

Science and Stewardship to Protect and Sustain Wilderness Values:

Tenth World Wilderness Congress Symposium

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Abstract

The Tenth World Wilderness Congress (WILD10) met in Salamanca, Spain in 2013. The symposium on science and stewardship to protect and sustain wilderness values was the largest of multiple symposia held in conjunction with the Congress. This symposium was organized and sponsored by the Aldo Leopold Wilderness Research Institute, the Wildland Research Institute of the University of Leeds, CzechGlobe—Global Change Research Centre, and the WILD Foundation. The papers contained in these proceedings were generated at this symposium, but not all authors submitted papers for consideration for inclusion in these proceedings. They have been organized into four major sections: (1) Europe: Intervention and Nonintervention to Meet Protection Goals, (2) Australia and Antarctica: Geography of Place and Spirit in The Big Wild, (3) Africa and North America: Linkages Across Boundaries to Protect Nature, and (4) Old World and New World: The Relationships Between Wilderness, Human Health and Culture. Included are papers that address wildland issues on all continents, but wilderness designation, protection and restoration processes and challenges vary tremendously from North America to Europe and from Antarctica to Africa, thus sections are defined by geography and topic.

Keywords: wilderness, rewilding, restoration, private lands, biodiversity, conservation, protected areas, economics, community involvement, policy, stewardship, education, spiritual values

Papers in this proceedings were not edited. Authors are responsible for content and accuracy.

Preface

The 10th World Wilderness Congress (10th Congreso Mundial de Tierras Silvestres) convened in Salamanca, España (Spain) in 2013 with an inspiring agenda. Over the seven days of WILD10, delegates from all over the world gathered to share information and learn from each other about many important conservation issues requiring international cooperation.

A huge topic in Europe currently (and the primary reason for WILD10 meeting in Spain) is “rewilding.” While the general model being followed in experimental fashion is based on rewilding of abandoned farmlands, there is much debate as to the best way to restore or re-envision “natural” landscapes in Europe. Some also term the wilderness movement in Europe “reimporting the wilderness concept,” acknowledging that the United States, Canada, Australia, New Zealand and South Africa land use and conservation policies were heavily influenced by Europeans who settled there. And now it is time to rewild Europe by the Europeans by protecting existing wild places. The rest of the world is watching as Europeans explore the ethics, the practicality, the science and the future of restoration and beyond.



The University of Salamanca and the city of Salamanca were great locations for this Congress. While this was the first time this Congress met in Spain, it was not the first time in Europe. The first meeting was in South Africa in 1977, followed by meetings in Australia (1980), Scotland (1983), the United States of America (Colorado) in 1987, Norway (1993), India (1998), again in South Africa in 2001, again in the United States of America (Alaska) in 2005, and in Mexico in 2009.

The papers included in these proceedings do not represent all of the oral and poster presentations of the Symposium on Science and Stewardship to Protect and Sustain Wilderness Values. It has been the tradition, however, to gather together many of those papers worthy of publication and compile them as an at least partial record of what transpired during these technical sessions. Other papers from the Symposium have been published in other outlets, as well. Every paper in these proceedings received peer review and editing by at least two of the compilers.



The Aldo Leopold Wilderness Research Institute, the Wildland Research Institute of the University of Leeds, CzechGlobe—Global Change Research Centre—Academy of Science of the Czech Republic, and the USDA Forest Service Rocky Mountain Research Station are proud to cooperate in compiling, publishing and distributing this publication. The WILD Foundation exhibited leadership and patience in coordinating facilities, schedules, and supporting many Congress delegates to attend and present in this Symposium.

We thank the Rocky Mountain Research Station Publishing Services Staff for yet another outstanding job of coordinating publication and distribution of these proceedings. Primary funding for printing and recording this publication came from the USDA Forest Service Office of International Programs.

