore, this involves careful attention to the processes that sustain such biocultural values in the first place. A critical aspect in this regard is to avoid reducing cultural connectedness to its immediately wilderness-related dimensions alone. Rather, considering and supporting culture and identity in its complexity from language preservation, religious expression and intergenerational dialogue offers a more solid, and reality-based, starting point for wilderness conservation.

Beyond State-centered models: strengthening customary management, reinforcing Indigenous territorial institutions, self-determination and building co-management

World Heritage designation is often accompanied by renewed planning efforts and management investments bringing together actors from both national and local levels (and sometimes international governmental or civil society supporters) at an unprecedented scale. At times designation is misunderstood as a requirement to demonstrate a formal government management presence throughout the site. Yet an adequate management response may in fact be more effective if decentralized and shared, taking advantage of a mosaic of different management arrangements strengthening customary management, reinforcing indigenous territorial institutions and building co-management. In parts of Amazonia, Australia and Canada protected areas are managed by local communities or Indigenous Peoples and this is showing encouraging signs of conservation benefits. Much can often be achieved by building upon and revitalizing local and indigenous knowledge systems and practices. However, this should not lead to their idealization as ready-made solutions. Many Indigenous Peoples’ and local community land areas, even where recognized, suffer from poor support at all political and administrative levels, infrastructure and funding for the effective management of sometimes large tracts of land. There may also be conflicting local views about the legitimacy of

local organizations and representatives, unresolved questions of inter-ethnic or gender equity and more. Much can be done, however, to support and invest in community-conserved areas and approaches as part of an effective – and equitable – World Heritage management approach and the tools for doing so are getting better (Corrigan and Hay-Edie 2013).

The Operational Guidelines are open to and indirectly encourage a wide range of governance and management options. Considerable work has been undertaken in the wider protected area community to document, provide guidance and strengthen innovative approaches to indigenous and community-led conservation and management. Many countries are involved in developing sophisticated models of co-management, indigenous and community conservation areas and conservation support to indigenous territories. World Heritage approaches to wilderness can therefore be expected to build on, enhance and add visibility to such efforts.

Low-density, low-impact lifestyles: from low impacts to biocultural integrity

Conservationist approaches to local livelihoods tend to combine a focus on low-density, low impact and non-industrial activities. The dividing line for many conservation NGOs and public authorities concerns the presence of so-called “modern” economic activity, infrastructure development and industrialized practices. Whether or not an activity is commercially-oriented is another frequently encountered consideration to determine acceptability. Whereas some wilderness approaches recognize indigenous presence, subsistence and certain development rights, it has been considered far more problematic once motorized vehicles (Freedman 2002), modern hunting equipment and commercial livelihoods replace subsistence activities. IUCN, in its protected area category 1B seeks to combine this with a cultural vitality perspective aiming to:

“enable indigenous communities to maintain their traditional wilderness-based lifestyle and customs, living at low density and using the available resources in ways compatible with the conservation objectives⁴”

This entails discussions about how wilderness conservation can enable the intactness and resilience of indigenous and local lifestyles, livelihood and knowledge systems and practices and the associated rights as well as accommodating change. This is not a trivial question as it directly relates to the survival and well-being of communities concerned. Importantly, it does not exclude questions of commercial livelihoods, an integral dimension of most indigenous and local economies. Diversity and integrity of traditional livelihood systems are often and increasingly under threat, rendering many Indigenous Peoples and local communities vulnerable both to poverty as well to engaging in to unsustainable practices.

From the conservationist perspective, new technologies and market integration may intensify pressures. Whereas road building or other infrastructure for some Indigenous Peoples and local communities, such as those in voluntary isolation, may represent a direct threat to their survival, roads for others represent a development priority. Furthermore, maintaining evolving traditional lifestyles for many Indigenous Peoples and local communities involves market integration and the use of new technologies. This, in many cases, raises complex questions, including when and how use or active management or modification is considered intrusive to or part of dynamic natural wilderness landscape processes. There are no easy answers, yet it is important to make sure that mechanisms are in place to deal equitably with the rights, interests and priorities of Indigenous Peoples and local communities and to prevent and manage potential conflicts.

Wilderness, livelihoods and economies: towards equitable approaches, trade-offs and conflict management

A continuous and ever more urgent challenge in wilderness areas concerns the possible threat of road access or other infrastructure development, energy, land development or extractive industry projects (Laurance et al. 2015), which can threaten efforts to secure wilderness protected areas (Bernard et al. 2014). In such cases, national, even international, investment priorities and projected short-term fiscal returns may override ecosystem – and biocultural – integrity and sustainability, with dramatic impacts. Conservationists often respond with emphasis on alternative economic development opportunities resulting from the provision of ecosystem services, tourism along with recreational values. Creating more space for and recognition of livelihoods and development rights are crucial in such discussions recognizing that, in both conservation and development initiatives, Indigenous Peoples and local communities disproportionately bear the costs without gaining an equitable share of new benefits.

Furthermore, the capture of development opportunities by powerful stakeholders is a common scenario. A wilderness approach that can demonstrate realistic and equitable attention to livelihood and economic development rights may succeed in the long run. This may involve putting in place measures and mechanisms that not only stimulate local wilderness economies, such as sustainable livelihoods and in some places wilderness tourism practices, but accompany such efforts with a strong emphasis on local ownership and benefit-sharing arrangements taking into account local development priorities.

Looking forward

Whereas wilderness conservation has had a legacy in some places of separating nature from culture, resulting in displacement, rights violations and exclusion of Indigenous

⁴ www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/gpap_category1b/, emphasis added.

Peoples and local communities from decision-making, wilderness conservation thinking has been evolving over the last decades. A new understanding of nature-culture linkages in wilderness has emerged, just as the urgency of reversing decades of neglect and marginalization in the name of conservation is today well-recognized. The World Heritage Convention today offers unprecedented opportunities to make meaningful contributions and ideally to even serve as a flagship in this respect (Osipova et al. 2014).

First of all, there is growing understanding of the need to carefully reconsider nature-culture linkages when determining Outstanding Universal Value, spearheaded by the Advisory Bodies and its partners through the connecting practice efforts by ICOMOS and IUCN, as well as capacity building on nature-culture inter-linkages led by ICCROM. This chapter introduces the notion of biocultural integrity to underscore that cultural values are not merely an add-on, but integral to the very nature, features and attributes of most globally significant wilderness landscapes or seascapes. Understanding the complexity involved is a crucial first step. Secondly, recent developments in World Heritage policy and debate confirm the requirement of crafting diverse options for governance mechanisms and management modalities, which are not only effective, but also equally equitable and culturally relevant (IUCN 2008a, Larsen et al. 2014a,b). Far more investment of resources, cooperative arrangements and alliance building are now needed to engage with Indigenous Peoples and local communities in wilderness conservation. Of immediate and urgent priority are the large wilderness landscapes and seascapes inhabited by Indigenous Peoples in voluntary isolation often rendered voiceless by dominant development actors.

With growing pressures on wilderness areas, conservation organizations, Indigenous Peoples and local communities, there is an urgent need to integrate nature and culture in the conservation of large intact landscapes both for nature conservation and for the cultural and social benefits it can bring. The World Heritage Convention can play an important role in shifting conservation thinking and practice with respect to ensuring biocultural integrity and social equity. The on-going efforts by IUCN, ICOMOS and ICCROM to connect practice and build capacity of heritage practitioners is a crucial contribution towards creating a space and the tools for integrated and equitable conservation approaches.

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3. Current recognition of wilderness values on the World Heritage List

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Understanding which World Heritage sites have already been inscribed for their wilderness values is useful when designing and implementing a wilderness and large landscapes and seascapes approach under the Convention. While there is no explicit reference to wilderness in the Convention's Operational Guidelines, wilderness values (or attributes of wilderness) have been recognized in numerous sites and under each of the four natural World Heritage criteria or as part of the conditions of integrity that are part of Outstanding Universal Value. However, which sites are recognized for wilderness values is not immediately obvious to the casual observer as the Tasmanian Wilderness (Australia) is currently the only World Heritage Site that has a reference to wilderness in its name.

In order to analyse how wilderness has so far been recognized under the Convention, we systematically reviewed available Statements of Outstanding Universal Value (SoOUV) for natural and mixed sites to identify sites with attributes corresponding to wilderness areas as defined in this guidance: i.e. largely biologically and ecologically intact landscapes and seascapes, with low human population densities and free or mostly free of industrial infrastructure (Kormos 2008, Watson et al. 2009, Mittermeier et al. 2003, Kormos et al. 2015). Statements of Outstanding Universal Value (SoOUV) are concise statements adopted by the World Heritage Committee at the time of inscription of a property on the World Heritage List. Their purpose is to raise awareness on the values of the property and to guide the assessment of its state of conservation. SoOUVs only became part of the nomination and inscription process for World Heritage sites in 2007. For those sites inscribed before 2007, retrospective SoOUVs must be proposed by the States Parties and adopted by the World Heritage Committee. While this process has been completed for the majority of sites, some sites still lack an approved SoOUV. We also reviewed sites where a draft SoOUV is available. While SoOUVs cannot substitute for a site-based assessment, they do provide a useful overview of natural World Heritage sites and the values for which they are inscribed and as such allow for an initial assessment of wilderness attributes.

For each wilderness attribute we identified we noted the criterion under which this attribute was recognized. As noted in Chapter 1, out of ten criteria used by the World Heritage Convention, four apply to natural sites, and a natural site must meet at least one of these four criteria to be inscribed.

An analysis of all the SoOUVs of natural and mixed World Heritage Sites reveals that for as many as 105 sites some reference is made to one or more attributes that can reasonably be related to wilderness as defined for the purpose of this guidance. Each of these attributes is discussed in detail below. For 23 of these sites (almost a quarter), their statements of Outstanding Universal Value actually use the terms “wilderness” or “wild”. The Central Highlands of Sri Lanka serial site includes the Peak Wilderness Protected Area as one of its components and numerous World Heritage sites have wilderness areas legally designated within them (e.g. Olympic National Park in the United States or the Selous Game Reserve in Tanzania). The identified attributes were grouped into broader categories which are presented below. We also provide excerpts from SoOUVs as illustrative examples. We note that although this methodology provides a useful overview, it is not an in-depth analysis of the sites values and is intended to provide indicative results.

Remoteness, isolation, or inaccessibility

This attribute includes sites where roads or other adverse human impacts were absent at the time of their inscription, typically sites with low human population densities. As stated in Chapter 1 the use of the term “wilderness” in this publication does not exclude human habitation or use, but only those human uses that have a significant negative impact on the natural values of the area, including roads and other transportation infrastructure, as well as extractive industries. The wilderness attribute most frequently referred to in statements of Outstanding Universal Value is that of “remoteness”. A total of 47 sites (almost half of all sites recognized for wilderness values) have been inscribed on the World Heritage List at least partly in recognition of their remoteness, isolation, or inaccessibility. For eight of those, a reference to remoteness is part of the justification for criterion (vii), while for seventeen sites it is part of the justification for criterion (ix). For another seven sites remoteness is part of the justification for criterion (x). However, for the majority of sites (25, or more than half) their remoteness is recorded as contributing to their conditions of integrity. Finally, for two sites remoteness was neither included in the justification for any of the criteria nor in the conditions of integrity, but instead was recorded in the brief synthesis of the SoOUV.

Intactness of ecological processes

Intactness of ecological processes is another frequently recorded attribute of wilderness, with 37 sites including some reference to it. Unsurprisingly, the majority of those sites (19, or more than half) include intactness of ecological processes as part of the justification for criterion (ix), followed by nine sites where this attribute contributes to their conditions of integrity. For a further four sites the reference is made in the justification for criterion (x), while the justification for criterion (vii) refers to intact ecological processes in only one case. Finally, there are another six sites for which the intactness of ecological processes is only mentioned in the brief synthesis of the SoOUV, without any specific reference being made in the justification for criteria or in the conditions of integrity.

In order for ecological processes to remain intact, sites typically have to be large enough to protect the full spectrum of those processes. Therefore, it is expected that the 37 sites which specifically record this attribute of wilderness will include some of the largest sites on the World Heritage List. Indeed, the two largest World Heritage Sites currently on the List, i.e. Phoenix Islands Protected Areas (40.8 million hectares) in Kiribati, and Papahānaumokuākea (36.2 million hectares) in the United States of America, both of which are marine sites, are recognized for this attribute of wilderness. In total, 19 sites (about half) recognized for their intact ecological processes each cover a surface area of more than one million hectares, while 8 sites (almost a quarter) are smaller than 100,000 hectares.

Pristine environment

As noted in Chapter 1, a site need not be pristine to have strong wilderness attributes; few sites around the world can claim to meet this very high standard as the term “pristine” suggests that a site is essentially untouched and displays no human impacts. In an era of accelerating climate change and pollution, this is increasingly difficult to demonstrate. On the other hand, many sites that can make a realistic claim to being pristine in part or in their entirety have not surprisingly been inscribed on the World Heritage List: the pristine environment of 33 sites is stated as a justification for their inscription. In the case of eleven of those 33 sites, it is part of the justification for criterion (ix), while for thirteen sites the reference to their pristine environment is made in the conditions of integrity. Criterion (x) and criterion (vii) are invoked five and four times respectively, while for only one site the pristine environment is considered a justification for criterion (viii). Finally, there are three sites where their pristine environment is not recorded as the justification for any of the criteria nor in the conditions of integrity, but only in the brief synthesis of the SoOUV.

A special mention deserves to be made of sites that are recognized for protecting primary forests, of which there are currently 16. These include large tropical rainforests such as Salonga National Park (Democratic Republic of the Congo) and Central Suriname Nature Reserve (Suriname), as well as vast stretches of boreal forests such as Virgin Komi Forests

(Russian Federation). Some of the sites inscribed for their primary or primeval forests are quite small (less than 50,000 hectares), such as Laurisilva of Madeira (Portugal) (15,000 ha) and Yakushima (Japan) (10,747 ha), though some of these sites are restricted in size because they are on small islands.

There is a marked overlap between references made to a site's pristine environment, their remoteness or absence of human impacts, and the intactness of ecological processes. Of the 33 sites that are stated to have a pristine environment, 25 (more than three quarters) are also stated to be remote or free from human impacts and 17 (more than half) are specifically recognized for their intact ecological processes. A total of 28 sites with a pristine environment include a reference in their SoOUV to one or the other of these attributes, and 14 make reference to both.

Intactness of the landscape or specific landscape features

Another attribute of wilderness closely related to the previous three is the intactness of landscapes or specific landscape features. Of 25 sites recognized for this attribute, only 5 make no reference to either one of the three previous attributes. The intactness of landscapes or landscape features is most frequently noted in the conditions of integrity (eleven sites), as a justification for criterion (vii) (six sites) or criterion (ix) (five sites). Criterion (x) is used three times, while criterion (viii) is used only once. In two cases, the intactness of landscapes or landscape features is not linked to any criteria or the conditions of integrity. This includes one site for which no statement of Outstanding Universal Value has yet been adopted by the World Heritage Committee.

As the World's rivers are increasingly being modified by humans through the construction of dams and other infrastructure, withdrawals for agriculture or urban use and pollution, it is becoming increasingly rare to find watersheds or river catchments that remain in their natural state. Several World Heritage Sites have been recognized for their protection of complete watersheds or river catchments, including Kakadu National Park (Australia), Lorentz National Park (Indonesia), Manú National Park and Puerto Princesa Subterranean River National Park (Philippines).

Another increasingly rare phenomenon is the protection of intact ecosystem gradients across a considerable range of altitudinal zones. This is important not only for climate change adaptation as discussed below, but in the case of coastal communities the protection of an intact ecosystem gradient from mountain ridges to coral reefs (“Ridge to Reef”) can be of vital importance for the sustainability of economic activities such as fisheries and tourism (Stock *et al.* 2011). Several World Heritage Sites do protect a complete altitudinal range from coast to mountain top, including Darién National Park (Panama) and the Tropical Rainforest Heritage of Sumatra (Indonesia). However, Lorentz National Park (Indonesia) is “the only protected area in the world to

incorporate a continuous, intact transect from snowcap to tropical marine environment” (Lorentz National Park SoOUV, whc.unesco.org/en/list/955).

Intact food webs, presence of apex predators, predator-prey relationships

Large predatory species play an important role in the top-down control of ecological processes and the functioning of ecosystems. On the other hand, ecological structures of food webs and predator-prey relationships are easily disturbed by anthropogenic factors and top predators often are also directly targeted by humans which results in cascade effects on entire ecosystems (Beschta & Ripple 2012). Therefore, intactness of food webs and particularly the presence of apex predators, which tend to have large ranges, indicate ecological integrity of an ecosystem and its undisturbed natural state in which top predators can continue fulfilling their ecological role.

A number of natural World Heritage sites feature this important attribute. The SoOUV of Wood Buffalo National Park (Canada) notes that it is “the only place where the predator-prey relationship between wolves and wood bison has continued, unbroken, over time” (SoOUV, whc.unesco.org/en/list/256). The SoOUV of Manú National Park (Peru) not only notes the presence of such top predators as jaguar, puma and harpy eagle, but also the fact that these are found in their natural population densities in the site (SoOUV, whc.unesco.org/en/list/402). It is worth noting that intactness of food webs represents an important attribute in different types of ecosystems, including both boreal and tropical forest ecosystems, as in the two cases mentioned above, but also wetlands and coastal ecosystems, as is the case in the Everglades National Park (USA) where primary predators include alligator, crocodile and Florida panther (a subspecies of cougar) (SoOUV, whc.unesco.org/en/list/76). In the marine realm, presence of top predators, such as sharks, is an important attribute of the Outstanding Universal Value of Papahānaumokuākea (USA) and Malpelo Fauna and Flora Sanctuary (Colombia).

While this attribute is mostly recognized under criterion (ix), in some cases undisturbed predator-prey relationships also provide a basis for inscription of a site under criterion (vii), as for example in case of Serengeti National Park (Tanzania) which hosts “one of the largest and most diverse large predator-prey interactions worldwide, providing a particularly impressive aesthetic experience” (SoOUV, whc.unesco.org/en/list/156).

Animal migrations

Many natural World Heritage sites protect spectacular, large-scale animal migration routes many of which are recognized as superlative natural phenomena, such as the famous annual wildebeest migration in the Serengeti ecosystem, the largest unaltered animal migration in the world (Serengeti SoOUV, whc.unesco.org/en/list/156). In the Northern hemisphere, the

Putorana Plateau supports one of the most significant reindeer migration routes in the world, a natural phenomenon which is to a significant extent dependent on the intact natural state of the site (Putorana Plateau SoOUV, whc.unesco.org/en/list/1234).

A number of other natural World Heritage sites, which would not necessarily be considered wilderness areas on their own, are important areas within larger migratory routes or flyways, as is the case with the Kenya Lake System in the Great Rift Valley which is an integral part of the most important route of the African-Eurasian flyway system (Kenya Lake System in the Great Rift Valley SoOUV, whc.unesco.org/en/list/1060). The Wadden Sea (Denmark / Germany / the Netherlands) and Banc d’Arguin National Park (Mauritania) are respectively “the essential stopover that enables the functioning of the East Atlantic and African-Eurasian migratory flyways” (Wadden Sea SoOUV, whc.unesco.org/en/list/1314), and “the most important habitat of the [Eastern] Atlantic for [...] Palaearctic migratory waders” (Banc d’Arguin SoOUV, whc.unesco.org/en/list/506). As such, the protection and conservation of areas that are important at different stages of large-scale migrations can contribute to the preservation of ecological processes that work on a scale where conservation of contiguous areas is not realistic.

An increasing global decline in ungulate migrations has been noted in recent years across different regions and species and was attributed to habitat loss and degradation as well as the construction of physical barriers on migration routes (Berger 2004, Bolger et al. 2008, Middleton et al. 2013), but more and more attention is now being paid to the impacts of climate change (Middleton et al. 2013). Protection of the remaining large intact landscapes supporting animal migrations will therefore become more important in preserving this stunning and increasingly rare phenomenon of animal behaviour, which plays an essential ecological role.

Sites important for animal migrations have been recognized under criterion (vii) as representing superlative natural phenomena or criterion (x) as supporting threatened species with migratory behaviour. Importance of intact large landscapes in supporting migration routes has also been mentioned in the integrity section of SoOUVs.

Climate refuge

A number of sites have played an important role as climatic refugia over evolutionary time, including the Tropical Rainforest Heritage of Sumatra (Indonesia) or the Rainforests of the Atsinanana (Madagascar) and will continue to provide refuge for species in the changing climate (Tropical Rainforest Heritage of Sumatra SoOUV, whc.unesco.org/en/list/1167). Different features make these sites particularly suitable as climatic refuges, including their large size, connectivity between different ecosystems and inclusion of the entire altitudinal gradient. An example of the latter is the Darién National Park (Panama) where the uninterrupted altitudinal transition between different types of forests from the coast to

the mountains allows species migration and contributes to resilience in the face of climate change (Darién National Park SoOUV, whc.unesco.org/en/list/159).

Some serial sites are particularly well designed to ensure connectivity between their components and therefore mitigate for the effects of climate change, as is the case in Cape Floral Region Protected Areas (South Africa), which comprises over one million hectares of protected areas and is surrounded by a buffer zone of almost 800,000 ha designed to facilitate functional connectivity (SoOUV, whc.unesco.org/en/list/1007). This attribute has been mainly mentioned under criterion (ix), but in some case also in the integrity section of some SoOUVs.

Absence of invasive alien species

Invasive alien species pose one of the most significant threats to natural World Heritage sites (Osipova et al. 2014). Those sites where natural ecological processes and native biodiversity remain unaffected by invasive species are therefore becoming more and more valuable. Absence of invasive alien species is specifically mentioned in a number of SoOUVs as an important attribute. A number of remote islands that have been inscribed on the World Heritage List for their exceptional pristine ecosystems remain free of invasive alien species which is becoming increasingly rare with new introductions of invasive alien species occurring even in very remote places (Anderson et al. 2006). In some cases it is also specifically recognized that the places that have not yet been affected by invasive alien species, in addition to maintaining their pristine ecosystems, provide unique opportunities for research, as is the case in Heard and McDonald Islands (Australia), whose intact ecosystems provide opportunities for ecological research investigating population dynamics and interactions of plant and animal species (SoOUV, whc.unesco.org/en/list/577). In the marine realm, Malpelo Fauna and Flora Sanctuary (Colombia) is one of the few sites free of invasive species and plays a highly important role in the maintenance, dispersal and replenishment of benthic larvae of corals, molluscs and fish in the broader Eastern Tropical Pacific (SoOUV, whc.unesco.org/en/list/1216).

Absence of invasive alien species has been recognized as an important attribute under criteria ix (as an important attribute of undisturbed natural ecological process) and x (showing the intactness of natural habitats and species composition of a site).

Undisturbed geological processes

While many wilderness areas on the World Heritage List are inscribed under criterion (ix) in recognition of their ecological intactness, ongoing geological processes also indicate unmodified nature of an area and its significant size which allows for these processes to continue. The large size (7.2 million ha) of Tassili n'Ajjer (Algeria) ensures the maintenance of geological processes (Tassili n'Ajjer SoOUV, whc.unesco.org/en/list/577) and within the 3 million hectares large Namib Sand Sea (Namibia) the extensive dune-scapes are continuously refreshed and maintained by wholly natural processes (Namib Sand Sea SoOUV, whc.unesco.org/en/list/1430). The

Heard and McDonald Islands (Australia)

Date of inscription: 1997; **Criteria:** (viii)(ix); **Size:** 658,903 ha

Heard and McDonald Islands are remote sub-Antarctic volcanic islands located in the southern Indian Ocean about half-way between Australia and South Africa, and just over 1,600 kilometres from Antarctica. The property covers a total area of 658,903 hectares of which about 37,000 hectares is terrestrial, and the remainder marine. The islands are a unique wilderness, containing outstanding examples of biological and physical processes continuing in an environment essentially undisturbed by humans.

Criterion (ix): Heard Island and McDonald Islands are outstanding examples representing significant on-going ecological, biological, and evolutionary processes. As the only sub-Antarctic islands virtually free of introduced species and with negligible modification by humans, they are a classic example of a sub-Antarctic island group with large populations of marine birds and mammals numbering in the millions, but low species diversity. These intact ecosystems provide opportunities for ecological research investigating population dynamics and interactions of plant and animal species, as well as monitoring the health and stability of the larger southern oceans ecosystem. Areas of newly deglaciated land as well as areas isolated from each other by glaciers provide unparalleled opportunities for the study of the dispersal and establishment of plants and animals (whc.unesco.org/en/list/577).

highly distinct wilderness landscape of the Volcanoes of Kamchatka (Russian Federation) includes an extraordinarily broad range of different types of volcanoes and associated geological features in mostly unmodified natural state (Volcanoes of Kamchatka Draft SoOUV). The draft SoOUV of Tasmanian Wilderness (Australia) specifically mentions the exceptional degree of integrity of its landforms and soils (Tasmania Wilderness Draft SoOUV).

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4. Current wilderness coverage on the World Heritage List: Broad gaps and opportunities

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For the purpose of this thematic study (see Chapter 1) we define the term “wilderness” generically to describe landscapes and seascapes that are biologically and ecologically largely intact, with a low human population density and that are mostly free of industrial infrastructure (Kormos et al. 2015, Kormos 2008, Watson et al. 2009, Mittermeier et al. 2003, Watson et al. 2016). We emphasize once more that the term “wilderness” is not exclusive of people, but rather of human uses that result in significant biophysical disturbance, and that wilderness quality is often defined in terms of remoteness from urban settlements and modern infrastructure as well as the degree of ecological impacts from industrial activity (Kormos et al. 2015, Mittermeier et al. 2003). In Chapter 3 we review the application of the term “wilderness” at a protected area scale under the World Heritage Convention, by identifying World Heritage sites whose Outstanding Universal Value is explicitly linked to a range of wilderness attributes in official documentation accompanying the site’s inscription on the World Heritage List. In this chapter we review the contribution existing natural and mixed (i.e. sites inscribed under both natural and cultural criteria) World Heritage sites make to the protection of global-scale wilderness areas and also identify broad gaps in wilderness coverage on the World Heritage List. We first assess global scale terrestrial wilderness, then marine wilderness.

As noted in both the terrestrial and marine analyses below, the data sets used to identify global-scale wilderness areas are proxies, and only broadly indicative of where such wilderness areas may be located. These analyses must ultimately be supplemented with regional and site-scale studies assessing specific wilderness attributes. Similarly, the gaps in wilderness coverage identified in this chapter should also be taken as only broadly indicative – these regions, and of course individual sites within them, must also be subjected to further scrutiny to assess their wilderness attributes and potential for Outstanding Universal Value. Nonetheless, these data-driven analyses do provide a useful framework for a first look at potential gaps in wilderness coverage on the World Heritage List deserving additional and more detailed evaluation.

Terrestrial wilderness analysis

In brief, our terrestrial analysis applies the Last of the Wild approach (Sanderson et al. 2002), using updated Human

Footprint data for 2009 (Venter et al. 2016a, Venter et al. 2016b), to calculate coverage of global-scale terrestrial wilderness areas within the boundaries of the 229 natural and mixed World Heritage sites inscribed at the time of our analysis (Allan et al. *submitted*).

Methods

Biogeographic classification of the terrestrial environment

Based on the widely used Terrestrial Ecoregions of the World (TEOW) (Olson et al. 2001), we created a layer of biorealms as a biogeographic framework for our analysis (Sanderson et al. 2002). The biorealms (n=62) represent all existing combinations of the world’s 14 vegetated biomes and seven biogeographic realms (excluding Antarctica): e.g. boreal forests exist in both the Palearctic and Nearctic realms (Olson et al. 2001). These biorealms have previously been used to identify broad gaps in the biogeographic coverage of natural and mixed World Heritage sites (Bertzky et al. 2013), and are also of appropriate scale for identifying broad gaps in terrestrial wilderness coverage globally.

Defining and mapping terrestrial wilderness

To map the extent of global-scale terrestrial wilderness areas we used the Last of the Wild approach as outlined in Sanderson et al. (2002), however we calculated it based on the updated Human Footprint for 2009 (Venter et al. 2016a, Venter et al. 2016b). The updated Human Footprint is a globally standardised measure of cumulative human pressure on the terrestrial environment for the years 1993 and 2009. At a 1 km² resolution, this is the highest resolution global cumulative threat map available, and is also the most comprehensive (McGowan 2016), including data on eight human pressures globally. These include: built environments, crop lands, pasture lands, population density, night lights, railways, major roadways and navigable waterways (for details see Venter et al. 2016a, Venter et al. 2016b). These eight individual human pressures were standardised on a 0-10 scale based on their estimated contribution to human influence on the natural environment following Sanderson et al. (2002). The standardised scores were then summed, giving a total cumulative pressure score out of fifty for each pixel (some pressures are mutually exclusive, whilst others can co-occur).

It is important to note that the Human Footprint does not reflect all the pressures which could potentially impact on the wilderness quality of an area. For example, other pressures such as hunting, poaching, logging, mining and other extractive activities (both exploration and exploitation), invasive alien species, pollution and climate change are not directly captured, although many of them are often highly correlated to the pressures that were included in the analysis (Venter et al. 2016a, Venter et al. 2016b).

To calculate the Last of the Wild we identified the 10% area within each biorealm with the lowest Human Footprint score. From this, we selected all contiguous areas > 10,000 km². In cases where a biorealm did not contain at least ten contiguous patches > 10,000 km², we consecutively selected the next largest patch until we had a total of ten patches per biorealm, or failing this, all patches per biorealm, above a 5 km² minimum threshold.

Calculating terrestrial wilderness coverage in World Heritage sites, biomes and biorealms

We calculated, globally and for each biome and biorealm, the existing coverage of terrestrial wilderness within the 229 natural and mixed World Heritage sites inscribed at the time of our analysis, using mapped boundaries from the May 2016 version of the World Database on Protected Areas (WDPA) (IUCN and UNEP-WCMC 2016). Out of the 229 sites, 208 (91%) overlapped with the Human Footprint map and were included in subsequent analysis, whereas 21 (9%) largely marine and/or small island sites were excluded. The analysis allowed us to identify biomes and biorealms with “gaps” (no coverage) or very little coverage in existing World Heritage sites.

Results

Current distribution of terrestrial wilderness in biomes and biorealms

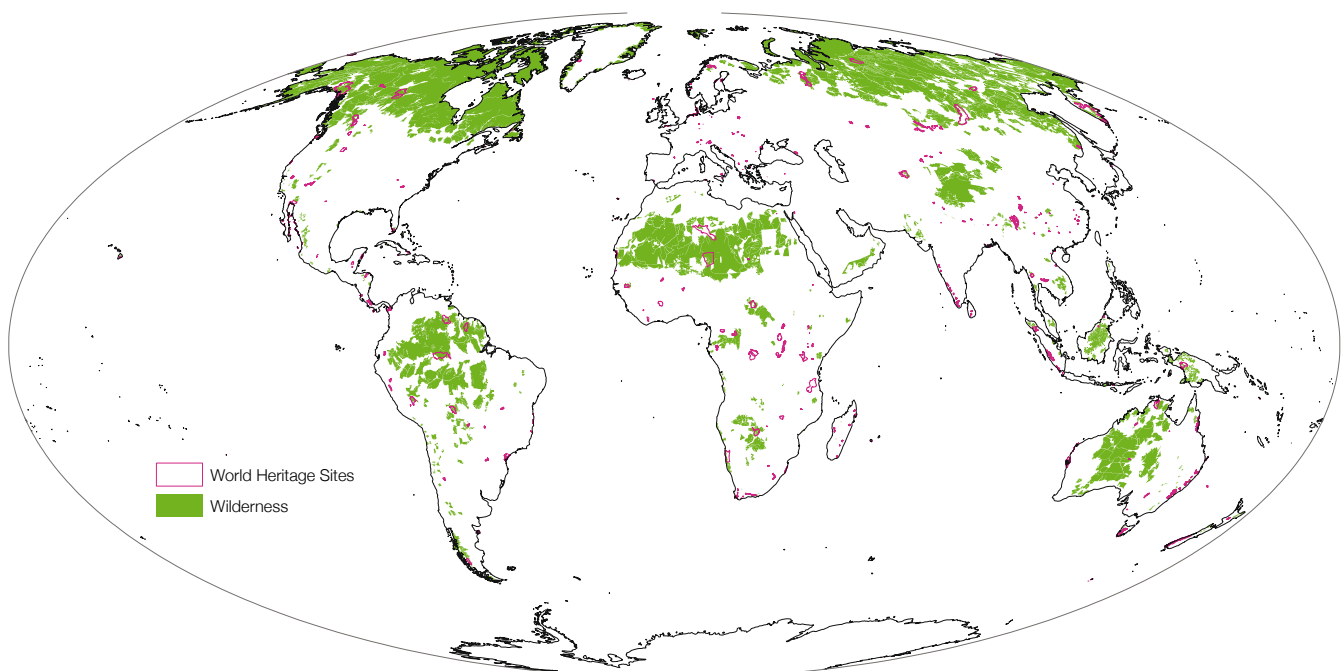
Global-scale wilderness extends across almost a quarter of the world's terrestrial area (22.7%) including all 14 biomes and 62 biorealms (Figures 2 and 3). Wilderness quality is not evenly distributed, with the largest extents occurring in the *boreal and taiga forests* (9,349,732 km², 62% of biome extent), *tundra* (6,623,675 km², 80%) and *desert and xeric shrublands* (6,470,715 km², 23%), whilst *mangroves* had the smallest wilderness extent (22,661 km², 7%) (Table 1).

Current terrestrial wilderness coverage and possible gaps in World Heritage sites

We found that natural and mixed World Heritage sites currently protect 545,307 km² of terrestrial wilderness amounting to 1.8% of the world's total wilderness area based on the Last of the Wild. This protection occurs across all 14 biomes with the greatest wilderness coverage occurring in *flooded grasslands and savannas* (14.7% of wilderness area in this biome), *mangroves* (11%), and *tropical and subtropical dry broadleaf forests* (9%) (Table 1 and Figure 4). However, gaps are evident with < 1% wilderness protected in *tropical and subtropical coniferous forests*, and *temperate grasslands, savannas and shrublands*, and < 2% wilderness protected in five other biomes. Gaps are also evident across biorealms, with wilderness in 39% (n=24) of biorealms not protected by natural and mixed World Heritage sites at all, and with < 1% protection in eight other biorealms (Table 2).

Out of the 208 natural and mixed World Heritage sites considered in this analysis, one quarter (25% n=52) contain

Figure 2. Terrestrial wilderness in 2009, as defined by the Last of the Wild approach and based on the Human Footprint data by Venter *et al.* (2016a and 2016b), and the current terrestrial extent of natural and mixed World Heritage sites.



wilderness as defined above (Table 3). Twelve natural and mixed World Heritage sites (6%) had a high level of coverage (> 90% wilderness), including the *Putorana Plateau* in Russia, *Nahanni National Park* in Canada, *Central Suriname Nature Reserve* in Suriname, and *Purnululu National Park* in Australia, and 25 natural and mixed World Heritage sites (12%) had good coverage (> 50% wilderness) (Figure 4). The *Okavango Delta* in Botswana alone accounts for

80% (11,914 km²) of the *flooded grasslands and savannas* wilderness protected within WHS globally. Of the 25 WHS with > 50% wilderness, 12 sites cover over 10,000 km² of wilderness each, another 12 sites have between 1,000 and 10,000 km² of wilderness, and only the 526 km² *Gunung Mulu National Park* in Malaysia has < 500 km² wilderness (which still constitutes 90% of the site area).

Table 1. Global-scale wilderness as defined by the Last of the Wild (LoW) approach in each biome and its coverage by natural and mixed World Heritage sites (NWHS). Biomes are sorted by percentage wilderness in NWHS.

Biome Name	Area of biome (km ²)	Area of LoW (km ²)	Area LoW in NWHS (km ²)	% of biome LoW	% of LoW in NWHS	Number of NWHS
Flooded grasslands and savannas	1,096,130	101,545	14,889	9.3	14.7	3
Mangroves	348,519	22,661	2,522	6.5	11.1	2
Tropical and subtropical dry broadleaf forests	3,025,999	170,212	15,185	5.6	8.9	5
Temperate broadleaf and mixed forests	12,835,688	544,189	29,649	4.2	5.4	5
Tropical and subtropical grasslands savannas	20,295,424	1,656,151	53,384	8.2	3.2	9
Temperate coniferous forests	4,087,094	707,544	21,163	17.3	3.0	5
Tropical and subtropical moist broadleaf forests	19,894,149	3,628,627	95,425	18.2	2.6	11
Mediterranean forests woodlands and scrub	3,227,266	125,260	2,313	3.9	1.8	1
Montane grasslands and savannas	5,203,411	760,651	13,764	14.6	1.8	4
Tundra	8,311,584	6,623,675	107,290	79.7	1.6	6
Deserts and xeric shrublands	27,984,645	6,470,715	89,427	23.1	1.4	9
Boreal forests / taiga	15,077,946	9,349,732	99,254	62.0	1.1	9
Temperate grasslands savannas and shrublands	10,104,080	214,074	995	2.1	0.5	3
Tropical and subtropical coniferous forests	712,618	57,241	47	8.0	0.1	1

Figure 3. Wilderness as defined by the Last of the Wild approach for each of the 62 biorealm considered in our analysis.

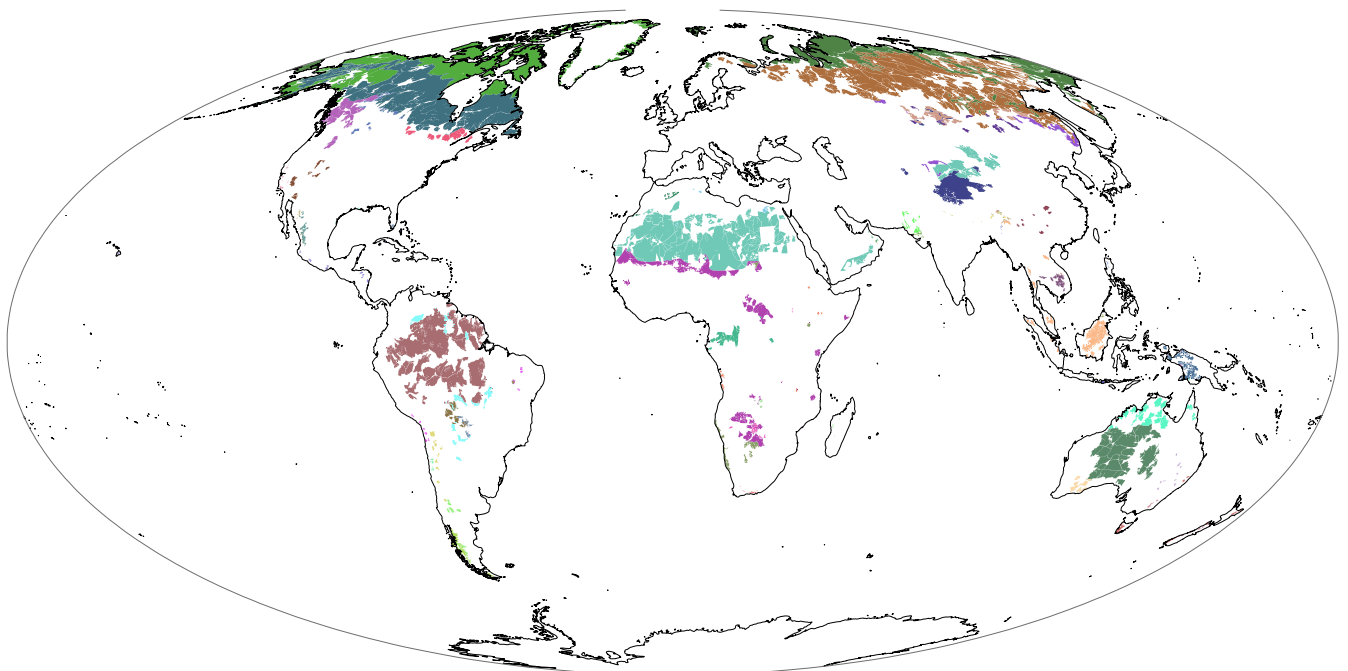


Figure 4. Percentage of wilderness based on the Last of the Wild currently protected in natural and mixed World Heritage sites (NWHS), for each of the 14 biomes.

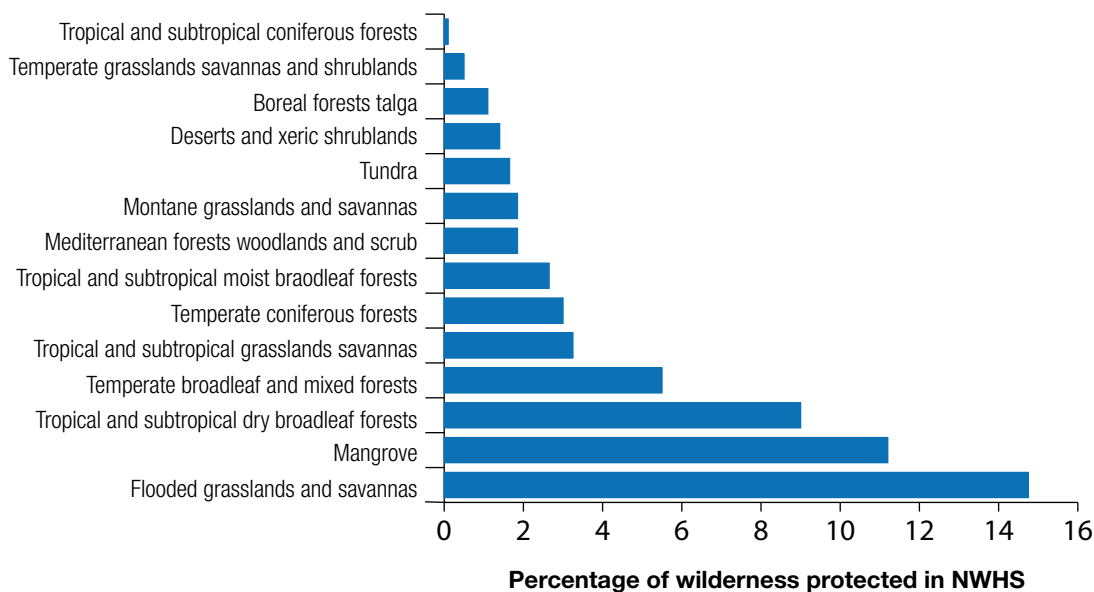
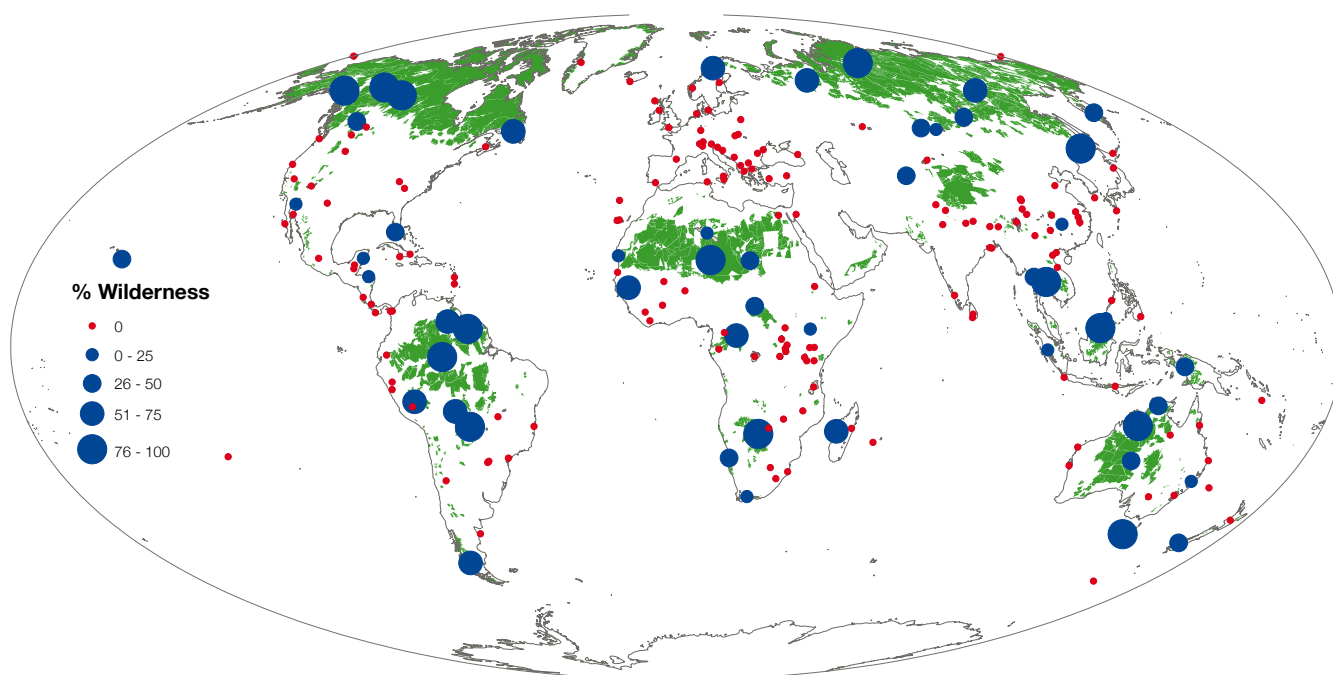


Figure 5. Percentage of each natural and mixed World Heritage site's terrestrial area which is wilderness, based on the Last of the Wild approach.



Discussion

This study is subject to a number of limitations, in particular regarding the Human Footprint data. By combining bottom up survey data with top down remote sensing data the Human Footprint is the most complete and highest resolution globally standardized pressure map, making it the best available dataset for our study (Venter et al. 2016). However, the Human Footprint does not include data on all the possible threats and pressures

which protected areas are facing. For example, the updated Human Footprint does not include data on mining or other extractive industries, and the roads layer is static between 1993 and 2009, which means that our estimates of human pressure are likely conservative. Our wilderness maps and our results in terms of wilderness coverage in natural and mixed World Heritage sites are therefore indicative rather than absolute. Any further analysis of potential candidate wilderness areas needs to consider additional, up-to-date information on industrial activities and roads.

Table 2. Wilderness as defined by the Last of the Wild approach in each biorealm and its coverage by natural and mixed World Heritage sites (NWHS). Gaps in World Heritage coverage (< 1% coverage) are highlighted in bold red.