The Compilers, September 2014

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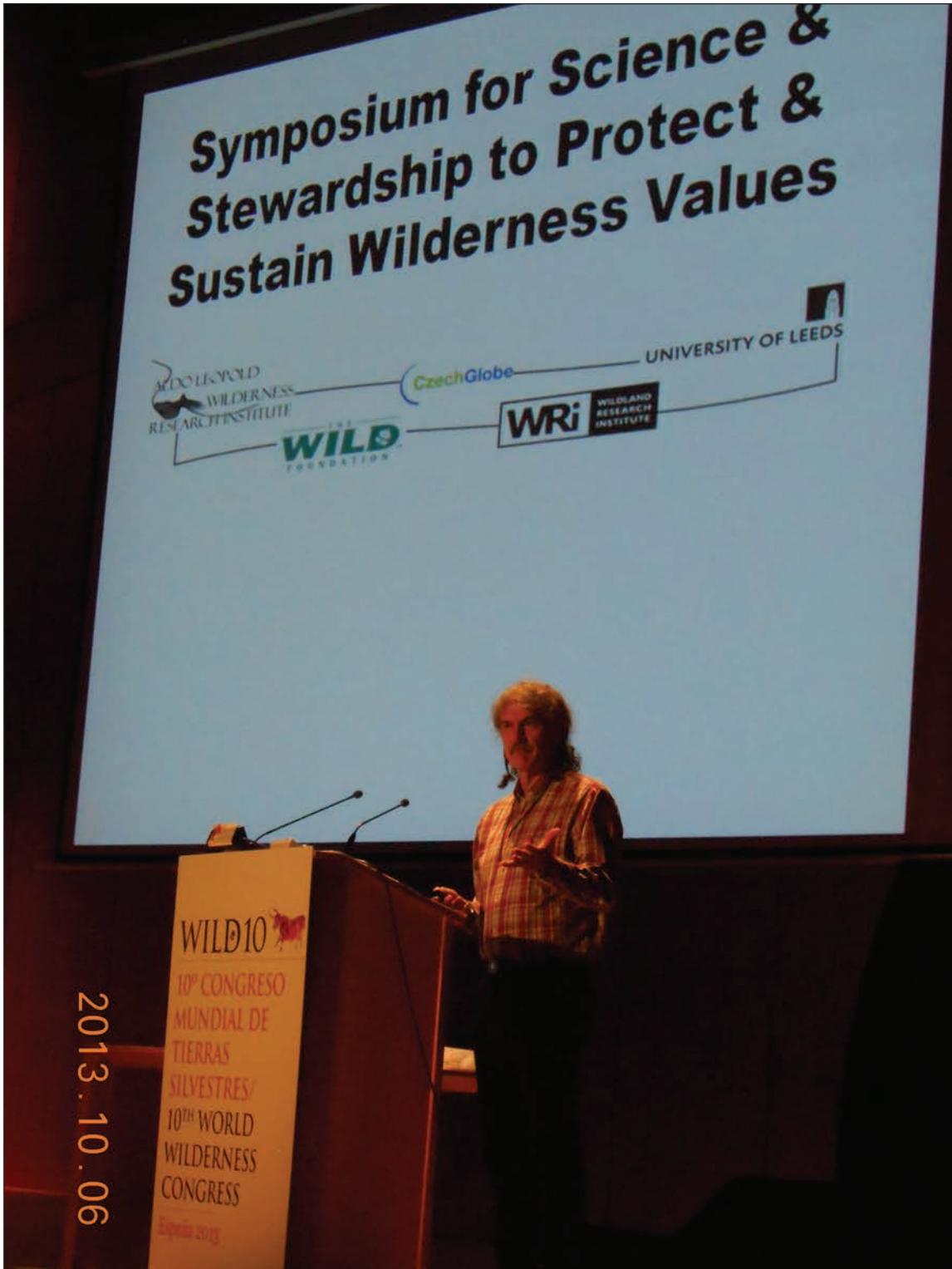
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Section 1—Europe: Intervention and Nonintervention to Meet Protection Goals



Wildlife Corridors Based on Spatial Modeling of Human Pressure: A Portuguese Case Study