Realm Name	Biome Name	Area of biorealm (km ²)	Area of LoW (km ²)	Area LoW in NWHS (km ²)	% of biorealm LoW	% of LoW in NWHS
Afrotropic	Deserts and xeric shrublands	2,408,199	138,017	12,041	5.7	8.7
Afrotropic	Flooded grasslands and savannas	458,825	34,533	11,914	7.5	34.5
Afrotropic	Mangrove	76,883	5,544	-	7.2	0.0
Afrotropic	Mediterranean forests woodlands and scrub	95,862	5,525	2,313	5.8	41.9
Afrotropic	Montane grasslands and savannas	864,245	20,540	-	2.4	0.0
Afrotropic	Temperate grasslands savannas and shrublands	25,841	3,864	-	15.0	0.0
Afrotropic	Tropical and subtropical dry broadleaf forests	195,296	11,118	1,081	5.7	9.7
Afrotropic	Tropical and subtropical grasslands savannas	14,012,118	1,055,211	31,981	7.5	3.0
Afrotropic	Tropical and subtropical moist broadleaf forests	3,493,130	187,599	4,017	5.4	2.1
Australasia	Deserts and xeric shrublands	3,580,113	1,585,016	549	44.3	< 0.1
Australasia	Mangrove	26,885	4,491	1,367	16.7	30.4
Australasia	Mediterranean forests woodlands and scrub	805,436	76,363	-	9.5	0.0
Australasia	Montane grasslands and savannas	67,648	6,504	1,913	9.6	29.4
Australasia	Temperate broadleaf and mixed forests	736,811	43,613	22,870	5.9	52.4
Australasia	Temperate grasslands savannas and shrublands	631,023	9,784	-	1.6	0.0
Australasia	Tropical and subtropical dry broadleaf forests	88,348	5,226	-	5.9	0.0
Australasia	Tropical and subtropical grasslands savannas	2,170,610	359,227	8,651	16.5	2.4
Australasia	Tropical and subtropical moist broadleaf forests	1,160,343	162,659	7,575	14.0	4.7
Indo-Malay	Deserts and xeric shrublands	1,089,109	44,647	-	4.1	0.0
Indo-Malay	Flooded grasslands and savannas	27,965	10,016	-	35.8	0.0
Indo-Malay	Mangrove	119,125	4,149	-	3.5	0.0
Indo-Malay	Montane grasslands and savannas	4,349	860	173	19.8	20.1
Indo-Malay	Temperate broadleaf and mixed forests	149,971	11,774	-	7.9	0.0
Indo-Malay	Temperate coniferous forests	67,304	6,460	-	9.6	0.0
Indo-Malay	Tropical and subtropical coniferous forests	95,956	5,620	-	5.9	0.0
Indo-Malay	Tropical and subtropical dry broadleaf forests	1,531,782	60,226	5,227	3.9	8.7
Indo-Malay	Tropical and subtropical grasslands savannas	34,657	892	-	2.6	0.0
Indo-Malay	Tropical and subtropical moist broadleaf forests	5,422,850	346,106	4,779	6.4	1.4
Nearctic	Boreal forests taiga	5,103,133	4,355,904	56,139	85.4	1.3
Nearctic	Deserts and xeric shrublands	2,324,734	68,588	16	3.0	< 0.1
Nearctic	Mediterranean forests woodlands and scrub	121,535	8,772	-	7.2	0.0
Nearctic	Temperate broadleaf and mixed forests	2,842,613	179,266	-	6.3	0.0
Nearctic	Temperate coniferous forests	2,306,570	443,358	11,619	19.2	2.6
Nearctic	Temperate grasslands savannas and shrublands	3,096,883	65,799	50	2.1	< 0.1
Nearctic	Tropical and subtropical coniferous forests	289,050	35,260	-	12.2	0.0
Nearctic	Tropical and subtropical dry broadleaf forests	51,096	3,413	-	6.7	0.0
Nearctic	Tropical and subtropical grasslands savannas	80,803	7,276	-	9.0	0.0
Nearctic	Tundra	4,253,628	3,717,951	67,487	87.4	1.8
Neotropic	Deserts and xeric shrublands	1,178,911	24,319	-	2.1	0.0
Neotropic	Flooded grasslands and savannas	270,986	31,910	2,975	11.8	9.3
Neotropic	Mangrove	125,626	8,477	1,155	6.7	13.6
Neotropic	Mediterranean forests woodlands and scrub	148,840	8,146	-	5.5	0.0

Realm Name	Biome Name	Area of biorealm (km ²)	Area of LoW (km ²)	Area LoW in NWHS (km ²)	% of biorealm LoW	% of LoW in NWHS
Neotropic	Montane grasslands and savannas	874,755	50,016	-	5.7	0.0
Neotropic	Temperate broadleaf and mixed forests	413,204	79,005	3,440	19.1	4.4
Neotropic	Temperate grasslands savannas and shrublands	1,629,667	41,020	205	2.5	0.5
Neotropic	Tropical and subtropical coniferous forests	327,612	16,360	47	5.0	0.3
Neotropic	Tropical and subtropical dry broadleaf forests	1,144,759	88,292	8,706	7.7	9.9
Neotropic	Tropical and subtropical grasslands savannas	3,993,839	232,551	12,559	5.8	5.4
Neotropic	Tropical and subtropical moist broadleaf forests	9,277,772	2,908,849	78,955	31.4	2.7
Oceania	Tropical and subtropical dry broadleaf forests	14,717	1,936	171	13.2	8.8
Oceania	Tropical and subtropical grasslands savannas	3,397	994	193	29.3	19.4
Oceania	Tropical and subtropical moist broadleaf forests	29,041	1,510	-	5.2	0.0
Paleartic	Boreal forests taiga	9,974,812	4,993,827	43,115	50.1	0.9
Paleartic	Deserts and xeric shrublands	17,403,579	4,610,128	76,821	26.5	1.7
Paleartic	Flooded grasslands and savannas	338,354	25,085	-	7.4	0.0
Paleartic	Mediterranean forests woodlands and scrub	2,055,593	26,454	-	1.3	0.0
Paleartic	Montane grasslands and savannas	3,392,415	682,730	11,678	20.1	1.7
Paleartic	Temperate broadleaf and mixed forests	8,693,090	230,530	3,339	2.7	1.4
Paleartic	Temperate coniferous forests	1,713,220	257,725	9,544	15.0	3.7
Paleartic	Temperate grasslands savannas and shrublands	4,720,666	93,608	740	2.0	0.8
Paleartic	Tropical and subtropical moist broadleaf forests	511,013	21,905	99	4.3	0.5
Paleartic	Tundra	4,057,079	2,905,724	39,803	71.6	1.4

Table 3. Coverage of wilderness in terrestrial natural and mixed World Heritage sites (NWHS) defined by the Last of the Wild approach. Sites are sorted by percentage wilderness; NWHS with no wilderness coverage are not shown.

Site Name	Country	Area (km ²)	Wilderness area (km ²)	% wilderness
Putorana Plateau	Russian Federation	19,757	19,800	100.0
Nahanni National Park	Canada	4,825	4,827	100.0
Central Suriname Nature Reserve	Suriname	16,236	16,029	98.7
Purnululu National Park	Australia	2,443	2,343	95.9
Wood Buffalo National Park	Canada	45,348	43,112	95.1
Pantanal Conservation Complex	Brazil	1,987	1,830	92.1
Air and Tenere Natural Reserves	Niger	78,520	70,523	89.8
Gunung Mulu National Park	Malaysia	526	472	89.7
Dong Phrayayen-Khao Yai Forest Complex	Thailand	6,205	5,227	84.2
Central Sikhote-Alin	Russian Federation	3,990	3,339	83.7
Okavango Delta	Botswana	20,505	17,105	83.4
Tasmanian Wilderness World Heritage Area	Australia	15,829	12,716	80.3
Central Amazon Conservation Complex	Brazil	51,198	39,809	77.8
Kluane / Wrangell-St Elias / Glacier Bay / Tatshenshini-Alsek	Canada, USA	97,066	74,968	77.2
Manú National Park	Peru	17,013	12,520	73.6
Noel Kempff Mercado National Park	Bolivia	16,178	11,462	70.9
Tsingy de Bemaraha Strict Nature Reserve	Madagascar	1,571	1,081	68.8
Canaima National Park	Venezuela	28,954	19,388	67.0

Site Name	Country	Area (km ²)	Wilderness area (km ²)	% wilderness
Gros Morne National Park	Canada	1,803	1,118	62.0
Niokolo-Koba National Park	Senegal	8,265	4,996	60.4
Virgin Komi Forests	Russian Federation	28,639	17,022	59.4
Sangha Trinational	Cameroon, Central African Republic, Congo	7,510	4,017	53.5
Lena Pillars Nature Park	Russian Federation	13,167	7,023	53.3
Laponian Area	Sweden	9,267	4,846	52.3
Los Glaciares National Park	Argentina	7,170	3,645	50.8
Manovo-Gounda St Floris National Park	Central African Republic	18,829	9,106	48.4
Canadian Rocky Mountain Parks	Canada	23,529	11,270	47.9
Te Wahipounamu – South West New Zealand	New Zealand	25,083	11,256	44.9
Thungyai - Huai Kha Khaeng Wildlife Sanctuaries	Thailand	6,327	2,838	44.9
Golden Mountains of Altai	Russian Federation	17,226	7,418	43.1
Hawaii Volcanoes National Park	USA	846	364	43.0
Uluru-Kata Tjuta National Park	Australia	1,331	549	41.2
Tajik National Park (Mountains of the Pamirs)	Tajikistan	25,351	10,086	39.8
Namib Sand Sea	Namibia	30,824	12,037	39.1
Lorentz National Park	Indonesia	23,655	8,942	37.8
Volcanoes of Kamchatka	Russian Federation	39,738	14,828	37.3
Everglades National Park	USA	5,840	2,157	36.9
Kakadu National Park	Australia	19,211	6,308	32.8
Lakes of Ounianga	Chad	631	195	30.9
Lake Baikal	Russian Federation	85,317	23,613	27.7
Tassili n'Ajjer	Algeria	75,543	17,615	23.3
Kinabalu Park	Malaysia	769	173	22.5
Gondwana Rainforests of Australia	Australia	3,698	811	21.9
Sian Ka'an	Mexico	5,299	1,155	21.8
Cape Floral Region Protected Areas	South Africa	11,021	2,313	21.0
China Danxia	China	836	99	11.8
Banc d'Arguin National Park	Mauretania	11,981	1,083	9.0
Tropical Rainforest Heritage of Sumatra	Indonesia	25,919	1,469	5.7
Uvs Nuur Basin	Mongolia, Russian Federation	12,505	337	2.7
Río Plátano Biosphere Reserve	Honduras	5,078	47	0.9
Lake Turkana National Parks	Tanzania	1,542	4	0.3
El Pinacate and Gran Desierto de Altar Biosphere Reserve	Mexico	7,121	16	0.2

The definition of wilderness according to the Last of the Wild methodology and Human Footprint data also involves several assumptions, limitations and relatively arbitrary thresholds. As a result, some natural and mixed World Heritage sites with good wilderness attributes may not make the thresholds and others with less good wilderness attributed may be included. For example, two World Heritage sites with good wilderness attributes which did not make our list are the 51,200 km² *Selous Game Reserve* in Tanzania, and the 8,983 km² *Yellowstone National Park* in USA. Yellowstone is not included in our list because the Last of the Wild approach

only includes the ten largest contiguous wilderness areas plus all wilderness areas > 10,000 km² in each biorealm. Yellowstone is intersected by roads which fragment its wilderness into smaller areas and therefore falls below the required size threshold. There are other larger areas with an equally low Human Footprint within the *Nearctic temperate coniferous forest* biorealm which qualify as wilderness according to the Last of the Wild analysis. While roads can have serious negative impacts on natural systems (Laurance et al. 2009, Laurance et al. 2015), we also know that Yellowstone has good wilderness values, maintaining its full complement of large

mammals including migratory and wide-ranging species. This underscores the need to supplement global datasets such as Last of the Wild with regional and site based analyses.

Likewise, as an example, the Selous Game Reserve does not make our list because the Last of the Wild approach only includes the 10% of a biorealm with the lowest Human Footprint. Although the Selous has a relatively low Human Footprint and a sufficiently large contiguous area, it does not fall within the top 10% threshold for the *Afrotropic tropical and subtropical grasslands and savannas* biorealm. This is due to other areas within this biorealm having exceptionally low Human Footprints, for example parts of the 42,000 km² Niassa Game Reserve in Mozambique, which may be an area deserving further analysis of its wilderness values.

Marine wilderness analysis

Following the same rationale of our terrestrial analysis, our marine analysis combines cumulative pressure data (Halpern et al. 2015) with a biogeographic framework (Spalding et al. 2007, 2012), to calculate coverage of marine wilderness areas within the boundaries of the 47 marine World Heritage sites inscribed at the time of our analysis. Importantly, for reasons outlined below, we restricted our analysis to marine areas under national jurisdiction.

Methods

Biogeographic classification of the marine environment

We compiled a combined layer of the widely used Marine Ecoregions of the World (MEOW), which provide a biogeographic framework on nearshore, continental shelf waters (up to 200m depth, hereafter referred to as nearshore provinces); and the Pelagic Provinces of the World, for waters beyond a depth of 200m and extending to the limit of Exclusive Economic Zones (EEZs, which extend 200 nautical miles from the coast) (Spalding et al. 2007, 2012). We aligned the outer limit of our analysis with the boundaries of EEZs as the World Heritage Convention currently does not apply to the large majority of marine areas beyond national jurisdiction (ABNJ) (but see UNESCO 2016). From the MEOW framework, in line with IUCN's marine World Heritage thematic study (Abdulla et al. 2013), we used the 61 marine provinces (excluding the Continental High Antarctic province) as the basis for our analysis, as they are of appropriate scale for identifying broad gaps globally.

Defining and mapping marine wilderness

In the absence of a global marine wilderness map, we used the cumulative marine pressure data (Halpern et al. 2015) to identify the least impacted ocean areas for our analysis. The cumulative marine pressure indicator summarizes impacts on the world's marine areas based on a set of 19 stress factors up to 2013, including fishing, climate change and land-based stressors. This layer represents the best available, globally consistent cumulative marine pressure data at a high resolution of 1 km².

We chose the 10th percentile value of the cumulative marine pressure for all marine areas within EEZ limits as the threshold for defining marine wilderness. This empirical threshold was

developed by comparing candidate values at the 1st, 3rd, 5th and 10th percentiles, and was selected for its ability to identify, in accordance with expert knowledge, known marine wilderness areas in marine World Heritage sites.

Calculating marine wilderness coverage in World Heritage sites and nearshore and pelagic provinces

Based on the threshold, we calculated the percentage of marine wilderness in each nearshore province and pelagic province, to identify provinces with large wilderness areas and those that have little or no wilderness coverage. Secondly, we calculated the existing coverage of marine wilderness within the 47 marine World Heritage sites, based on the boundaries from the May 2016 version of the World Database on Protected Areas (WDPA) (IUCN and UNEP-WCMC 2016). Lastly, a further analysis was undertaken to identify nearshore and pelagic provinces with large wilderness areas not represented by current marine World Heritage sites. This was achieved by overlaying all three layers: the cumulative pressure data, the World Heritage boundaries and the combined biogeographic classification; and by calculating the number of World Heritage sites with marine wilderness and their percentage coverage.

Results

Current distribution of marine wilderness in nearshore and pelagic provinces

The global distribution of marine wilderness is uneven (Figure 6) and it reflects different pressure combinations across all marine provinces (both nearshore and pelagic). We found large variations between provinces with largely undisturbed waters and those subject to intensive human influence. Some provinces contain a vast extent of contiguous marine wilderness areas as defined in this study, while many other provinces have little wilderness: wilderness makes up less than 10% of the total area of 36 of the 61 nearshore provinces considered in this analysis, and also less than 10% of the total area within EEZ limits of 31 of the 37 pelagic provinces (Table 4). Below we summarize our results grouped by the world's five major ocean basins: Arctic, Pacific, Southern, Atlantic and Indian Ocean.

Globally, among marine areas under national jurisdiction (i.e. within EEZ limits), the Arctic Ocean stands out as still largely intact and with the largest marine wilderness area overall, covering a total of 3.3 million km² in the nearshore Arctic province (Figure 7), and one of the highest percentages of wilderness coverage (47.9%) in all nearshore provinces. It also includes 2.8 million km² of wilderness (56.1%) within the Arctic pelagic province (out to the EEZ boundary), making it the largest contiguous waters with a significant wilderness coverage across all oceans.

Substantial marine wilderness areas can also be found in some parts of the Pacific Ocean (Figure 8). In the nearshore provinces, the Sahul Shelf, off the north coast of Australia, contains a large marine wilderness area (228,274 km², 21.9%), second only to the Arctic province. Other nearshore provinces with notable wilderness areas (> 10,000 km²) include for example the Tropical Southwestern Pacific, the Tropical East Pacific, the Warm Temperate Northeast

Pacific, the Cold Temperate Northeast Pacific, and the Cold Temperate Northwest Pacific (Figure 8 and full list in Table 4). In the Pacific pelagic provinces, the South Central Pacific in northeast Polynesia hosts the second largest wilderness area (1.8 million km², 10.8%) after the Arctic pelagic province (Figure 8). This forms part of a vast wilderness area that extends well beyond

the EEZ limits. In addition, numerous pelagic provinces have a wilderness area exceeding 10,000 km², they include the North Central Pacific, the Equatorial Pacific, the Southwest Pacific, the Humboldt Current, the Southern Subtropical Front, the Eastern Tropical Pacific and the Subarctic Pacific.

Figure 6. Marine wilderness in 2013, defined as the 10% least impacted marine areas under national jurisdiction, based on the cumulative human pressure data by Halpern *et al.* (2015). Wilderness in marine areas under national jurisdiction shown in dark green, with wilderness in the high seas (delineated using the same threshold) denoted by paler green.

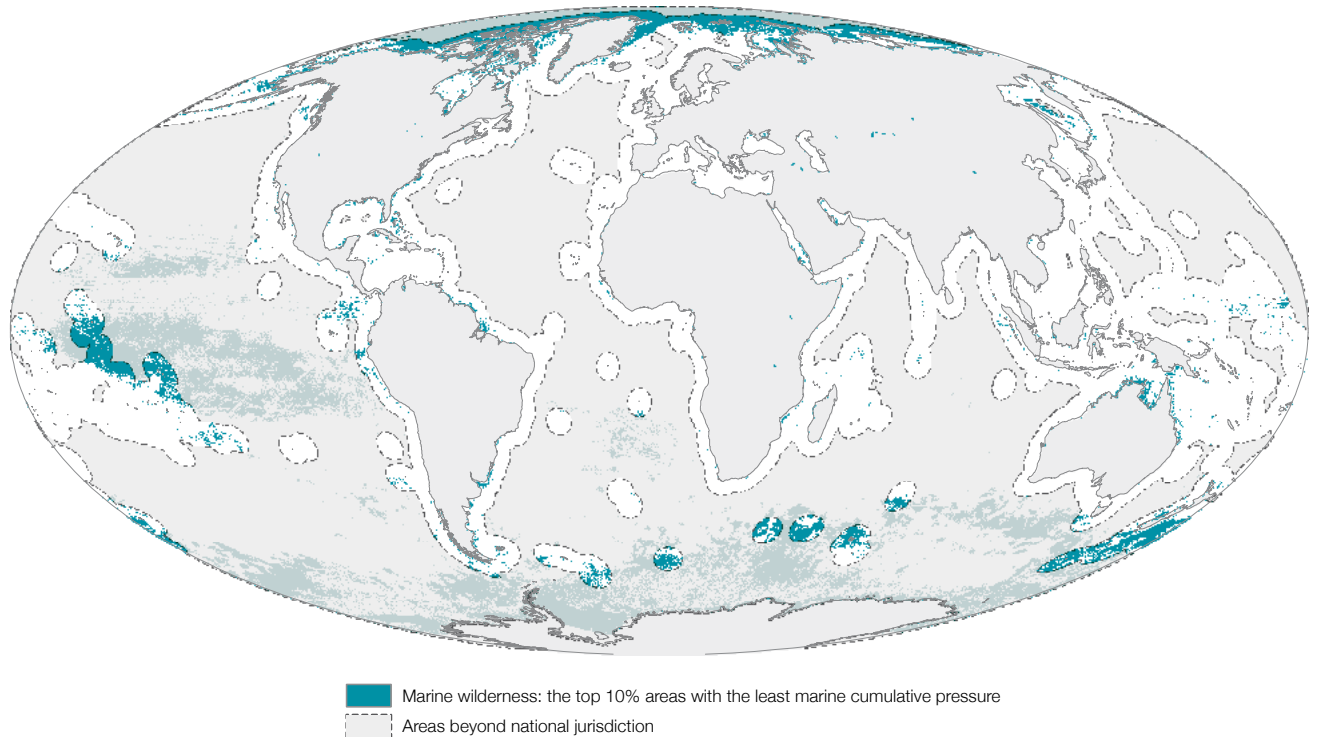


Figure 7. Marine wilderness in the Arctic Ocean (including the combined area of the Arctic nearshore and pelagic provinces out to the EEZ boundary at 200 nautical miles).

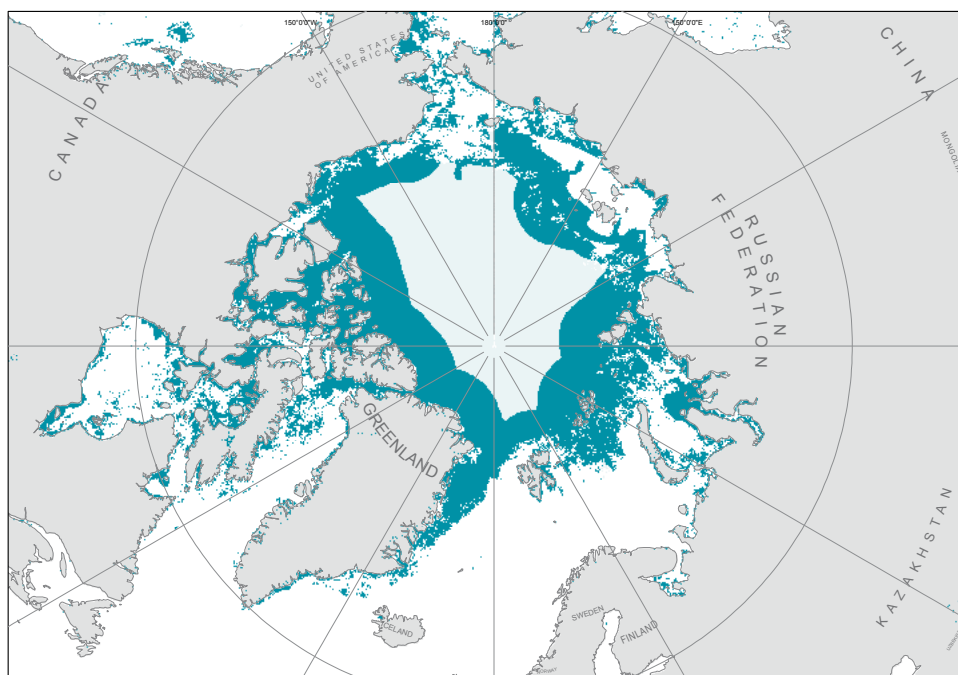


Figure 8. Marine wilderness in the Pacific Ocean. Nearshore (in *italics and underlined>*) and pelagic provinces with wilderness areas greater than 10,000 km² are labelled.

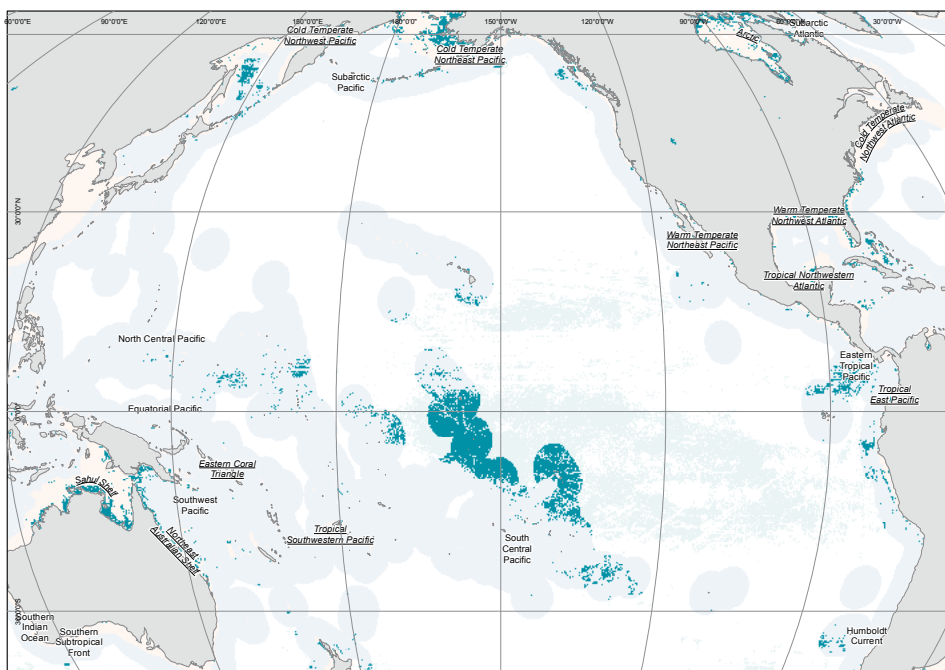


Table 4. Marine wilderness area in each nearshore and pelagic province. Provinces are sorted by wilderness area; provinces with no wilderness area are not shown.

Nearshore province	Total area (km ²)	Wilderness area (km ²)	% wilderness
Arctic	6,951,104.1	3,332,924.7	47.9%
Sahul Shelf	1,316,408.2	288,274.4	21.9%
Tropical Northwestern Atlantic	1,004,227.8	143,302.8	14.3%
Magellanic	963,261.9	105,058.0	10.9%
North Brazil Shelf	495,287.7	102,330.0	20.7%
Northeast Australian Shelf	291,384.9	89,515.9	30.7%
Cold Temperate Northeast Pacific	546,851.3	83,073.9	15.2%
Warm Temperate Northwest Atlantic	367,642.3	72,993.1	19.9%
Warm Temperate Southwestern Atlantic	559,453.2	70,916.6	12.7%
Cold Temperate Northwest Pacific	1,609,386.8	66,139.0	4.1%
Subantarctic Islands	91,072.0	65,222.1	71.6%
Southern New Zealand	239,592.5	64,145.4	26.8%
Red Sea and Gulf of Aden	283,193.8	59,348.6	21.0%
Western Indian Ocean	487,740.2	58,279.8	11.9%
Somali/Arabian	389,043.0	54,481.1	14.0%
Warm Temperate Northeast Pacific	184,579.5	22,238.2	12.0%
Black Sea	165,389.9	20,973.7	12.7%
Gulf of Guinea	371,409.4	20,129.3	5.4%
Sunda Shelf	1,832,301.1	16,732.3	0.9%
Tropical East Pacific	234,301.5	16,351.6	7.0%
Eastern Coral Triangle	225,823.1	15,921.1	7.1%
Cold Temperate Northwest Atlantic	882,950.1	12,402.8	1.4%
Tropical Southwestern Pacific	208,208.8	11,999.3	5.8%
Subantarctic New Zealand	36,284.4	11,295.5	31.1%

Nearshore province	Total area (km²)	Wilderness area (km²)	% wilderness
Mediterranean Sea	671,771.3	11,195.1	1.7%
South China Sea	541,717.5	9,945.4	1.8%
Central Indian Ocean Islands	78,844.8	9,618.0	12.2%
Western Coral Triangle	947,278.0	8,622.5	0.9%
Lusitanian	304,782.3	7,839.2	2.6%
Southeast Polynesia	45,998.4	6,366.9	13.8%
Benguela	160,759.9	6,249.8	3.9%
East Central Australian Shelf	68,305.5	6,014.1	8.8%
Northern European Seas	1,738,628.5	5,612.4	0.3%
Warm Temperate Southeastern Pacific	143,291.5	5,392.3	3.8%
Northwest Australian Shelf	305,907.0	5,088.4	1.7%
Tropical Southwestern Atlantic	197,315.0	4,697.2	2.4%
Scotia Sea	35,791.9	4,398.6	12.3%
Southeast Australian Shelf	240,026.5	4,159.3	1.7%
Northern New Zealand	48,701.1	3,984.6	8.2%
Tropical Northwestern Pacific	57,727.9	3,638.8	6.3%
Bay of Bengal	283,533.5	3,530.5	1.2%
West African Transition	71,857.9	3,402.2	4.7%
Marquesas	4,540.9	3,400.4	74.9%
Andaman	308,436.0	3,245.9	1.1%
Central Polynesia	16,182.2	2,921.0	18.1%
Marshall, Gilbert and Ellis Islands	48,562.3	2,357.8	4.9%
Agulhas	122,482.8	2,329.0	1.9%
Galapagos	16,172.6	1,678.4	10.4%
West Central Australian Shelf	89,973.5	1,558.7	1.7%
Hawaii	31,466.7	1,133.5	3.6%
Southwest Australian Shelf	333,631.8	1,050.5	0.3%
West and South Indian Shelf	386,295.7	704.7	0.2%
Amsterdam-St Paul	903.8	434.9	48.1%
Tristan Gough	1,839.1	413.0	22.5%
Java Transitional	65,239.6	124.9	0.2%
Juan Fernández and Desventuradas	1,724.7	120.5	7.0%
Lord Howe and Norfolk Islands	9,290.5	105.7	1.1%
St. Helena and Ascension Islands	1,196.4	104.8	8.8%
Warm Temperate Northwest Pacific	662,221.5	103.0	0.0%
South Kuroshio	42,381.4	49.8	0.1%
Easter Island	698.6	21.8	3.1%

Pelagic province	Total area (km²)	Wilderness area (km²)	% wilderness
Arctic	4,972,797.5	2,791,071.0	56.1%
South Central Pacific	17,414,445.1	1,876,671.8	10.8%
Antarctic Polar Front	2,248,136.2	1,002,555.5	44.6%
Subantarctic	2,152,436.0	802,858.3	37.3%
Southern Subtropical Front	3,611,681.6	765,959.1	21.2%
Antarctic	1,820,650.2	503,463.1	27.7%

Pelagic province	Total area (km ²)	Wilderness area (km ²)	% wilderness
Equatorial Pacific	5,183,569.3	500,179.6	9.6%
Eastern Tropical Pacific	4,052,129.2	230,006.8	5.7%
Subarctic Pacific	4,499,939.2	169,395.5	3.8%
Southern Indian Ocean	2,408,515.4	131,921.7	5.5%
North Central Pacific	11,725,296.9	122,926.4	1.0%
Humboldt Current	2,143,314.0	63,434.6	3.0%
Northern Indian Ocean	8,761,429.9	32,477.9	0.4%
Subarctic Atlantic	2,547,882.5	29,696.6	1.2%
Southwest Pacific	6,545,454.6	23,182.1	0.4%
South Central Atlantic	2,174,503.0	20,217.5	0.9%
Malvinas Current	320,538.3	8,392.8	2.6%
Indonesian Through-Flow	3,165,453.0	7,623.5	0.2%
California Current	1,267,363.9	6,915.3	0.5%
Sea of Japan/East Sea	741,504.7	3,523.6	0.5%
Benguela Current	758,675.4	2,614.5	0.3%
Equatorial Atlantic	4,225,043.9	237.5	0.0%
Red Sea	229,960.6	234.0	0.1%
Agulhas Current	1,540,320.7	224.4	0.0%
Kuroshio-Oyashio Current	1,044,420.8	169.4	0.0%
Somali Current	1,768,521.6	50.6	0.0%
North Pacific Current	17,394.2	34.1	0.2%
Inter American Seas	3,296,053.5	24.5	0.0%
North Central Atlantic	2,521,547.0	23.6	0.0%
Canary Current	1,564,163.0	13.1	0.0%
Gulf Stream	758,606.4	5.2	0.0%
Leeuwin Current	942,160.7	3.5	0.0%

The Southern Ocean, encircling the continent of Antarctica, encompasses a considerable expanse of marine wilderness (Figure 9). While the large majority remains beyond the reach of the Convention, we identified several marine provinces with substantial wilderness areas within EEZ limits, most of which locate around islands off the coast of Antarctica. In the nearshore provinces, the Subantarctic Islands (65,221 km², 71.6%), Southern New Zealand and Subantarctic New Zealand are the three provinces with considerable marine wilderness. In the pelagic waters, very large wilderness areas are found in the Antarctic Polar Front (1 million km², 44.6%), Subantarctic (802,858 km², 37.3%), Southern Subtropical Front (765,959 km², 21.2%) and Antarctic (503,463 km², 27.7%).

Compared to the three ocean basins described above, we found wilderness areas in both the Atlantic Ocean and the Indian Ocean to be rather dispersed, fragmented and generally smaller in area (Figure 10). Most of the nearshore provinces with wilderness areas can be found along the western side of the Atlantic Ocean and the western side the Indian Ocean, including the Tropical Northwestern Atlantic, the Warm Temperate Northwest Atlantic, Warm Temperate Southwestern Atlantic, the Cold Temperate Northwest Atlantic, the North

Brazil Shelf, the Magellanic, the Western Indian Ocean, the Red Sea and Gulf of Aden, and the Somali/Arabian province. Pelagic provinces with notable wilderness areas include the Southern Indian Ocean, Northern Indian Ocean, Subarctic Atlantic and South Central Atlantic.

Current marine wilderness coverage in World Heritage sites

Our analysis found that 36 of 47 marine World Heritage sites contain varying degrees of marine wilderness areas inside their boundaries (Figure 11 and Table 5). Together, these 36 sites currently protect over 133,277 km² of marine wilderness within EEZ limits, of which 76% is concentrated within the two largest wilderness sites (Great Barrier Reef and Phoenix Islands Protected Area) and 97% is protected in the ten largest wilderness sites.

For example, in the Pacific Ocean, the Great Barrier Reef off the east coast of Australia has the single largest marine wilderness area within EEZ limits of all natural and mixed World Heritage sites (78,310 km², 22.7% of its total marine area). The Phoenix Islands Protected Area, the largest World Heritage site in the world, covers a considerable 23,432 km² of wilderness area within EEZ limits. Overall, out of 36 sites that contain marine wilderness, ten natural

and mixed World Heritage sites contain more than 1,000 km² of wilderness inside their boundaries (Table 5).

While the actual amount of marine wilderness in each site is an important indicator, the percentage of the site's area that is marine wilderness may provide another useful indication of the degree to which vast wilderness areas are recognized and represented in World Heritage sites. For instance, in the Southern Ocean, wilderness makes up 95.4% (5,396.7 km²) of Macquarie Island's waters. In the Arctic Ocean, 59.7% (7,200

km²) of the Natural System of Wrangel Island Reserve's waters are wilderness areas.

However, our analysis also highlights that many more wilderness areas that may support globally significant marine values and features, are still outside the network of marine World Heritage sites. In addition, significant wilderness areas exist in marine areas beyond national jurisdiction not analyzed here, as the high seas are outside the current reach of the Convention (but see UNESCO 2016).

Figure 9. Marine wilderness in the Southern Ocean. Nearshore (in *italics and underlined>*) and pelagic provinces with wilderness areas greater than 10,000 km² are labelled.

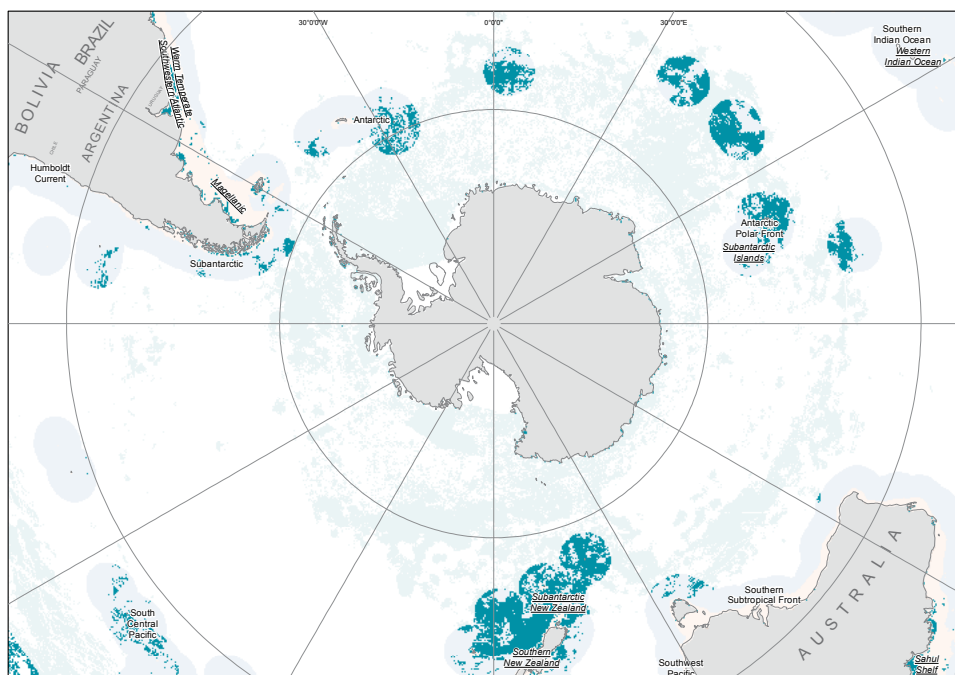


Figure 10. Marine wilderness in the Atlantic and Indian Ocean. Nearshore (in *italics and underlined>*) and pelagic provinces with wilderness areas greater than 10,000 km² are labelled.

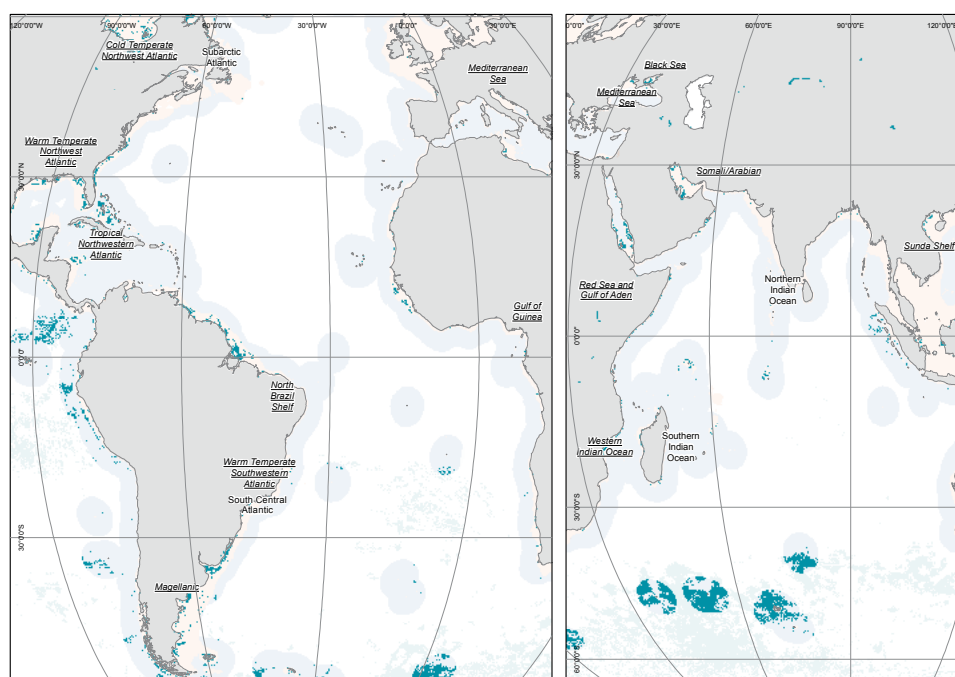
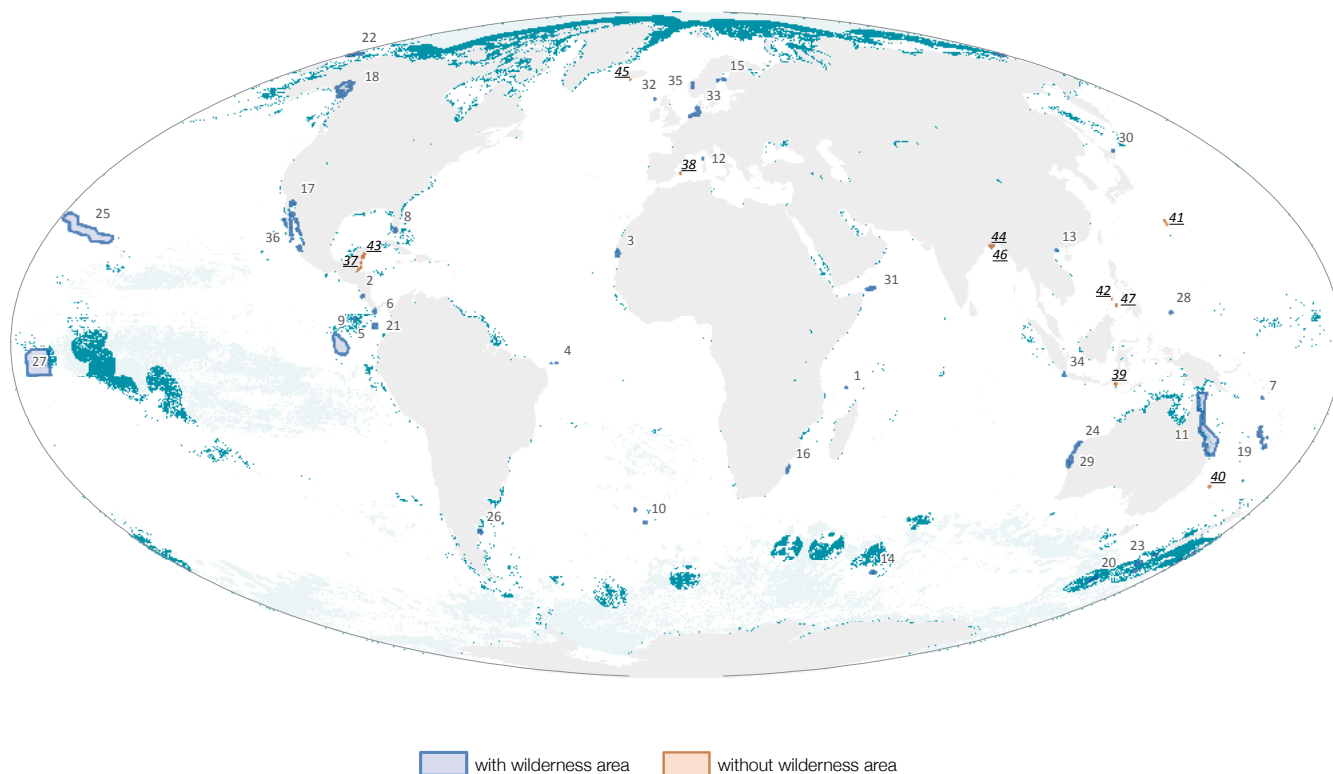


Figure 11. Distribution of natural and mixed marine World Heritage sites with (normal label) and without (bold and underlined label) marine wilderness. See below for site names. Wilderness in marine areas under national jurisdiction shown in dark blue, with wilderness in the high seas (delineated using the same threshold) denoted by paler blue.



Labels and site names for Figure 11

1	Aldabra Atoll	17	Islands and Protected Areas of the Gulf of California	33	The Wadden Sea
2	Area de Conservación Guanacaste	18	Kluane / Wrangell-St Elias / Glacier Bay / Tatshenshini-Alsek	34	Ujung Kulon National Park
3	Banc d'Arguin National Park	19	Lagoons of New Caledonia: Reef Diversity and Associated Ecosystems	35	West Norwegian Fjords – Geirangerfjord and Nærøfjord
4	Brazilian Atlantic Islands: Fernando de Noronha and Atol das Rocas Reserves	20	Macquarie Island	36	Whale Sanctuary of El Vizcaino
5	Cocos Island National Park	21	Malpelo Fauna and Flora Sanctuary	37	Belize Barrier Reef Reserve System
6	Coiba National Park and its Special Zone of Marine Protection	22	Natural System of Wrangel Island Reserve	38	Ibiza Biodiversity and Culture
7	East Rennell	23	New Zealand Sub-Antarctic Islands	39	Komodo National Park
8	Everglades National Park	24	Ningaloo Coast	40	Lord Howe Island Group
9	Galápagos Islands	25	Papahānaumokuākea	41	Ogasawara Islands
10	Gough and Inaccessible Islands	26	Península Valdés	42	Puerto-Princesa Subterranean River National Park
11	Great Barrier Reef	27	Phoenix Islands Protected Area	43	Sian Ka'an
12	Gulf of Porto: Calanche of Piana Gulf of Girolata Scandola Reserve	28	Rock Islands Southern Lagoon	44	Sundarbans National Park
13	Ha Long Bay	29	Shark Bay Western Australia	45	Surtsey
14	Heard and McDonald Islands	30	Shiretoko	46	The Sundarbans
15	High Coast / Kvarken Archipelago	31	Socotra Archipelago	47	Tubbataha Reefs Natural Park
16	iSimangaliso Wetland Park	32	St Kilda		

Table 5. Existing natural and mixed World Heritage sites (NWHs) with marine wilderness areas. Sites are sorted by site name; NWHs with no wilderness coverage are not shown.

Site Name	Country	Criteria	Marine area (km ²)	Marine wilderness (km ²)	% wilderness
Aldabra Atoll	Seychelles	(vii)(ix)(x)	352.8	15.7	4.5%
Area de Conservación Guanacaste	Costa Rica	(ix)(x)	539.7	84.7	15.7%
Banc d'Arguin National Park	Mauritania	(ix)(x)	6,492.6	695.1	10.7%
Brazilian Atlantic Islands: Fernando de Noronha and Atol das Rocas Reserves	Brazil	(vii)(ix)(x)	123.1	0.9	0.7%
Cocos Island National Park	Costa Rica	(ix)(x)	1,874.0	879.4	46.9%
Coiba National Park and its Special Zone of Marine Protection	Panama	(ix)(x)	3,782.0	35.8	0.9%
East Rennell	Solomon Islands	(ix)	506.5	41.9	8.3%
Everglades National Park	USA	(viii)(ix)(x)	2,116.8	1.8	0.1%
Galápagos Islands	Ecuador	(vii)(viii)(ix)(x)	138,690.3	2,022.4	1.5%
Gough and Inaccessible Islands	UK	(vii)(x)	3,920.9	75.1	1.9%
Great Barrier Reef	Australia	(vii)(viii)(ix)(x)	345,690.5	78,310.4	22.7%
Gulf of Porto: Calanche of Piana, Gulf of Girolata, Scandola Reserve	France	(vii)(viii)(x)	30.6	0.9	2.9%
Ha Long Bay	Viet Nam	(vii)(viii)	449.7	8.7	1.9%
Heard and McDonald Islands	Australia	(viii)(ix)	6,032.4	1,917.7	31.8%
High Coast / Kvarken Archipelago	Finland, Sweden	(viii)	2,560.4	3.5	0.1%
iSimangaliso Wetland Park	South Africa	(vii)(ix)(x)	872.4	7.0	0.8%
Islands and Protected Areas of the Gulf of California	Mexico	(vii)(ix)(x)	15,423.3	1,826.0	11.8%
Kluane / Wrangell-St Elias / Glacier Bay / Tatshenshini-Alsek	Canada, USA	(vii)(viii)(ix)(x)	2,494.0	1,575.3	63.2%
Lagoons of New Caledonia: Reef Diversity and Associated Ecosystems	France	(vii)(ix)(x)	15,519.4	93.4	0.6%
Macquarie Island	Australia	(vii)(viii)	5,396.7	5,147.8	95.4%
Malpelo Fauna and Flora Sanctuary	Colombia	(vii)(ix)	9,638.9	144.1	1.5%
Natural System of Wrangel Island Reserve	Russian Federation	(ix)(x)	12,066.6	7,200.8	59.7%
New Zealand Sub-Antarctic Islands	New Zealand	(ix)(x)	13,854.1	6,118.0	44.2%
Ningaloo Coast	Australia	(vii)(x)	5,359.1	207.8	3.9%
Papahānaumokuākea	USA	(iii)(vi)(viii)(ix)(x)	364,752.7	950.1	0.3%
Península Valdés	Argentina	(x)	87.3	10.5	12.0%
Phoenix Islands Protected Area	Kiribati	(vii)(ix)	407,961.0	23,431.9	5.7%
Rock Islands Southern Lagoon	Palau	(iii)(v)(vii)(ix)(x)	918.7	2.6	0.3%
Shark Bay, Western Australia	Australia	(vii)(viii)(ix)(x)	15,340.4	1,517.7	9.9%
Shiretoko	Japan	(ix)(x)	208.7	1.8	0.8%
Socotra Archipelago	Yemen	(x)	1,298.5	175.5	13.5%
St Kilda	UK	(iii)(v)(vii)(ix)(x)	246.3	0.9	0.4%
The Wadden Sea	Netherlands, Germany, Denmark	(viii)(ix)(x)	10,816.9	301.3	2.8%
Ujung Kulon National Park	Indonesia	(vii)(x)	579.0	3.5	0.6%
West Norwegian Fjords – Geirangerfjord and Nærøfjord	Norway	(vii)(viii)	99.6	12.2	12.3%
Whale Sanctuary of El Vizcaino	Mexico	(x)	720.4	455.0	63.2%

Broad gaps in marine wilderness coverage within World Heritage sites

Our analysis shows that out of over 4.9 million km² of marine wilderness areas in the nearshore provinces, 97,016 km² (2%) are currently within the natural and mixed World Heritage network. In the pelagic provinces, only 34,453 km² (0.4%) of the 9 million km² marine wilderness areas are covered. This highlights potentially large gaps in the representation of marine wilderness values in the existing World Heritage network.

A large majority of provinces do not have their wilderness values represented by World Heritage sites (Table 6). According to the analysis, more than half of all nearshore marine provinces do not have a marine World Heritage that overlaps with wilderness: 30 of the 61 nearshore marine provinces are home to at least one marine World Heritage site that contains some marine wilderness area (Figure 12). Both the Tropical East Pacific and the Northern European Seas provinces support four World Heritage sites, and five other provinces have two each: Subantarctic Islands, Western Indian Ocean, Warm Temperate Northeast Pacific, Tropical Southwestern Pacific and West Central Australian Shelf. The

remaining wilderness areas in 31 provinces, including the likes of Sahul Shelf, North Brazil Shelf and Warm Temperate Northwest/Southwestern Atlantic, currently have no marine World Heritage sites. In the pelagic environment, only 8 of the 37 provinces have wilderness areas represented on the World Heritage List, but many pelagic provinces with vast wilderness such as the Arctic and Antarctic (within EEZ limits) remain without any World Heritage sites (Table 6 and Figure 12).

Even for provinces with World Heritage sites, the extent to which wilderness areas are covered remains generally low (Table 6 and Figure 12). Notable exceptions in the nearshore waters include the Northeast Australian Shelf, where 72,849 km² (81.4%) of the 89,515 km² wilderness areas are covered by the Great Barrier Reef World Heritage site; and the Galapagos, West Central Australian Shelf, and Hawaii provinces, all with over 75% of their wilderness areas already included on the World Heritage List. In contrast, the four existing World Heritage sites cover only 5.6% of the 5,612 km² of wilderness areas in the Northern European Seas province, highlighting that even provinces with multiple sites may have marginal wilderness representation at present.

Table 6. Marine wilderness coverage by existing natural and mixed World Heritage sites in nearshore and pelagic provinces. Gaps in World Heritage coverage (< 1% coverage) are highlighted in bold red. Provinces are sorted by wilderness area; provinces with no wilderness area are not shown.

Nearshore province	Marine wilderness (km ²)	Marine wilderness in WH sites (km ²)	% wilderness in WH sites	Number of WH sites
Arctic	3,332,924.7	5,246.5	0.2%	1
Sahul Shelf	288,274.4	-	0.0%	0
Tropical Northwestern Atlantic	143,302.8	1.7	< 0.1%	1
Magellanic	105,058.0	19.2	< 0.1%	1
North Brazil Shelf	102,330.0	-	0.0%	0
Northeast Australian Shelf	89,515.9	72,849.9	81.4%	1
Cold Temperate Northeast Pacific	83,073.9	1,352.7	1.6%	1
Warm Temperate Northwest Atlantic	72,993.1	-	0.0%	0
Warm Temperate Southwestern Atlantic	70,916.6	-	0.0%	0
Cold Temperate Northwest Pacific	66,139.0	1.7	< 0.1%	1
Subantarctic Islands	65,222.1	4,225.7	6.5%	2
Southern New Zealand	64,145.4	961.4	1.5%	1
Red Sea and Gulf of Aden	59,348.6	169.4	0.3%	1
Western Indian Ocean	58,279.8	12.2	< 0.1%	2
Somali/Arabian	54,481.1	-	0.0%	0
Warm Temperate Northeast Pacific	22,238.2	2,204.1	9.9%	2
Black Sea	20,973.7	-	0.0%	0
Gulf of Guinea	20,129.3	-	0.0%	0
Sunda Shelf	16,732.3	-	0.0%	0
Tropical East Pacific	16,351.6	137.1	0.8%	4
Eastern Coral Triangle	15,921.1	41.9	0.3%	1

Nearshore province	Marine wilderness (km ²)	Marine wilderness in WH sites (km ²)	% wilderness in WH sites	Number of WH sites
Cold Temperate Northwest Atlantic	12,402.8	-	0.0%	0
Tropical Southwestern Pacific	11,999.3	110.0	0.9%	2
Subantarctic New Zealand	11,295.5	2,728.9	24.2%	1
Mediterranean Sea	11,195.1	0.9	< 0.1%	1
South China Sea	9,945.4	8.7	0.1%	1
Central Indian Ocean Islands	9,618.0	-	0.0%	0
Western Coral Triangle	8,622.5	-	0.0%	0
Lusitanian	7,839.2	102.2	1.3%	1
Southeast Polynesia	6,366.9	-	0.0%	0
Benguela	6,249.8	-	0.0%	0
East Central Australian Shelf	6,014.1	1,300.3	21.6%	1
Northern European Seas	5,612.4	312.6	5.6%	4
Warm Temperate Southeastern Pacific	5,392.3	-	0.0%	0
Northwest Australian Shelf	5,088.4	161.6	3.2%	1
Tropical Southwestern Atlantic	4,697.2	0.9	< 0.1%	1
Scotia Sea	4,398.6	-	0.0%	0
Southeast Australian Shelf	4,159.3	-	0.0%	0
Northern New Zealand	3,984.6	-	0.0%	0
Tropical Northwestern Pacific	3,638.8	2.6	0.1%	1
Bay of Bengal	3,530.5	-	0.0%	0
West African Transition	3,402.2	577.2	17.0%	1
Marquesas	3,400.4	-	0.0%	0
Andaman	3,245.9	-	0.0%	0
Central Polynesia	2,921.0	334.5	11.4%	1
Marshall, Gilbert and Ellis Islands	2,357.8	-	0.0%	0
Agulhas	2,329.0	-	0.0%	0
Galapagos	1,678.4	1,678.4	100.0%	1
West Central Australian Shelf	1,558.7	1,518.6	97.4%	2
Hawaii	1,133.5	890.7	78.6%	1
Southwest Australian Shelf	1,050.5	-	0.0%	0
West and South Indian Shelf	704.7	-	0.0%	0
Amsterdam-St Paul	434.9	-	0.0%	0
Tristan Gough	413.0	61.1	14.8%	1
Java Transitional	124.9	3.5	2.8%	1
Juan Fernandez and Desventuradas	120.5	-	0.0%	0
Lord Howe and Norfolk Islands	105.7	-	0.0%	0
St. Helena and Ascension Islands	104.8	-	0.0%	0
Warm Temperate Northwest Pacific	103.0	-	0.0%	0
South Kuroshio	49.8	-	0.0%	0
Easter Island	21.8	-	0.0%	0
Total	4,935,662.6	97,016.2	2.0%	

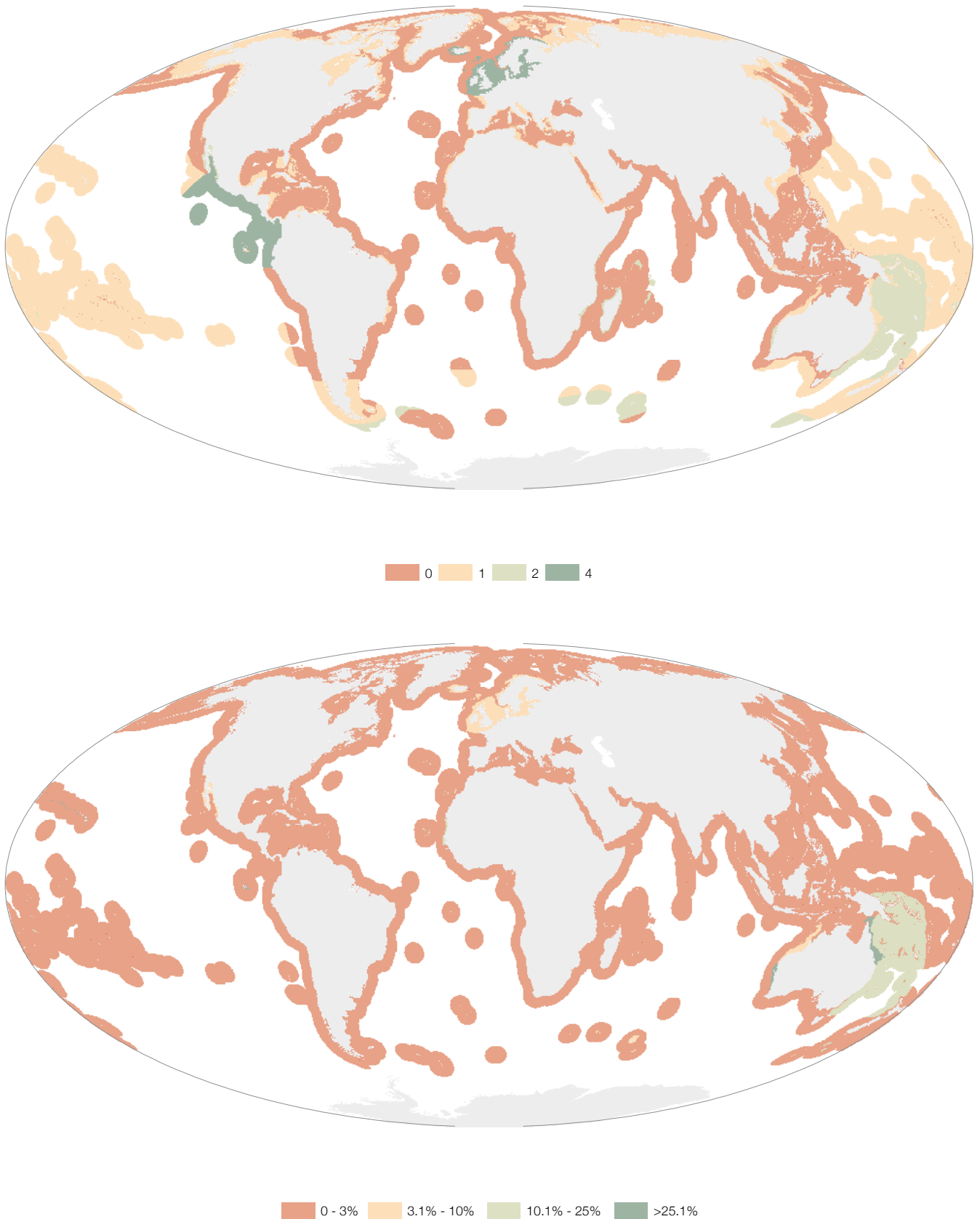
Arctic	2,791,071.0	-	0.0%	0
South Central Pacific	1,876,671.8	22,155.2	1.2%	1
Antarctic Polar Front	1,002,555.5	3,100.9	0.3%	2
Subantarctic	802,858.3	2,179.6	0.3%	1
Southern Subtropical Front	765,959.1	403.4	0.1%	1
Antarctic	503,463.1	-	0.0%	0
Equatorial Pacific	500,179.6	1,002.5	0.2%	1
Eastern Tropical Pacific	230,006.8	1,260.1	0.5%	4
Subarctic Pacific	169,395.5	-	0.0%	0
Southern Indian Ocean	131,921.7	-	0.0%	0
North Central Pacific	122,926.4	65.5	0.1%	1
Humboldt Current	63,434.6	-	0.0%	0
Northern Indian Ocean	32,477.9	-	0.0%	0
Subarctic Atlantic	29,696.6	-	0.0%	0
Southwest Pacific	23,182.1	4,285.9	18.5%	2
South Central Atlantic	20,217.5	-	0.0%	0
Malvinas Current	8,392.8	-	0.0%	0
Indonesian Through-Flow	7,623.5	-	0.0%	0
California Current	6,915.3	-	0.0%	0
Sea of Japan/East Sea	3,523.6	-	0.0%	0
Benguela Current	2,614.5	-	0.0%	0
Equatorial Atlantic	237.5	-	0.0%	0
Red Sea	234	-	0.0%	0
Agulhas Current	224.4	-	0.0%	0
Kuroshio-Oyashio Current	169.4	-	0.0%	0
Somali Current	50.6	-	0.0%	0
North Pacific Current	34.1	-	0.0%	0
Inter American Seas	24.5	-	0.0%	0
North Central Atlantic	23.6	-	0.0%	0
Canary Current	13.1	-	0.0%	0
Gulf Stream	5.2	-	0.0%	0
Leeuwin Current	3.5	-	0.0%	0
Total	9,096,107.0	34,453.2	0.4%	

Discussion

Global datasets such as the cumulative marine pressure cannot capture every pressure or threat exhaustively (Halpern & Fujita 2013). Some areas identified as marine wilderness in our analysis may suffer from impacts such as chemical, plastic or sound pollution that are not represented in the dataset but may diminish their wilderness values, or disqualify them in whole or in part from consideration as wilderness. Conversely, some areas that have not been identified as wilderness in this

analysis may nonetheless have important wilderness values. The cumulative marine pressure data is therefore at best a proxy for wilderness, and our analysis should therefore be considered as initial and indicative guidance which will require further analysis at all scales – global, regional and site-level. Nonetheless, this first global analysis illustrates how data driven approaches can be employed to identify broad gaps in the World Heritage network and how, with more detailed data at appropriate scale, it can be improved to offer greater accuracy and higher resolution.

Figure 12. Number of World Heritage sites containing wilderness areas in each nearshore province (top) and wilderness area in World Heritage sites as percentage of total wilderness area in each nearshore province (bottom).



Conclusions

Despite the limitations in our global-scale analysis and the acknowledged need for additional analyses, our results confirm a major and fascinating potential for the Convention to better meet its objectives by systematically recognizing terrestrial and marine wilderness for what they are: a quickly disappearing and irreplaceable pillar of life on Earth (Lovejoy 2016). Systematic analysis will help the Convention identify room for consolidating existing World Heritage sites, while encouraging new ones, perhaps as serial sites or large complexes comprised of various types of protected areas (Kormos et al.). Far from separating the land and sea from people, saving these last places from industrial and commercial development is a meaningful contribution to keeping the world's cultural diversity alive. In some places, such large havens can be the only option to save the last "isolated" indigenous peoples from unwanted contact. We hope that our analysis, along with the overall guidelines, provides entry points and inspiration for tangible follow-up.

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5. Implementing a wilderness and large landscapes and seascapes approach under the Convention

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Introduction

The rationale for a wilderness and large landscapes and seascapes approach under the Convention is compelling. Wilderness is a dwindling, increasingly scarce and irreplaceable resource globally (Potapov et al. 2017, Watson et al. 2016, Venter et al. 2016a and b) deserving of representation on the World Heritage List. As described in Chapter 4, as of 2015 and using the Last of the Wild approach, World Heritage sites only covered 1.8% of wilderness globally. This certainly suggests potential for new World Heritage sites to help improve wilderness coverage globally.

In light of increasingly fragmented and degraded landscapes globally (Potapov et al. 2017, Haddad et al. 2015, Laurance et al. 2014), as well as accelerating climate change impacts, it is also apparent given established principles of conservation biology (Lindenmayer et al. 2008) that many existing World Heritage sites will need to be interconnected with other protected areas, and well-buffered, and could even need expanded boundaries to maintain their Outstanding Universal Value in perpetuity. Thus, there is also considerable scope for applying a wilderness and large landscapes and seascapes approach to existing World Heritage sites.

The rationale for a strengthened wilderness and large landscapes and seascapes approach is further bolstered by the fact that the World Heritage Convention has shown a clear inclination for establishing large World Heritage sites with strong wilderness attributes even in the absence of conceptual guidance: although there are only 238 natural and mixed World Heritage sites as of 2016, i.e. less than 1% of the global protected areas estate in terms of numbers of protected areas, these 238 sites cover an area of 286 million hectares of land and sea, which amounts to about 8% of the global protected areas estate in terms of area. Many World Heritage sites both terrestrial and especially marine, are very large. As noted in Chapter 3, there are 105 World Heritage sites whose Statements of Outstanding Universal Value list wilderness attributes as part of the justification for inscription. And as noted in Chapter 1, there are also a number of regions around the world – for example the Yellowstone to Yukon Conservation Initiative or the Eastern Tropical Pacific Marine Corridor – where the Convention seems to be moving *de facto* towards a wilderness and large landscape and seascape approach.

If there are many good reasons for the World Heritage Convention to focus on wilderness and large landscapes and seascapes – and if the World Heritage Convention is already moving in this direction in several regions – the question becomes how can such an approach be implemented more systematically?

Implementing a wilderness and large landscapes and seascapes approach under the Convention requires two key activities. The first is to assess existing World Heritage sites to gauge whether they are sufficiently large and/or connected to other protected areas to maintain their integrity into the future, particularly given rapid global change, or with a view to expanding sites to better recognize nature-culture linkages. The second is to invest in nominating new wilderness World Heritage sites to fill gaps in wilderness coverage, while ensuring that these new sites are also sufficiently large and/or connected to other protected areas to maintain their values into the future. In both cases a number of tools are available under the Convention that can facilitate such an approach. In this chapter we review those existing tools that can be leveraged immediately and also suggest policy innovations that could further facilitate a wilderness and large landscapes and seascapes approach.

Existing tools

Wilderness planning and Tentative Lists

The development of national Tentative Lists, a series of sites with potential Outstanding Universal Value that a country, or a group of countries, intends to nominate for inscription presents opportunities for systematic appraisal of wilderness and large land and seascape conservation in existing or new sites. The Convention's Operational Guidelines call for revision of Tentative Lists at least once every ten years, and they are typically reviewed by States Parties every seven or eight years. This offers opportunities for "upstream processes" i.e. consultations between governments, IUCN, technical experts and civil society to evaluate sites with potential outstanding universal value. Upstream processes should include assessments of potential wilderness and large land and seascape conservation, both at national and regional/international scales. Regional upstream processes would likely be helpful in a number of terrestrial and marine regions identified in Chapter 4 (e.g. the Arctic or Central Asia) to ensure a coordinated approach between countries sharing large wilderness areas.

Expanding sites and/or their buffer zones

The Convention allows States Parties to modify the boundaries of existing sites to expand them (or reduce their size). A boundary modification is deemed minor if it has no significant impact on the site and does not alter the Outstanding Universal Value of the site. An expedited review process is available for requests for minor boundary modifications. A modification that is deemed significant requires the State Party to submit a new nomination to the World Heritage Committee. Minor boundary modifications may be a useful tool for ensuring better connectivity, particularly in the short term. Significant boundary modifications are also potentially very useful, but represent a more ambitious undertaking, particularly if expansion involves working across borders to create a contiguous transboundary site or a serial site (as described below).

Buffer zones are not technically part of a World Heritage site's boundaries but the Operational Guidelines state they should be included (UNESCO 2015), and notes specifically that they should include "attributes that are functionally important as a support to the property and its protection". Adding or expanding a buffer zone is treated as a minor boundary modification under the Operational Guidelines and can therefore be accomplished relatively quickly under the Convention, assuming a country has the legal or administrative mechanisms in place to establish buffer zones. Adding or expanding buffer zones can also be helpful in implementing a wilderness approach as there is no size limitation on buffer zones, and they can often be quite large. For example, at 2.3 million hectares, the Okavango Delta's buffer zone is larger than the site itself. Adding or expanding buffer zones can be a flexible way to improve the connectivity and resilience of World Heritage sites (UNESCO 2009).

Serial World Heritage sites

Serial World Heritage sites are defined as those sites consisting of two or more separate, non-contiguous components, each of which is necessary to fully represent a particular natural or cultural phenomenon which contributes to the Outstanding Universal Value of the site. Serial sites, including transboundary serial sites, are also potentially useful in promoting ecological integrity and connectivity (Engels et al. 2009). For example, the Rainforests of the Atsinanana in Madagascar, totaling six protected areas covering almost 500,000 hectares, illustrates the potential for serial sites to help protect a large landscape, though establishing functional connectivity between the components of the serial site is an added measure governments would have to take in many instances to truly ensure integrity. Developing a serial nomination involving many different components is usually a longer, more complex and more expensive undertaking, especially if components are located in multiple countries. However, it does present an opportunity to undertake a comprehensive planning process and to fully capture the Outstanding Universal Value of a broader region or ecosystem in one nomination.

Twinning arrangements

Twinning agreements, which are informal agreements between two or more countries designed to promote coordinated and integrated management of World Heritage sites that have

biological linkages, even if the sites are not part of the same ecosystem, or even part of the same biome. Twinning agreements are of particular use when World Heritage sites share migratory or wide-ranging wildlife that cover large distances. For example, in 2014 the Government of Mauritania signed a twinning agreement with the governments of Germany, Denmark and the Netherlands to coordinate management of the Banc d'Arguin and the Wadden Sea (a serial site and itself transnational), to improve protection of migratory birds along the East Atlantic Flyway that congregate in both sites. While this is a new mechanism in the World Heritage context and has so far only been used in the case of the Banc d'Arguin and the Wadden Sea, it does appear to be a useful and flexible mechanism for exchange and conservation efforts at continental scales.

Indigenous and community driven nominations

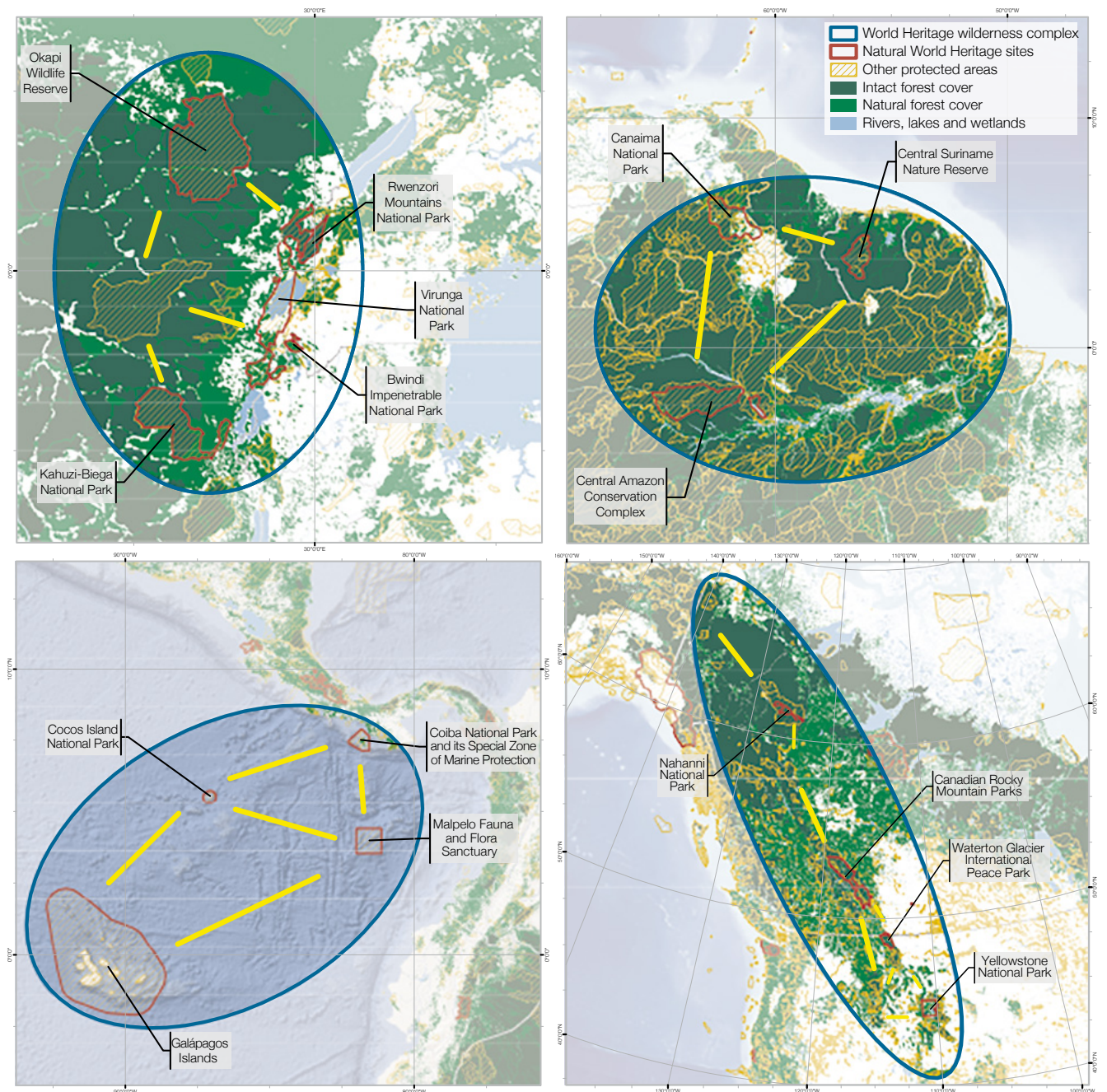
As noted in Chapter 2, and in the case studies, rights-based approaches must be fully respected in World Heritage site nomination processes and Indigenous Peoples and local communities must be fully integrated in the governance and management mechanisms for all World Heritage sites. Given the essential role of Indigenous Peoples and local communities in the conservation of wilderness areas around the world – in many cases, wilderness landscapes remain intact because they have been under indigenous stewardship for centuries or millennia – more consistent consideration and additional analysis of the interplay between indigenous cultures and the maintenance of large landscapes with outstanding universal value is essential. The need for further guidance on this critical nature – culture interplay has been noted by the World Heritage Committee and would go a long way towards enabling and supporting nominations of sites with wilderness values led by indigenous communities. While to date there has only been one World Heritage nomination process led by Indigenous Peoples (Pimachiowin Aki), interest in the Convention appears to be growing amongst Indigenous Peoples. As of 2015, the new Operational Guidelines also recognize Indigenous Peoples as partners in the work of the Convention, and stress the need for rights-based approaches and free, prior and informed consent in developing nominations, which represents crucial progress.

The need for policy innovation: World Heritage Wilderness Complexes

Increased use of the Convention's existing tools to promote wilderness and large landscapes and seascapes conservation, while certainly helpful, may not fully enable a wilderness and large land and seascape approach as the tools mentioned above are not explicitly wilderness-focused or specifically tailored to generate wilderness conservation outcomes, including improved connectivity. A new mechanism under the Convention – for example a "World Heritage Wilderness Complex" designation – might help the Convention achieve its wilderness conservation potential, which is increasingly urgent as the planet's remaining biologically intact areas are becoming increasingly rare (Kormos et al. 2015).

The key characteristics of a World Heritage Wilderness Complex ("Complex") would be that: (a) the Complex includes two or more existing World Heritage sites or

Figure 13. Four examples of what World Heritage Wilderness Complexes could look like. The Albertine Rift World Heritage Wilderness Complex in Africa (A), the Guiana Shield World Heritage Wilderness Complex in South America (B), the Lower Yellowstone to Yukon (Y2Y) World Heritage Wilderness Complex in North America (C), and the Marine World Heritage Wilderness Complex in the Eastern Tropical Pacific Corridor (D). From: Kormos et al. (2015).



a serial site with wilderness attributes as described in Chapter 3; and (b) the sites are large enough and have sufficient buffer zones to maintain ecological integrity and have the functional connectivity between them needed to protect and maintain their wilderness attributes and outstanding universal value. Demonstrating functional connectivity would be necessary to secure recognition as a World Heritage Wilderness Complex. However, areas outside World Heritage sites that are included to provide connectivity would not be considered part of the World Heritage site, but would have specific protection policies to assure connectivity is maintained (Kormos et al. 2015).

A World Heritage Wilderness Complex approach could be modular, beginning with two World Heritage sites or a serial site, and building towards a larger landscape with additional World Heritage sites and connectivity conservation areas over time. As mentioned in Chapter 1, there are many of large-scale connectivity conservation initiatives in the world, many of the best known of these initiatives rely on protected areas as core zones that are also World Heritage sites. Many of these World Heritage sites are very large serial sites. Thus, to a significant degree, a World Heritage Wilderness Complex designation would recognize what is already occurring *de facto* in many places across the planet. However, explicit recognition of these

existing efforts by the World Heritage Convention would provide these initiatives with significant added energy and prestige, would likely boost donor funding and tourism, and would encourage more incipient connectivity conservation projects (Kormos et al. 2015).

Finally, to take forward the crucial issue of redefining the way in which the Convention considers nature-culture linkages in wilderness areas (and more widely) it will be essential than the strong but recent collaboration of IUCN, ICOMOS and ICCROM (exemplified by the programme entitled Connecting Practice) is continued and becomes a norm in the Convention. Such approaches will need rethinking in all of the actors if they are to become a new reality.

Conclusion

A more systematic wilderness and large land and seascapes approach under the Convention would identify opportunities for inscribing new wilderness sites to fill gaps on the List, improve the integrity of existing sites to ensure Outstanding Universal Value is sustained or enhanced and would also play a major role in helping to engage Indigenous Peoples and local communities in the Convention's work and to better recognize nature-culture linkages. Such an approach would in essence constitute an extension of existing wilderness conservation practice under the Convention. However, a more methodical application of this approach as outlined in this guidance document through national and regional upstream processes could enhance those existing efforts very substantially, strengthening current wilderness conservation efforts under the Convention while providing significant incentives for its more strategic and comprehensive application in new land and seascapes. At a time of rapid and accelerating climate change and widespread habitat destruction, degradation and fragmentation, leveraging the Convention for conservation of those last wilderness areas on the planet with outstanding universal value is not only a common-sense undertaking but likely essential to meet the objectives of many World Heritage sites and of the Convention as a whole.

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Case studies

The following five case studies describe indigenous and community relationships with wilderness and large landscapes and seascapes that are partially or completely covered by World Heritage sites. The five sites are the Golden Mountains of Altai in the Russian Federation, Kakadu National Park in Australia, Manu National Park in Peru, the Okavango Delta in Botswana and Papahānaumokuākea in the United States. The purpose of these case studies is twofold. First, to give voice on complex issues relating to biocultural landscapes, World Heritage

and protected areas to Indigenous Peoples and communities themselves: it is important to hear these issues articulated directly and powerfully by those who are often most affected by them. A second purpose is to express the profound personal dimension of protecting wild nature: the need for an individual (i.e. not just societal) ethical commitment to conserving wild places, the need for reciprocity between human beings and wild landscapes and seascapes and the profound spiritual dimension of this relationship.



Altai in a snowy helmet

Buyanbadrakh Erdenetsogt

Translator's preface

This case study is written by Buyanbadrakh Erdenetsogt, a leading shaman of the Mongolian Shamanism Center and Head of the Association of Protection of Altai Cultural Heritage (Altai Uv). He belongs to the Olkhonuud—Medeebayan clan. Since 2003, Buyanbadrakh has been working on revitalizing native culture and traditional knowledge in Mongolia. He has traveled through all 21 of Mongolia's provinces conducting ceremonies in sacred places to restore relationships, re-generate biocultural knowledge and renew the energy of protector spirits. He has carried out the Great Fire Ceremony, the Sun Ceremony, Mountain Spirits Ceremony and the Great Tengri (Father Sky) Ceremony. In 2011, he produced an anthology of invocations to the 99 Tengris (skies). Buyanbadrakh has participated in a number of international gatherings promoting

the values of nomadic culture, as he puts it “translating the language of Tengri and nature to modern audiences through the help of my guardian spirits and ceremonies”.

In this statement, he unveils deep cultural relationships between Indigenous Peoples and large, intact natural areas of his motherland, the Altai Mountains. It is a “testimonial” to the importance of nature and culture in their landscape and a description of what that relationship involves. In his poetic words, he describes the spiritual significance of sacred sites or sacred landscapes/mountains, traditions linked closely to nature, stewardship of nature and how the nature- culture relationship has helped maintain “wild,” intact areas. It is important to underscore that the notion held by some in western cultures of “wild”, “wilderness” as a barren ‘uncivilized’ threatening “otherness” that needs to be subdued, is a very foreign concept for many Indigenous Peoples, including Mongols and Altaians. The term for large landscapes that are intact, full in their integrity in Mongolian is “unagan baigal”,

a literal translation of “unagan” from ‘unagan daakh’ the untouched hair of a newborn baby or the hair with which a baby appears from the mother’s womb. Thus, wilderness would be a landscape with the qualities of purity and wholesomeness of a newborn.

In his case study Buyanbadrakh refers to the Altai Fire Ceremony. This ceremony has been conducted for over five years, first in the Russian Altai Republic, including the Ukok Plateau of the Golden Mountains of Altai World Heritage site, and then in the Mongolian part of Altai. The impact of the ceremony on the landscape and cultural memory of native Altai communities transcends state boundaries and the boundaries of the current World Heritage site.

-Erjen Khamaganova

Case study

Buyanbadrakh Erdenetsogt

I am humbled by the task of writing about the Altai Mountains, a special place that bestows fatherly protection. The tip of my writing brush is languishing: I realize the weakness of my mind before carrying out such an important duty. IUCN’s new Guidelines for the protection of large landscapes is a very important endeavor and I will try to add the views of an indigenous person from Altai to this complex discussion.

Today’s globalization, urbanization and overreliance on technology act like a strong poison brought on by bad spirits. The conveniences that these forces are promising to ordinary humans have an allure like a magnet. All these influential forces have huge destructive power and affect humankind in a deadly way; they change healthy lifestyles, native traditions, languages and unique cultural heritage of Indigenous Peoples. The Altai Mountains are the cradle of human civilization, the place of origin of many Indigenous Peoples of the Eurasian continent. Altai is the foundation stone of many nations, their protector from various formidable threats. For thousands of years this landscape was “stamped” by the hooves of small and powerful Mongolian horses, “infused” by the sounds of Mongolian long songs, and “energized” by rhythmic Bielge dance. The great history of Nomads is inscribed in this landscape, forming an integral part of human history. The Indigenous Peoples of Altai expressed their commitments to continue safeguarding Altai in their The Darvi Declaration of sacred sites Guardians and traditional cultural practitioners of the Pamir, Tien Shan and Altai Sayan biocultural mountain systems adopted during the Fire Ceremony on the foothills of Sutai Khaikhan one of the powerful Summits of Altai in 2014. It states:

“We underscore that there can’t be one single model of conservation for sacred sites and biocultural landscapes and that each indigenous or local community protects them with a diversity of traditional and culturally unique methods. However, across this diversity, the core foundations for conservation of sacred sites are similar and based on maintaining a relationship of deep respect, reciprocity and constant communications with sacred sites.

We understand the importance of and commit to improving collaboration between indigenous and local communities of the Pamir Tien Shan and Altai Sayan biocultural regions for the conservation of natural and cultural heritage.

The Altai is the cradle of humanity and a depository of memory of the Earth and her people. Over millennia, the Altai and our ancestors have been safekeeping and maintaining this rich cultural memory and knowledge. Altai played an exceptional role in the development of human civilization and the geological configuration of the planet. The intangible aspects of the cultural and natural heritage of Altai are not only connected to the indigenous and local communities - who inhabit the Altai today – but also form the spiritual foundations and identities of the many peoples who originated from Altai and spread around Eurasia.

We appreciate and deeply value the unifying spiritual connections between our people and their biocultural landscape with its powerful sacred sites which we shall continue to revitalize through regularly conducting ceremonies.”

The many Altai traditional cultural practitioners, shamans and sacred sites guardians, the signatories to this Darvi Declaration are all united by the ancient worldview and belief system that see the Sky as the father and Earth as the mother. In such an understanding of the world, some Western notions of wilderness are hard to accept. This relational understanding of the world realizes the need to reinforce the “golden triangle” – an unbreakable interweaving of human-nature-culture, and the Altai Mountains are the witness of this. Altai nomads, unlike sedentary people, enjoyed everyday communication with nature, they co-existed in productive reciprocity and mutual dependence, this formed a noble culture of worshipping nature, and living in harmony and reconciliation.

Traditional knowledge of Altai nomads organically combines *arga bileg* both wisdom and method, intuitive knowledge and practical logic. Deep understanding and appreciation of the character of mountains and waters, animals and plants, pastoral resources and nomadic routes, precise observations of movements of planets and stars, rising and setting of the sun and moon are distinguishing features of traditional pastoral knowledge of nomads. It is impossible even to simply list the infinite number of traditional methods and practices of nomads related to nature. On the other hand, it is possible to state that people who can relate to and easily communicate with nature are organically the best conservationists.

In these relationships, an important component is worshipping of mountains, sacred places and ovoos (shamanic rock cairns). To conduct proper ceremonies Zairans (shamans with several degrees of initiation) erect ovoos, call upon spirits/owners of mountains and waters, offer them food and drink, open up for them peoples’ struggles, concerns, hopes and aspirations. In this world, there is nothing that does not have an owner/spirit; everything is alive and spiritual. Even seemingly haphazardly thrown stones have their spiritual owners. Mountains and

plants, the place of one's birth, a state and nation's history all have owners/spirits, and these owners or spirits are both from the Earth and in the Sky.

The beauty of the Altai Mountains with summits covered by eternal snow, glaciers, glacial clear lakes, matchless valleys and gorges is irreplaceable. In the ancient times, when the brown-wrinkled Mother Earth was still covered by water, the crown of the Earth—the mountains of Altai were already full of life and striving for life as stated by our ancestors and elders in their legends and stories. Stone inscriptions, petroglyphs, and petrographic history, ruins, archeological artifacts provide factual evidence. Altai is not mere a toponym, a geographic name, it is a name of a civilization. This name embraces the peoples' oral tradition, legends and epics, the melody and harmony of Altai music, images and colors, history, pride, joy and sorrow, dreams and aspirations, and the struggle and progress of all Altai Peoples.

Altai keeps unresolved mysteries and secrets. These mountains like our ancestors maintain rich memory and can transmit it to further generations. People believe that the Snow Leopard became a symbol of these mountains not by chance. The snow leopard is a special animal; it lives only in very intact parts of nature. These landscapes have been under the stewardship of Indigenous Peoples from time immemorial. Today Altai is the core of Snow Leopard habitat, stretching across 12 nation-states of Asia.

However, even here anthropogenic pressure is high and the number of this species is declining every day and it is a heartbreaking issue. There is an urgent need to restore balance and enhance conservation of snow leopards' "wild" landscapes. The threats from infrastructure construction, mining industries, and large development projects need to be stopped. Unfortunately, there are not many tools available for conservation that include input from local communities. The only international instrument for conservation in Altai today is the UNESCO World Heritage Convention. Currently, however, the existing Golden Mountains of Altai World Heritage site includes only three separate areas of the Russian portion of Altai: Altaisky Zapovednik and a zapovednik's buffer zone around Lake Teletskoye; Katunsky Zapovednik and the zapovednik's buffer zone around Mount Belukha; and the Ukok Quiet Zone on the Ukok plateau. The total area covers 1,611,457 hectares. These areas are obviously not enough for protecting a "wilderness area" of such outstanding universal value. During the process of nomination of the WHS and management of this site the Indigenous Peoples and local communities of Altai were not consulted, or even if consulted, their views were not taken seriously for consideration, because Altai cannot be limited by political and administrative boundaries and Indigenous Peoples clearly understand this. The Darvi Declaration, signed by indigenous cultural practitioners (including representatives from Golden Mountains of Altai World Heritage site) called on governments, the UNESCO World Heritage Committee and its advisory bodies, the IUCN World Heritage Programme and ICOMOS, as well as other

relevant international organizations to take the following actions (among others):

- **Incorporate experience, initiative and knowledge of indigenous and local communities in the nomination process and management of World Heritage sites.**
- **Pay special attention to maintaining continuous relationships with sacred sites that are at the core of the Earth's biocultural landscapes.**
- **Recognize the role of local and Indigenous Peoples to independently identify Outstanding Universal Value and nominate properties to the UNESCO World Heritage Committee for subscription as World Heritage.**
- **Support traditional institutions and customary laws of indigenous and local communities in developing and implementing nomination files and management plans for World Heritage sites.**
- **Support the recognition and joint nomination of the sacred biocultural Altaian landscape as a trans-boundary mixed World Heritage site and Cultural Landscape.**
- **Broaden the current boundaries of the World Heritage Site known as the "Golden Mountains of Altai".**

In our shamanic invocation we appeal:

*O my thirteen Altai,
O my twenty-two Khukhii,
O my thirty-three Gobi,
O my three mighty rivers.*

This eternal invocation refers not only to mountains and waters of Mongolia, it is inclusive of all parts of Altai that people have been worshiping for millennia, no matter how political boundaries are configured.

In the development of a new IUCN guidance document a clear statement of the rights of Indigenous Peoples for identification, nomination and management of "wilderness areas" on UNESCO World Heritage Sites needs to be expressed.

*All continents on this globe
Are under the one single sky
By stretching Indigenous cultural traditions
Let's revive them to live eternally.*



Kakadu culture and the nature

James Warden in collaboration with the Gundjeihmi Aboriginal Corporation

Kakadu National Park was established in April 1979 though at the time it was unknown to almost all Australians. In the far tropical north of the country, and with a name unfamiliar to Australians at the time, it was remote in every sense. Kakadu is now Australia's largest and most famous national park. Kakadu has also generated some of the greatest controversy of any World Heritage property.

Kakadu was inscribed on the World Heritage List in 1981 at the fourth session of the World Heritage Committee. It was then extended in 1987, 1992 and 2011 and is currently just under 2 million hectares. The 1981 inscription met six of the ten criteria. It is currently inscribed under only five criteria. Cultural criterion (iii) was dropped from the 1992 inscription because at the time criterion (iii) only referred to a culture that had “disappeared”. ICOMOS saw that condition as wrong and potentially highly offensive to the Traditional Owners. ICOMOS had come to understand that the Traditional Owners of Kakadu were so deeply connected to their land that the distinction between nature and culture was indistinguishable to them. In a deeply ironic development, the Operational Guidelines were amended soon after, and cultural criterion (iii) was reworded to include “living” cultures. And a “living culture” is the key point through which the natural values of Kakadu now ought to be understood and appreciated. That anomaly must be corrected and Kakadu should be reinscribed as a living culture under the reworded criterion (iii) and also as a Cultural Landscape.

Kakadu is a place that is exemplary for a discussion of how nature and culture may be understood as one and the same. For World Heritage purposes, Kakadu is a mixed site with natural and cultural values. Some World Heritage properties are recognized for their cultural values, others for their natural values and some for both. Kakadu indeed has both. To exemplify the unity of nature and culture we take the example of *Boywek*, the knob tailed gecko. *Boywek* is both a little living reptile and a mighty ancestor hero who shaped the land and journeys across time.

Critically, Kakadu thus owns an enduring living traditional culture. Kinship is the defining indigenous principle of the place. In Kakadu there are about nineteen clans – which is a grouping of one or more families. The senior owners from each clan have authority over their land that is specified and known. More broadly all people, stories, songs, animals, plants, places and ceremonies are divided into two moieties – *Duwa* or *Yirridja*. Each moiety is divided into eight ‘skin groups.’ The skin group for a new child comes from their mother whilst the moiety comes from their father. Are you following? In other words everything is related to everything else and in this sense there is no such category of ‘religion’. Law and lore and time and land are all one. But within that cosmology Traditional Owners speak for their own land – the specified territory of their clan. But this is also subject to some other finer cultural complexities. For the last few decades overlain across Kakadu are some further complications that the rest of the world has brought.

At the heart of the question of culture and nature is the highly involved yet simple question of “whose place is it?” Who can

speak for it? Under the World Heritage apparatus Kakadu is of Outstanding Universal Value symbolically held and rightly celebrated by and for all people. Under Australian law 'radical title' to the land is vested in the Crown (i.e. *the state* at its most fundamental constitutional level). Legal title to the property is held by the Traditional Owners under a deed of grant, since 1976. The Commonwealth of Australia holds a lease over much of the area for the purposes of the national park. There are also other leases over the area.

Yet, for Bininj/Mungguy, the land has always been theirs. In their understanding, it has been theirs since the Dreaming. Archaeologists have dates somewhere over 50,000 years. Rock art, depicting spirit figures, animals and people, whilst difficult to date, is estimated at 20,000 years or thereabouts. The short-necked turtle *Ngardehwoh* (*Elseya dentata*) is depicted in ochre on the walls. As food that creature may be eaten at any time, for example, at many places including *Djarridjin* especially in the season of *Banggerreng* (April). *Yok* the bandicoot (*Isodon macrourus*) eats *Anmamdak* (*Canthium schultzei*) in this season and both the fruit and the animal are good plentiful eating for people in that season. *Anworrlbon* (*Lophopetalum arnhemicum*) provides good shade along the banks of the billabong. *Dunbukmang*, the black bream (*Hephasestus jardini*) is caught anytime and cooked on the coals. *Deudeu* the dollar bird (*Eurystomus orientalis*) inhabits the area with its distinctive call. Bininj/Mungguy would burn the country in *Banggerreng* (April) an *Wurrung* (June) to bring new growth for the following year and ensure reliable new supply for food, shelter and fibre and to fulfil their responsibilities. In Kakadu the year has six seasons that shape travel, ceremony, hunting, story and the active management of resources.

The Traditional Owners see themselves as being of the land and belonging to the land. Their ancestor figures and heroes are born from rocks, rainstorms, water, thunder and lightning and from the living things and ancient creatures that once-upon-a-time made the place. Creation stories, that anthropologists are able to retell, give narratives of how the land came to life and how topographical features were formed and how the old people came from the earth and how the ochre painted beings that live on the high walls came forth at the very beginning.

Hand prints, stencilled with a spat slurry, a mouth-full of wet red or yellow or white ochre, are blown onto a rock wall of the Kakadu escarpment. The prints remain as the artist's signatures, the very handmark of the makers. Then down on the flood plains and up and under the escarpment there are the increasingly resonant stories told in peer-reviewed science journals about landscape ecology, evolution and botanical sciences that are informed directly through collaboration with Traditional Owners. In actual and practical terms Indigenous owners have literally made the landscape and shaped the ecology, especially through fire-farming. They have done so for somewhere over 50,000 years. Humans have shaped the ecology. In this sense, like the rock art, the biota of Kakadu has also been hand made in the collective cumulative construction and adaptation of nature.

Kakadu also exemplifies that epochal and still recent moment when colonization and industrialism met traditional people in a heavy collision. Entirely within Kakadu National Park and the Kakadu World Heritage site is one of the world's largest uranium mines designated as the Ranger Project Area. Only the MacArthur River in Saskatchewan surpassed Ranger as the world's biggest uranium mine. Ranger is on Mirarr land and whilst a source of considerable revenue it was never wanted and is the direct cause of profound distress and dislocation.

The following statement by the Senior Traditional Owner, Yvonne Margarula, to the Australian Senate in 2005 is in her own language and conveys the depth of feeling about the impost of the Ranger Mine in the middle of Kakadu:

Gerrngelzgen Balanda barri—gihgimuk government andi-djawam adberre wanjh ad Binz'nj djaarri-Mirarr arri-warnyaknz'nj bu Balanda gabarri-bolkgarung uranium-gen.

Along with other Aboriginal people the Mirarr opposed uranium mining when the Government approached us in 1978.

Dabbarrabbolk adberre barri-geleni wardi gabarri-bolkgarung wanjlz gabolkwarremen wanjlzad Bininj warridj arri-darrgidwarremen.

The old people were worried about the damage mining would do to country and the problems that mining would bring for Aboriginal people.

Dabbarrabbolk adberre barri-woz'bukwong. Balanda marrek andi-bekkayi wanjh barri-djalbolkgarungz'. Bolkkime ba-bolkwarreminj.

The Government would not listen and forced the Ranger uranium mine on us, but the old people were right and today we are dealing with everything they were worried about.

Balanda barri-wern barrim-wam gubehne, ba-bolkgimukminj, gunbang barrim-gang dja bolkkime ad Bininj munguih arri-dangwerren gun-wardde-gen.

Uranium mining has completely upturned our lives - bringing a town, many non-Aboriginal people, greater access to alcohol and many arguments between Aboriginal people, mostly about money.

Gare gabarri-bolkgarung, barri-bolkwarrewong. Gare an-gare anlabbarl ba-rrz', bolkin-ze, gan—djorlokwarre galz—di. An-warddebang warridj barri-gurldjabnameng dja gun-red adberre ba-bolkborledmeng an-warrehwarre.

Uranium mining has also taken our country away from us and destroyed it —billabongs and creeks are gone forever, there are hills of poisonous rock and great holes in the ground with poisonous mud where there used to be nothing but bush.

*Aye marrek nga-djare nga-bolknan gure gabarri-bolkgarung
Ranger mine gure abbard ayengarduk nuye gun-red.*

I do not like visiting the Ranger mine and seeing what has happened to my father's country.

The threat of an additional major mine called Jabiluka also brought the nature and culture distinction into sharp relief in the 1990s although it was not ultimately built after a huge opposition campaign. The World Heritage Committee debated whether the proposed Jabiluka uranium mine on Mirarr land would endanger Kakadu's World Heritage values. In a defining statement to the Committee in 1998, the Mirarr stated their twin responsibilities under Aboriginal custom as traditional custodians of land:

There are two main approaches to the way Mirarr view their responsibilities - looking after country (gunred) and looking after people (guhpleddi). Gunred encompasses control of country including the prevention of both destruction of country and desecration of sites. It is also the recognition, assertion and promotion of cultural rights and the carrying out of living tradition on country. Guhpleddi is intrinsically tied to gunred because people and country are as one. It encompasses an extremely complex set of relationships between Mirarr, other people and country.

The division, in the European tradition, of human experience and inquiry into the fields of 'nature' and 'culture' has no equivalent in Aboriginal Australia. Understanding just why and how this is so better defines our understanding of Aboriginal worldviews and should also, in turn, inform new approaches to land management and indeed social policy. In the context of Kakadu National Park and the ongoing efforts of the Mirarr traditional owners to protect and manage their land and life it is imperative that the actions of civil society, state actors and industry be guided by an accurate appreciation of Aboriginal worldview.

It is often said Aboriginal Australians consider the land to be 'alive'. Much is made of the abiding connection between Aboriginal people and their land and waters, but little of this connection is clearly understood, often being glossed over by non-Aboriginal people in a somewhat romantic vision of the sacral relations between Aboriginal people and their traditional estates. That relationship, in fact, is established through an ancient and contemporary, extensive and intricate set of interconnecting relationships and obligations underpinning Aboriginal cosmology, social order and environmental custodianship.

The 'glue' that binds all this together is essentially the kinship or moiety systems that govern the Aboriginal universe. In the context of the Top End of the Northern Territory, all living things, inanimate entities, areas of land, water bodies, ceremonies and natural phenomena are associated with either of the moiety systems, one pair being matrilineal and the other patrilineal. This interpretation and portrayal of the

universe also patterns social relations, guiding marriage choice, ceremonial responsibilities, area of residency, diet and much more.

This complex interrelationship explains why, across Australia, land and waters are regarded as sentient, for they too have moiety and interact with the human world in an ongoing and reflexive way. Languages and stories are said to be 'buried in the land', dialects are considered 'hard like rock' or 'soft like water', plants and animals are directly involved in complex kinship relations with humanity. What Euro-Australians consider the 'natural world' evidences to Aboriginal people the truth of their creation stories, including geological features, ecosystems and the animal world. Indeed, animals are accorded special status in much Aboriginal Australian lore and worldview, essentially as 'non-human people', sharing moiety and the human cultural life. In this sense for Indigenous people the land is alive and the distinction between nature and culture is entirely dissolved.



Peru's Manú National Park – wild and inhabited

Tilman Jaeger

A celebration of life like no other

In the transition between the western Amazon Basin and the eastern Andes, life has evolved in more shapes and forms than anywhere else on the planet; this region is believed to be the most biodiverse terrestrial region of the world. The legendary Manú National Park, often referred to as the crown gem of Peru's national protected area system, epitomizes this extraordinary natural wealth. When the park was created in 1973 in the face of imminent large-scale logging, Manú was the world's largest tropical forest protected area by far. Its visionary proponents, a handful of Peruvian conservationists and a few external NGO supporters, understood Manú's enormous significance for Peru and indeed life on Earth, long before the term "biodiversity" was even coined. Following an expansion in 2002, the park's surface area now exceeds 1.7 million hectares, about the size of Swaziland. A natural World Heritage property since 1987, Manú encompasses the entire watershed of the Manú River, a major tributary of the mighty Madre de Dios, which joins the Amazon on its epic journey to the Atlantic.

Because the globally renowned Cocha Cashu Biological Station is located in the park, an unrivalled record of scientific knowledge on tropical forest ecology has been created over several decades. We can only guess what profound knowledge the Indigenous Peoples of Manú must possess about their longstanding natural home, backyard, pharmacy and grocery store.

The ancient and ongoing human history of Manú and its surroundings is less known and has not attracted comparable public and academic attention. The simplistic criticism of a national park dedicated to conserving "pristine nature", while ignoring human beings trapped within its boundaries, has repeatedly been suggested. Undoubtedly, there are very difficult and unresolved questions surrounding protected areas and Indigenous Peoples and many of them crystalize in Manú National Park. This case study attempts to shed light on a truly exceptional place and its indigenous inhabitants, while fully acknowledging that a brief case study cannot possibly do justice to its sheer scale, diversity and complexity. It is hoped that this overview may serve as food for thought by identifying some of the ingredients of the setting and by offering both lessons from the past and some difficult questions for the present and future.

The long and troubled human history of a remote "wilderness"

Contemporary discussions about the overlap of Manú National Park with the home and livelihoods of several Indigenous Peoples is only the latest – and relatively short – chapter of the ongoing indigenous history of the region. The indigenous history of the region, including what is today Manú National Park, spans at least three millennia (Huertas et al. 2003). Numerous archeological findings, including but not limited to pre-Incan ruins, ceramics, textiles, tools, weapons and rock art indicate a continuous to this day by at least four linguistic groups, Arawakan, Panoan, Harakmbut, and Tacana (Shepard et al. 2010). While it is likely that the Indigenous Peoples of Manú National Park hold knowledge about the ancient past, very little about the Pre-Colombian history is known to scholars.

The fate of Amazonian peoples following European arrival, however, is well documented. Numerous generations experienced traumatic encounters with explorers and missionaries since the late 16th century, driven by economic and religious motives (Camino, 1977). It is now widely accepted that most indigenous societies in the Amazon had collapsed by the mid-17th century due to violent conflict, displacement and “Old World” diseases (Myers, 1988; Denevan, 1992). There was both cooperation with and fierce resistance to the colonizers, well into the mid-19th century (Santos-Granero, 2002, cited in Shepard et al. 2010). The Madre de Dios River basin – to which the Manú River basin belongs – proved notoriously difficult to conquer due to the remote location, major rapids complicating or impeding navigation and violent resistance (MacQuarrie, 1992). While the entire Madre de Dios basin remained devoid of a permanent “European” presence through the late 19th century, it did not escape new pressures emerging around that time.

Although short-lived (1895 to 1917), the merciless rubber boom left its mark on the Indigenous Peoples of the Manú River basin. In addition to lethal conflicts, many perished due to disease, malnutrition and precarious working conditions. The atrocities of the rubber boom sparked international protests and consideration before British courts and the U.S. Congress (Hardenburg 1912; U.S. House of Representatives 1913). However, the rubber boom came to an end only due to the competition from Asian rubber plantations.

While the collapse of rubber extraction decreased the pressure, Zarzar et al. (1983) and Alvarez-Lobo (1996) argue that the same routes and techniques established during the rubber boom were used for human trafficking at least until the 1950s. According to these authors, Indigenous Peoples from the Manú River basin were captured and sold as slaves in plantations, logging operations or domestic service.

The 1960s brought another wave of intrusions, this time attracted by timber, pelts and hides. Sawmills were constructed on the lower Manú River targeting the high-value timber of mahogany (*Swietenia macrophylla*) and cedro (*Cedrela odorata*). In addition, missionaries of the controversial Summer Institute of Linguistics (SIL) and anthropologists began to contact isolated indigenous populations (d’Ans, 1981). Large scale development starting in the 1980s at the nearby Camisea gas field, originally developed by Shell and today operated by an international consortium, put further pressure on the region’s Indigenous Peoples in the form of contamination, diseases and wildlife depletion. While difficult to prove, it has plausibly been suggested that some indigenous groups may have migrated to Manú National Park from areas affected by the gas extraction and by seismic exploration conducted by Mobil Oil northeast of the park (Shepard et al. 2010).

Even this simplified historic account puts the common notion of Manú as an uninhabited primal Eden on its head. While historic population densities are unknown and discussions on this topic are controversial, people have without a doubt

been living in and using what is today Manú National Park for a very long time. It is a myth that there has been no historical contact between Indigenous Peoples and colonizers of European descent. It is likewise a myth that Manú National Park conserves “untouched” nature in the literal sense of the word. Manú National Park objectively has a strong human dimension. Against the above historic backdrop, the supposedly “savage” indigenous hostility to outsiders, which has resulted in several deadly clashes in and near Manú National Park over the years, seems more like a rational reaction to a very real experience.

While neither uninhabited nor untouched, there is no indication that local indigenous resource use has modified the rich and diverse forests in any fundamental way. In this sense, Manú National Park perfectly complies with the nuanced wilderness definition offered by these guidelines. While Manú is certainly a particularly stark and meaningful example, the histories of many of South and Central America’s “last wild places” share remarkably similar elements.

The establishment of the national park

Despite millennia of human history, including selective commercial resource extraction, the Manú River basin remains wild and difficult to access to this day. The movement leading to the declaration of the national park was driven by concerns about the starting industrial logging operations on the lower Manú River and other foreseeable threats rather than concern for Indigenous Peoples. However, the indigenous presence within the park’s boundaries was certainly known, and is well documented in anthropological studies of the time (d’Ans, 1972). One NGO supporter involved in Manú’s creation publicly called for respect of indigenous culture and traditions in Manú, including traditional hunting, as early as in the mid-1970s (Jungius, 1976). When the park was eventually established, loggers, hunters, and missionaries were expelled, whereas indigenous inhabitants were not (Shepard et al. 2010). When the park was declared in 1973, Peruvian law did not formally recognize indigenous populations. Much of the Manú National Park is zoned as an ‘untouchable area’ where only scientific research is allowed. The lack of any formal recognition of Indigenous Peoples within the park (Endo et al. 2010) very obviously did not do justice to reality and constitutes an awkward starting point for the debate and relationships between Indigenous Peoples and other actors. Most references distinguish sedentary Matsigenka from several mobile peoples or groups of mobile hunter-gatherers. PRO-MANÚ (2003) notes “at least seven indigenous groups”, others suggest a smaller number of contemporary groups that can reasonably be distinguished (e.g. Shepard et al. 2010). Estimates range between a modest 2,000 to 3,200 indigenous inhabitants. In its World Heritage reporting, Peru reported 2,203 people living within the park in 2009 (Republic of Peru, 2011), not including a smaller number of Indigenous Peoples living in voluntary isolation and initial contact, respectively. It appears that there has always been *de facto* acceptance of the presence of Indigenous Peoples. On the contrary, Endo et al. (2010) report that post park creation, several laws granted

“ancestral populations the right to remain within protected areas, provided that their traditional subsistence activities did not interfere with the park’s conservation goals”. While little is known about the mobile hunter-gatherers, the sedentary Matsigenka groups have gradually been adopting small-scale farming lifestyles in and around the small but growing settlements of Tayacome and Yomybato within the park. While raising some concerns, research on the impacts of those communities on the surrounding forests could not produce any alarming findings (Endo et al. 2010; Ohl-Schacherer et al. 2007).

It is telling to compare land and resource development in Manú National Park to its surroundings since the park was established. The region has since seen strong population growth, encroachment and major land and resource use change, induced by industrial resource extraction and major infrastructure development, such as the Camisea gas field and a major road connecting Brazil to the Pacific via the region. Manú National Park is therefore more valuable than ever, along with a still fragile network of other protected areas and indigenous territories. It is safe to say that this visionary conservation achievement was the basis for preventing the kinds of developments within Manú National Park, which are now common outside of its boundaries. It can be argued that the Indigenous Peoples of Manú have benefitted from the national park in the sense of the park shielding them from environmental and social change in the broader region.

The potential for the realization of shared interests between Indigenous Peoples and conservationists remains to be better understood and uncovered. Shepard et al. (2000) claim that past policies were “idealistic, paternalistic, and negligent” towards the people inhabiting the park, suggesting dire social, political and even health consequences, as well as an “atmosphere of mutual resentment and mistrust”. Some of the same authors subsequently acknowledged some improvements in the form governmental and non-governmental attempts to “attend to the needs of indigenous communities” (Shepard et al. 2010). A case in point are the two settled Matsigenka communities in the park, who “have become more visible to park personnel and scientists working in Manú Park” in the wording of these authors.

Still, Manú National Park continues to epitomize the deep division between “those who view Indigenous Peoples as conservation allies and those who see them as a threat to the long-term viability of wildlife populations” (Endo et al. 2010).

Some lessons

A first, seemingly trivial lesson is that the human history in protected areas does not start with the establishment of the latter. The same holds true for perceptions both of and by Indigenous Peoples. Mutual resentment and mistrust built over generations are common. The debate on protected areas and Indigenous Peoples is important, but only one facet of a much more fundamental debate. It is unhelpful to reduce corresponding discussions to a clash between “western” conservation objectives and “traditional” Indigenous Peoples.

Manú National Park is a very good example to illustrate that human use is not incompatible with contemporary interpretations of “wilderness”. Most of the intact and large landscapes with a modest human footprint emerging as critical to conserve the diversity of life on Earth have long been inhabited by Indigenous Peoples, many to this day. While fully acknowledging the reality of severe violations of indigenous rights in the name of conservation, it is incorrect and unfair to suggest that conservationists have generically ignored Manú’s Indigenous Peoples. On balance, the presence of Indigenous Peoples in Manú National Park has *de facto* been recognized. It is true though that the legal and policy framework for Indigenous Peoples has remained less than clear through a park history of more than 40 years. If conservation and human rights are to play a meaningful role in the future of Manú and the broader landscape, the interface must be considered in more systematic fashion, within and beyond protected areas.

There is a deep division in the “conservation community”. Some express concerns about impacts of a growing indigenous population adopting a sedentary lifestyle (e.g. Terborgh 1999), some popular media limit the complexity to a simplistic view of Indigenous Peoples *per se* being “stewards” (Marris 2016), yet other suggest a need for balancing rights and responsibilities (Shepard et al. 2010). There are no simple solutions. Regardless of positions, it is nonsensical to ignore the well documented fact that vast areas of global conservation importance across large parts of the world coincide with the presence of often vulnerable Indigenous Peoples. Conservation must come to terms with this fact beyond the change of rhetoric that has taken place. At the same time, it is unhelpful to suggest that conservation interests are the key problem of Indigenous Peoples, as is sometimes alleged. Rather, the fate and troubled relationships between Indigenous Peoples and “mainstream societies” have been shaped by a history often starting centuries before formal conservation policies in the contemporary sense even existed. Today, the competition for land pits governmental and non-governmental conservation actors against Indigenous Peoples. It is absurd to isolate this competition from the bigger picture as the competition for land and resources involves many other, typically much more powerful political and economic actors and forces.

There are very good reasons to assume that a lack of formal protected area status would have triggered land and resource use which would have severely compromised both the conservation values and the livelihoods and the cultural survival of Indigenous Peoples in what became the national park. Both conservationists and Indigenous Peoples have successfully fought against external interests, sometimes literally, and every single individual deserves full credit. The sad truth, however, observable across the planet, is that Indigenous Peoples typically stand little chance to successfully oppose powerful political and economic interests targeting their lands. The park management therefore constitutes a *de facto* ally of sorts, despite a rocky relationship, and even though this has never been jointly articulated. It cannot be overemphasized that the dedication of protected area leaders and staff has not only resulted in restrictions but also in major benefits for indigenous

inhabitants, albeit indirectly rather than as a primary objective. While there is every reason to further improve the relationship between park management and Manú's indigenous inhabitants, it is critical to recall that there are many other actors and interests, including powerful international extractive industries. It is naïve and paternalistic for conservationists to unilaterally assert identical values and interests. Simplistic ideas about "synergies" were often dreamed up by well-meaning conservationists rather than being the result of dialogue between the supposed allies. This has led to disappointment and rejection of the notion of obvious alliances on both sides. Rather than assuming shared values, the most promising avenue seems to be the identification and realization of shared interests. The most important shared interest could well be to prevent the incursion by outsiders.

At the time of writing, Peru's Protected Areas Agency SERNANP, states the following objectives for Manú National Park on its official website (translation by author): "To conserve representative samples of the biological diversity of the tropical forest of southeastern Peru. To contribute to regional development through research, as well as the recognition and protection of the cultural diversity and self-determination of the Indigenous Peoples of the area". Rather than reflecting a narrow protection paradigm, this sounds like a very encouraging perspective and foundation.

Question marks and outlook

Neither nature nor culture are frozen in time. Ecosystems are by definition open and dynamic systems and the same can be said of human culture. Situations, discussions, interests and aspirations constantly evolve. It is beyond debate that to this day Indigenous Peoples have not overused Manú National Park in any ways that would be alarming from a formal conservation perspective. Manú National Park is a living example that wilderness and human presence and use are not mutually exclusive. At the same time, it would be simplistic and unhelpful to assume that Indigenous Peoples are per se guarantors of conservation in today's world.

At a time of increasing and fully legitimate recognition that Indigenous Peoples should have the rights of meaningful involvement in decision-making that affects them, the debate about the interface between protected areas and Indigenous Peoples is here to stay; avoiding the debate is not an option. This has important implications for nature conservation and raises many questions, including the following:

- **Who is to say what the interests and aspirations of Indigenous Peoples are? Certainly not conservationists or any other external actors. Indigenous Peoples must be able to do so themselves. Mechanisms to make this happen, for example through federations, are in their infancy at best, however.**
- **Why should Indigenous Peoples or any other "communities" have homogeneous interests or positions towards conservation? Real-life experience shows that individual interests can fundamentally vary, as they do in any human group.**

- **How can one do justice to this diversity when seeking "free and prior informed consent"? While the concept and objective is a laudable breakthrough, the implementation gap remains enormous.**
- **What are the implications when indigenous aspirations are clearly incompatible with conservation objectives in existing protected areas due to population growth, sedentarization and changing lifestyles? This is a scenario some may overstate, while some others appear to ignore it; both seems unhelpful.**

There are no simple answers but there is a way forward by recognizing the legitimacy of these questions and the critical importance of finding better answers to them. In a place like Manú National Park, the interface between the conservation of a global gem and its indigenous inhabitants deserves to be a prominent debate rather than the simmering discussion it has been since the park was established. Addressing these questions must fully involve Indigenous Peoples on terms acceptable to those who are in contact at all. The dialogue with peoples in contact with "mainstream" society must move from object to subject, as has long been called for in the rights debate (Barsh, 1994). Failure to make progress will not make the critical questions go away; further delays are likely to make it increasingly difficult to find acceptable answers for all parties. As a precautionary principle, peoples in isolation or initial contact in Manú National Park and other protected areas should be respected in line with existing guidance by the United Nations Office of the High Commissioner for Human Rights (OACNUDH 2012), as they should be anywhere. At a time of rapid vanishing of large natural areas permitting the very possibility of cultural survival of peoples in isolation or initial contact, formal protected areas respecting isolated peoples may well be the land use decision offering the best long-term prospects for them. Provided full consideration and inclusion of isolated peoples is an explicit objective, protected areas can add a layer of protection against development incompatible with wilderness conservation and the continuation of indigenous ways of life. Tragic cases of deaths through the unintentional spreading of diseases by film crews, anthropologists and missionaries, which have recently been reported from Manú National Park are not acceptable and must be prevented.

For all its imperfections and unanswered questions, Manú National Park has successfully conserved a large and most spectacular example of the world's most biodiverse terrestrial region. By withdrawing the Manú River basin from the forces that have been re-shaping nearby areas of the Peruvian Amazon, the national park has de facto done much more for its indigenous inhabitants than some critical voices suggest. While one can only speculate about what course history would have taken without the establishment of the park, it is very difficult to imagine any politically realistic scenario which would have been preferable from both the perspectives of conservation and some of the last isolated Indigenous Peoples.

While focusing on "nature", Manú National Park's World Heritage status has added an important layer of protection

to both nature and the people who have been an integral part of it for millennia. While it is sobering that the only reference to Indigenous Peoples in the inscription decision is encouragement “to pursue the anthropology programme regarding the resident native population” (Decision CONF 005 VII.A, Paris 1987), more recent language reflects a positive evolution of World Heritage practice. In 2011, the World Heritage Committee explicitly requested technical recommendations in its decision 35 COM 7B.34 (Paris, 2011) to protect “the Indigenous Peoples living in voluntary isolation and in initial contact from external pressures and engage with sedentary indigenous groups within the property in a more meaningful dialogue to define the future”. This is an encouraging use of the Convention, and one that is fully in line with the Convention’s objective to follow an integrated view of “Nature” and “Culture”. It is a use of the Convention that should inspire more systematic thinking and practice in the many World Heritage sites facing the same or similar questions as Manú National Park.

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Indigenous stewardship and traditional governance of Okavango Delta, Botswana

Gakemotho Satau and Nigel Crawhall

Botswana's Okavango Delta became the 1,000th site inscribed on the World Heritage List at the 38th session of the World Heritage Committee in Doha, Qatar in 2014. The event was a conservation achievement, but also recognised the San's indigenous status as rights-holders, conservation actors and knowledge holders in Botswana. San representative Gakemotho Satau stood behind the Minister of the Environment, Wildlife and Tourism (MEWT), HE Tshekedi Khama in Doha, holding up the national flag marking a historic moment for Botswana and for the San peoples of southern Africa.

This is a case study of a 'new generation' of World Heritage site. The site has been inscribed for the Outstanding Universal Values of its natural characteristics: its biodiversity and ecological processes and its great beauty. At the same time, the state dossier takes note of the presence of Indigenous Peoples and local communities within the site and recognises the cultural heritage of the ||Anikhwe San on the islands in the core zone, and, more generally, the cultural heritage of the Khwedam-speaking peoples of the Okavango Delta. Recognition of outstanding natural values by the Convention is enhanced by the national recognition of the cultural context, cultural values and human cultural diversity within the site – each of which contribute to the long term sustainability of this exceptional site.

For millennia, the Okavango Delta has played a major role in nurturing both human cultural diversity and knowledge systems, as well as the unique biological diversity and inland waterway ecosystem. According to Barnard (1992), this northern boundary of the Khoe-speaking hunter-gatherers is an ancient site of human occupation and a territory with centuries of contact between San aboriginal peoples and later in-migrating agro-pastoral-fishing Bantu-speaking peoples from the north. This article examines the traditional San system of land tenure and natural resource governance and how these relate to sustaining biodiversity of the Okavango Delta since prehistoric times.

Site description

The Okavango Delta is a vast inland wetland system with permanent marshlands and seasonally flooded plains when the summer rains in Angola drain onto the plains of Botswana. The inscribed site is 2,023,590 hectares with the overall flood territory being over 1.2 million hectares. Flooding is a key element in its unusual biodiversity, ecosystem and cultural development. The rains fall in the highlands in Angola, flushing down into waterways which flow inland, away from the sea. These flood waters pour into the Kalahari Basin causing seasonal transformations that nourish intense birdlife, large mammal populations and flora. The waters peak between June and August during the region's parched winter, attracting one of Africa's greatest concentrations of wildlife. It is an exceptional example of the interaction between climatic, hydrological and biological processes. The Okavango Delta is home to iconic species of mammals, including elephants, cheetah, white rhinoceros, black rhinoceros, African wild dog, hyenas, lions and rare water birds.

The Okavango Delta was inscribed as a Ramsar wetland in 1997. The site was long overdue for World Heritage inscription, which was achieved through the patronage of HE Lt. Gen. Seretse Khama Ian Khama, President of Botswana and well-known conservationist.

Cultural heritage in a natural landscape

In recent times, five major ethnic groups live in the Okavango Delta: the Bugakhwe, Dixeriku, Hambukushu, Wayeyi and ||Anikhwe. Each group speaks its own language and expresses its own cultural identity. There are as many as twelve ethnic groups spread out across the District of Ngamiland; all of whom are impacted by the inscriptions of the Okavango Delta and Tsodilo Hills.

This case study focuses on the two main Indigenous Peoples who have occupied the territory for millennia. The Bugakhwe and ||Anikhwe, also referred to as *San*, *Basarwa*, or *Bushmen* – are the Indigenous Peoples of southern Africa. Traditionally the San were nomadic hunter gatherers and lived in small groups. The ||Anikhwe are distinguished for being hunter-gatherer-fishing people. The other three ethnic groups: Dixeriku, Hambukushu and Wayeyi most probably migrated into the Okavango Delta far later than the two San ethnic groups and are Bantu peoples according to their linguistic traditions. The Wayeyi seem to have been in the delta, practicing artisanal fishing at least by the 18th century. They speak Central Bantu languages, indicating they likely migrated from central Africa during the expansion of agro-pastoralism and metallurgy.

The Ngamiland District is ruled by a Paramount Chief, Kgosi Kgolo Tawana Moremi, first-born son of Letsholathebe. The current Paramount chief is descended from an important line of BaTawana chiefs who migrated from eastern Botswana and took control of Ngamiland, settling in what would later become the Moremi Game Reserve in the eastern Delta. Kgosi Kgolo Tawana was the original Paramount Chief of the BaTawana (1795 -1820), part of the BaNgwato people from eastern Botswana. Tawana established the Setswana speaking chieftaincy's presence in Ngamiland. Kgosi Kgolo Moremi I was his son and Paramount Chief of the BaTawana (1820-1828). Moremi I established control over the San territories of the Okavango Delta and Ngamiland.

Historical governance of natural resources

The San peoples of the Okavango Delta have occupied this territory for millennia. The San system of traditional territorial governance, tenure and sustaining of the biological diversity of the Delta is a valuable resource in considering how the Delta can be governed and conserved under the new World Heritage designation.

The San practices, mapped out by the San organisations as physical, ecosystemic and cultural spaces provide us with a framework for understanding large-scale territorial governance and management. The San historical land tenure system aligns closely with Elinor Ostrom's writings, which posited that stable, indigenous and local peoples reliant on natural resources

typically establish a common pool resource governance system that is rule-governed, based on ecological carrying capacity knowledge, works on the basis of equity within a fixed rights-bearing and duty-bearing community, and which adjusts human behaviour to natural resource conservation and sustainable use (Ostrom 1990).

The Indigenous Peoples of the Okavango Delta are speakers of Khwedam – a language from the Central Khoe-San language family, from the northern Khoe branch of this diverse language family. Khwedam has historically consisted of several major dialects: Buma is spoken in West Caprivi across the border in what is now Namibia and closely related ||Xom along the Okavango; the second distinct dialect is Bugakhwe of Seronga, Beetsha, Gurigua and Khwai, among which also the ||Xo, Thobokhuru, |'Oatau, ||'qarangu and Djaokhwe sub-dialects are found in Botswana, Southern Angola and West Caprivi.

The ||Anikhwe ('River Bushmen') speak a dialect located at ||Xaoxa, Nxamacere, Mohembo, Xakao and Mogotlho along the Panhandle of the Okavango Delta. The ||Anikhwe have a sub-dialect known as Gumayi ('Islanders'). Historically the Gumayi owned the islands and thus, buried their dead in the Islands whereas the ||Anikhwe would bury their dead on the mainland outside the river banks. However, both ||Anikhwe dialect speaking communities occupied the riverine parts of the Delta where they foraged their food and medicines from the animals, fish, berries and tubers that inhabited the delta.

The larger Bugakhwe speech community were seasonal visitors to the Delta, following game movement to- and -from the Delta during their hunting. They hunted big game, collected honey, berries and medicine from the vast forests that overlapped as their traditional territories. They made greater use of the drylands around the Delta while using the rich biodiversity of the Delta as a seasonal support.

The Bugakhwe and ||Anikhwe societies orally transmitted their knowledge, land and resource tenure along with their intangible heritage. Their intense oral heritage system helped transfer valuable knowledge over generations and continues to play an important role in verification of land rights, transmission of wisdom and knowledge of the spiritual and physical environment from one generation to the next.

The dialect distribution of Buga and ||Ani are important in understanding the different physical environment they occupied and in turn their distinct management and governance responses to different ecosystem and niche usage patterns. ||Anikhwe spatial distribution is primarily associated with fishing, collecting reeds, access to the islands and the seasonal burn of the old grasses to replenish the biodiversity and keep fire risks under control. Bugakhwe spatial organisation covered the vast forest and dryland areas to the north. This has been mapped recently by Khwe researchers. They demonstrate highly precise family-based territorial tenure systems. The anchor for the system were the sip wells – underground water supplies – supported by a distribution of land types to facilitate hunting

and seasonal migrations. The mapping shows that each dune in the desert region could be associated with a specific family. Before their interaction with the Bantu-speaking peoples in Southern Africa, water determined the way of life of former hunter-gatherer societies of Bugakhwe and ||Anikhwe. The source of water attracted much wildlife and nourished the natural landscape to create highly diverse fauna and flora. Toponymy helped specify governance and shared resources within the broader community. Water sources were named, marked and managed by a few hundred related people, usually with close family blood lines. They named their settlements and hunting camps according to the physical characteristics of water sources.

There is no place named in Khwedam where there is no water, and this has been reflected in most of the suffixes of the Khwe place names; (*-tca* or *-tsha* meaning 'water') and few places with suffixes: *-óro*, *-xoére*, *-dòm* and *-||xom* referring to types of water sources. Traditional sip wells (*||ana*), pans (*tucaóro*), depressions (*qàúóro*), fossil drainage lines (*dom*) forests (*tc'au*), plains (*éé*) and the Delta (*||xom*) amongst others, marked the physical natural landscape in which seasonal hunting and gathering activities were implemented. Spreading over it was a catalogue of permanent and seasonal camps, burial sites named after one of the water sources at that location.

Natural water management was located in the holistic cultural-natural knowledge system of the Khwe. Khwe regarded water as their sacred gift from *Khyani* (the highest God) and this gift was managed by socially organised compliance roles played by a Khwe societies through the fear and acknowledgement of *||hanguo* (ancestral powers) that were believed to be the intermediaries between the living society and the most highest God. Thus, the waters were respected through norms that were cultural and spiritual. Water was managed to guarantee sustainable and equitable use between people, between species and across generations.

When visiting a water source, an elder amongst or a group leader would first touch the water. He or she would wash his/her face and drink first, before the rest could follow. In that way, he/she introduced the team to the ancestors and thanked them for providing and protecting the good water for their use. The contrary would be disrespectful to the ancestors who are most likely to punish the group by hunger strife and bad luck. An outsider would also have to seek a consent from the old authorities to access water rights. Failing to request permission could lead to deadly conflict. The elders would give the right of use to some of the water sources and as well, introduce visitors to the principles guiding user rights. They would be closely monitored to see if their observance and respect for nature was acceptable. Failure to comply with local governance systems resulted in outsiders being expelled from the territory.

The hunting and gathering grounds neighbouring the key water source would systematically assimilate the name of the water source. These territories became a critical natural asset that would be inherited down generational lines, serving as a

bio-network in which Khwe interpreted their life. Traditional norms on harvesting, burning and hunting played a significant role in ensuring sustainable use and benefit to the natural environment.

Daukx'am (the controlled burning at an area of land) was pivotal to harmonious understanding of the broader landscape and how each Khwe spatial territory related to the others in the system. This understanding included all the natural components of the environment, including plants and animal species. Animal and plants ecology, seasons and weather conditions influenced grassland burning decisions. Nevertheless, the dry hot summer season was never a good time for burning, as it would result in extreme fires that would destroy the soil, plants and important insects like bees, as well as wildlife.

The Khwe would selectively burn their areas of land when the time was deemed right, with detailed and holistic understanding of the ongoing natural processes. Among the Khwe, burning of the veldt was regarded a healing process that not only stimulated diversity of fauna and flora, but also the natural beauty and abundance of fresh pastures, and opened special areas for newborn wildlife to play and run, relieving animals from stress.

As with other African hunter-gatherers, clan affiliation and dialect relationships played a role in clarifying whether a person would be allowed to gather or hunt prior to the approval of the clan leader. Despite the seemingly vast expanse, hunting was only authorised according to strict rules including what could be hunted, for how long and how far.

||Anikhwe spatial use was relatively restricted compared to the Bugakhwe. ||Anikhwe used to live upriver and hunted and gathered at river-run forest and reed beds for animals, fish and plants whereas the Bugakhwe established seasonal camps along the river, which were in most cases next to animal corridors. Bugakhwe relocated to the Okavango Delta (*||xom* or *dom*) during very dry periods or drought. They maintained controlled burning of the veldt (grasslands) to control encroachment of bushes and other unwanted species and also to improve plant restoration.

Modern context and visions of integrated governance

The Khwe and ||Anikwe landscape and cultural systems are inseparable. As with different mapping projects undertaken by African Indigenous Peoples, each landscape reveals itself to be rule-governed, with both rights and responsibilities oriented to the conservation of biodiversity and ecosystems services (IPACC 2009). Whereas this is of historical interest, it also has implications for the future governance of this unique landscape.

One of the challenges in contemporary conservation is to ensure that traditional systems of social control that protect biodiversity, and social cohesion that conservation targets are part of the social and economic system. For conservation to

be effective in the long term, it relies heavily on the values of the local community. The local community in turn has to live with the challenges of dangerous wildlife encounters and the influx of foreign tourists. The Khwe and ||Anikhwe people have defined their future as intimately tied to the conservation of the Delta. They are also holders of highly detailed knowledge of the landscape, dryland and wetland hydrology, flora and fauna. The challenge will be whether this marriage of contemporary tenure systems can be informed by socio-ecological principles?

All the peoples of the Okavango Delta face various challenges which impact on their well-being and the sustainability of their cultures. The gradual integration of the Okavango Delta into the national economic, social and political institutions of Botswana has not been balanced with representation of their unique languages and cultures. The San are not represented in the national chieftaincy system and this constrains their ability to influence policy and decision-making. Local languages are not used in schools, and local traditional knowledge and skills appear to be degrading.

The marginalisation of San languages in Botswana poses a particular threat to the effective intergenerational transmission of biodiversity knowledge and systems. This has been compounded by the blanket ban on hunting, including subsistence hunting, since 2014. As established in the UNCBD's Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity – it is the use that sustains the intention to conserve. Articles 8j and 10c encourage Parties and Indigenous Peoples to recognise that knowledge systems and shared benefits make biodiversity part of a sustainable and living economy.

The shift from a traditional to a cash market economy changed the necessary skills that children require for their future. Traditional knowledge has become less important as activities such as hunting and fishing become less appealing. The traditional economy provided young people and adults with abundant skills, training and livelihoods. But in the transition to a national market economy, the San peoples of the Okavango Delta have found themselves facing poverty, various forms of discrimination, and high unemployment.

The inscription of the Okavango Delta on the World Heritage List creates a new opportunity for San and other local communities to apply their knowledge of biodiversity conservation and heritage, both natural and cultural, in developing a sustainable future. The traditional knowledge and practices of the people of Okavango Delta could be resources in an integrated, multi-sectoral approach to tourism development, other livelihoods and conservation.

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Papahānaumokuākea: Where Nature and Culture are one

Amanda Boyd, L. Hokulani Kaʻaekuahiwi, Molly Noelaniokakai Mamaril, Toni Parras and Kaʻaleleo Brad Wong

Inscribed as a World Heritage site in 2010 for its outstanding natural and cultural significance, Papahānaumokuākea is one of the largest World Heritage sites in the world and is the only mixed cultural and natural site in the United States. Located in the remote Northwestern Hawaiian Islands, Papahānaumokuākea Marine National Monument was created expressly to protect both natural and cultural heritage. At the time of World Heritage inscription in 2010, the size of Papahānaumokuākea Marine National Monument was 362,073 square kilometers. In 2016 President Obama expanded Papahānaumokuākea Marine National Monument, however the World Heritage site retains its original size.

Puʻuhonua – Place of Refuge

Now encompassing 1,508,870 square kilometers of Pacific Ocean – larger than the nations of Greece, Denmark, Cuba, Columbia and the United Arab Emirates combined - Papahānaumokuākea is comprised of basalt islands, low-lying atolls, predator-dominated coral reefs and deep-water seamounts. It is a classic and unparalleled example of volcanic island and atoll formation, home to an incredible diversity of marine and terrestrial species as well as the largest seabird rookery in the world. The area provides crucial habitat for endangered and threatened species of global concern, including the critically endangered and endemic Nihoa finch and Laysan

duck. The beaches and waters offer foraging and pupping areas for nearly the entire population of endangered Hawaiian monk seals and nesting grounds for over 90% of the threatened Hawaiian population of green sea turtles. The isolation of the islands and waters has caused Papahānaumokuākea to function as an intact miniature evolutionary universe. Dramatic examples of adaptive radiation, a process in which organisms diversify rapidly from an ancestral species into a multitude of new forms, have led to very high rates of endemism, resulting in a multitude of species that exist nowhere else on Earth.

The region is considered a puʻuhonua (place of refuge) for its physical and spiritual significance. Papahānaumokuākea is a region of deep cosmological significance to the living Native Hawaiian culture that extends back hundreds of years into antiquity. A revered connection exists between Kānaka Maoli (Native Hawaiians) and Papahānaumokuākea, creating a bio-cultural landscape of cultural and spiritual values that apply to different species and islands within the region. Though impacted by humans in some places by overharvesting, introduction of non-native species and pests, and military occupation, the restoration of natural habitats and continued preservation of this ancestral environment illuminates the Hawaiian concept of the kinship of all things, including humans.

ʻĀina Hoʻomalū – Protected Land

Papahānaumokuākea has been granted various protections over the last century. In addition to its reverence by Native Hawaiians, various entities have placed protections over different parts of the region, including:

- 1903:** President Theodore Roosevelt places Midway Atoll under control of the Navy to stop the slaughter of seabirds for feathers and eggs at Midway Atoll.
- 1909:** President Theodore Roosevelt creates the Hawaiian Islands Bird Reservation (now the Hawaiian Islands National Wildlife Refuge).
- 1974:** President Nixon proposes many of the islands in what is now Papahānaumokuākea as a National Wilderness Area.
- 1993:** The State of Hawaiʻi establishes the Kure Atoll Seabird Sanctuary (now the Kure Atoll Wildlife Sanctuary).
- 1996:** President Clinton transfers Midway Atoll management responsibilities from the U.S. Navy to the U.S. Fish and Wildlife Service.
- 2000:** President Clinton creates the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve.
- 2005:** The State of Hawaiʻi establishes the Northwestern Hawaiian Islands Marine Refuge.
- 2006:** President George W. Bush fully protects the region as the Northwestern Hawaiian Islands Marine National Monument; a year later it was given its Hawaiian name, Papahānaumokuākea.
- 2008:** The International Maritime Organization, a specialized agency of the United Nations, designates the Monument as a Particularly Sensitive Sea Area.
- 2010:** Delegates to the United Nations Educational, Scientific and Cultural Organization's 34th World Heritage Convention in Brasilia, Brazil unanimously vote to inscribe Papahānaumokuākea as a mixed (natural and cultural) World Heritage site.
- 2016:** Under authority of the Antiquities Act, President Obama expands Papahānaumokuākea National Monument by 1,144,338 square kilometers to 1,508,870 square kilometers, quadrupling the size of the monument (though the portion of the Monument that is a World Heritage site remains unchanged).

Papahānaumokuākea is cooperatively managed by the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, the State of Hawaiʻi, and the Office of Hawaiian Affairs. In addition, the Native Hawaiian community provides input and recommendations on management through the Native Hawaiian Cultural Working Group. sw. Access to the Monument is by permit only and is limited to activities that contribute to the site's vision to "forever protect and perpetuate ecosystem health and diversity and Native Hawaiian cultural significance of Papahānaumokuākea."

In January 2017, a Memorandum of Agreement was signed that formally added the Office of Hawaiian Affairs as the fourth Co-Trustee of Papahānaumokuākea, giving this indigenous organization equal say in monument management, the first such formal partnership between Federal, State and an indigenous group of its kind.

Kuanaʻike – The Hawaiian Worldview

In traditional Native Hawaiian culture, there was no division between people and the earth. There existed a relationship that was genealogical and comparable to that of a parent and child: nurturing and reciprocal. Native Hawaiians depended on the land for sustenance and shelter, while the land was tended to and taken care of in return. An 'ōlelo no'ēau (Hawaiian proverb) proclaims, "he ali'i ka 'āina, he kauwā ke kanaka" ("land is a chief, man is its servant"), which expresses people's responsibility as stewards of the land and natural resources through genealogical relations.

The living relationship between humans and land was perpetuated through oral and visual traditions. Histories of daily life, travel, conquest, the environment and more were documented in mo'olelo (stories), oli (chants), mo'okū'auhau (genealogical chants), mele (songs), nane (riddles) and other oral traditions. The most well-known Hawaiian cosmological chant, the Kumulipo (Source of Deep Darkness), tells of the birth of the natural world from Pō (the realm of darkness and the afterlife) beginning with the simplest known form of life, the coral polyp, and progressing to more complex forms. Being excellent observers of the natural world, Native Hawaiians encoded natural relationships into this genealogical chant. These relationships are oftentimes presented as sibling pairs, and represent real life-cycles. Humans appear in the second half of the chant as the world enters Ao (the realm of light and the living).

One story contained within the Kumulipo tells of Papahānaumoku (a mother figure personified by the earth), and Wākea (a father figure personified by the expansive sky). These two deified ancestors are revered by Native Hawaiians, as their union and others along their family line resulted in the creation, or birthing, of the entire Hawaiian archipelago and the Native Hawaiian people themselves. Human life therefore comes not only from two biological parents, but from a complex spiritual and literal genealogy that ties humans to everything else, both living and non-living. This strong interweaving of natural elements and people are part of the foundation of Hawaiian culture, language and spiritual understanding which

explains their responsibilities as environmental stewards. The naming of the Monument as Papahānaumokuākea honors and preserves these beliefs, strengthening Hawaii's cultural foundation and grounding Hawaiians in an important part of their history. Taken apart, "Papa" (earth mother), "hānau" (birth), "moku" (small island or large land division), and "ākea" (wide) suggest a fertile woman giving birth to a wide stretch of islands beneath a benevolent sky. Taken as one long name, Papahānaumokuākea is a symbol of hope and regeneration for the Northwestern Hawaiian Islands and the main Hawaiian Islands.

Kūkulu Manamana – Ritual Power and Religious Expansion

The vast area of ocean and emergent lands that make up the Northwestern Hawaiian Islands has long been a significant part of Native Hawaiian life and tradition. Historical sources such as Hawaiian language newspapers, chants, songs and genealogies document centuries of huaka'i (explorations and travels) throughout the region, and evidence of settlement there is a testament to the ingenuity of those voyagers. These far-flung islands, atolls and their surrounding waters command a deep respect from the Native Hawaiian community and is regarded as an 'āina akua (sacred region) from which Native Hawaiians believe all life springs and to which ancestral spirits return after death. From this perspective, the islands within the region are oftentimes referred to as kūpuna (elder or ancestor) islands.

Native Hawaiians believe that the northern limit of which the sun travels annually, Ke Ala Polohiwa a Kāne (the Tropic of Cancer), is the border between the realms of Pō and Ao, with Pō being the region beyond the reaches of the sun's path to the northwest. This border between the realms also marks a geological change in the composition of the islands, transitioning from volcanic emergent landmasses to sandy atolls and coral reefs. The unique geographic location and features of the Northwestern Hawaiian Islands bridging these two realms affirms the sacredness of the region and its importance to the foundational tenets of Native Hawaiian culture and tradition. Situated beyond Ni'ihau, Nihoa is thought to have served as a bridge or staging ground for religious ceremonies on Mokumanamana. It contains numerous religious sites, habitation sites and agricultural terraces, showing considerable investment from Native Hawaiians.

Mokumanamana, northwest of Nihoa, acted as a spiritual gateway and became the central focus of ali'i (chiefly elites) in establishing the island as a ritual center of power for the Hawaiian system of heiau (temples, places of worship). These rituals were set up to honor ancestors in order to gain mana (divine power), and led to a religion that became widely established throughout the Main Hawaiian Islands. Central to this religion was the concept of the 'aha (cord), which came to symbolize the connection between ancestors and descendants, and of weaving the people together, just as a cord is woven. From the 'aha cord grew the 'aha ceremony, which included the building of heiau across the pae'āina (archipelago) to track specific movements of the sun. Mokumanamana was the

northernmost location in which Native Hawaiians showed physical evidence of habitation and ritual.

In recognition of their role in perpetuating cultural practices, the islands of Nihoa and Mokumanamana are listed on the National Register of Historic Places.

Aha Kupanaha iā Hawai'i 'imi loa – Pursuing new knowledge brings bountiful rewards

The Native Hawaiian community continues to utilize Papahānaumokuākea on a consistent basis for physical and spiritual sustenance, voyaging, and way-finding. With the revival of the Polynesian practices of voyaging and way-finding aboard double-hulled sailing canoes, there is an interest and need to continue to develop the skills necessary for such voyages. This integral training and navigational knowledge is often place-specific, and can only be done in home waters, where novice navigators can apply some of their life experience in environmental observations and associations. The voyage from Ni'ihau to Nihoa and on to Mokumanamana is one of the foundational way-finding tests where a navigator must use their combined training and skill to find the small, unlit and low-lying landmasses in the vast ocean. Successful arrival at the islands serves as a significant benchmark in their training. Moreover, the cultural ceremonies and protocol associated with Nihoa, Mokumanamana and the other atolls up the chain can only happen off of those shores where appropriate respect can be paid to their ancestors, in their particular spiritual, natural and geological manifestations.

These intimate familial and genealogical ties, together with the symbiotic relationship of man to both land and sea, continue today for many Native Hawaiian families and form the basis for Native Hawaiian resource management methodologies. Connections between Papahānaumokuākea and the populated Main Hawaiian Islands are being revived and strengthened through continued access and "research" (or "ways of knowing") by a new generation of Native Hawaiian scholars and practitioners. Activities include rediscovering traditional place names, conducting nearshore monitoring and environmental observations, organizing archaeological studies, and creating seasonal calendars to inform native habitat restoration. Historical materials are being integrated with modern technological advances to confirm much of the biological, geophysical and even spiritual assertions made by Native Hawaiians centuries ago. Contemporary scholars are combining these historical resources with their skills to deepen the understanding of records left by Native Hawaiians who once accessed the region regularly.

For a culture that considers nature and civilization to be part of a genealogical whole, Papahānaumokuākea offers a special place to reconnect with an ancestral environment. The management of Papahānaumokuākea not only encourages the continuation of these cultural connections by assisting various Native Hawaiian organizations with accessing the Monument, but seeks to combine contemporary sciences with traditional ecological knowledge and practices to better understand the place from a Hawaiian perspective.

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