Lara Nunes, Ana Luisa Gomes, and Alexandra Fonseca

Abstract—In times of economical crisis, rewilding can be a less costly conservation management approach, able to generate economic value from wild lands and to rural communities. Simultaneously, improvement of connectivity between protected areas was identified as a global priority for conservation. Allowing the rewilding concept and connectivity concern, a model for identification of less disturbed corridors for wildlife was designed. Less disturbed corridors can be serious candidates become rewilding areas due to their already low human pressure for wildlife. Accordingly, it was asked of experts from different areas such as nature conservation, environmental and land planning to answer an inquiry to evaluate some variables representing human disturbance. The 51 expert answers obtained were used to create a single spatial gradient of human disturbance to wildlife. Between three Portuguese conservation areas, the least disturbance corridors to wildlife were designed and analyzed. Location of each corridor was compared with Iberian Wolf (*Canis lupus signatus*) distribution, a top predator known by its sensitivity to human presence and disturbance. When spatially compared, the obtained corridors fit the wolf confirmed presence distribution. This is a promising result for the model fitness to human pressure and to optimize a future network of rewilding corridors between protected areas.

Introduction

Wilderness and Rewilding

The concept of wilderness, legally defined by the US Wilderness Act (1964), is associated with the existence of areas with little or no human influence and that can be used for the promotion and maintenance of wildlife and natural processes, which benefit from minimal human intervention.

The rewilding concept, associated with the concept of wilderness, emerges as a conservation strategy that relies

primarily on the natural recovery processes that make ecosystems self-sustaining, involving only protective measures relating to the human activities and, wherever necessary, the reintroduction of key species (Brown et al., 2011). Rewilding can be one of the land management policies to be adopted in abandoned territories, as it promotes the natural regeneration of forests and other natural habitats favoring biodiversity increase and improving ecosystem services. It is a passive management conservation strategy with lower maintenance costs than other territorial management options presenting significant benefits, such as environmental regulation services provided by natural ecosystems, as well as greater economic value of wild lands to rural communities (REAR, 2012).

Rewilding in Europe and Portugal

Despite its many benefits, the bet on natural processes (rewilding) has been, until recently, dismissed as a European territorial management option (Navarro and Pereira, 2012). Initiatives like the adoption of the “European Parliament Resolution on Wilderness in Europe” in 2009, the establishment of the Wild Europe Initiative, the Rewilding Europe Project and PAN Parks Network are bringing the concept of rewilding to the European conservation policy discussion.

Rewilding management is starting to take its first steps in the field in Europe. In Western Iberia, helped by Rewilding Europe Project, Transumância e Natureza Association (ATN), a partner of the project, is managing Portuguese Faia Brava Private Reserve, one of two pilot areas in the Iberian Peninsula where the rewilding process is taking shape (REAR, 2012).

In fact, the Portuguese landscapes, characterized by this long history of humanization, now evidenced in the last decades a clear trend towards depopulation and the consequent abandonment of farming activities. Thus arises the opportunity to apply the concept of Rewilding, as a return to the wild.

The Importance of Corridors for Wildlife

The expansion of urban areas and the boost in infrastructures networks has been driving to a progressive fragmentation of the Portuguese landscape in the last decades. Under these conditions, in which there have been significant losses in important habitats, the existence of a conservation network connecting areas with high natural values through wildlife corridors, certainly contributes to a more effective protection of a large number of habitats and species (Gomes et al., 2011; Rudnick et al., 2012).

L. Nunes is a Biologist, from CVS - Corridors for Wildlife Project, A. L. Gomes and A. Fonseca are Environmental Researchers at Directorate-General for Territory Development (DGT), Rua Artilharia Um, 107, 1099-052 Lisboa, Portugal, Phone number: (+351) 21 381 96 00, Fax: (+351) 21 381 96 99, nunes.lara@gmail.com, luisa.gomes@dgterritorio.pt, afonseca@dgterritorio.pt.

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Presently, emerging climate change effects are pushing the species out of the protected areas, as an adaptive response to changing environmental conditions. This migration can only be possible in a favorable environment to such species.

The static approaches that have been adopted in this field of conservation, where areas are selected and managed in order to protect the biodiversity of today (Lawler and Mathias, 2007), are becoming inadequate in the current context of a rapidly changing territory. Recent studies have shown that existing protected areas are not likely to lead to the protection of biodiversity in a continuous change future (Bengtsson et al., 2003). Moreover, many species, even whole communities, will be forced to move in response to climate change (Parmesan, 2006). Movements of populations will be one of the major challenges for many species (Lawler and Mathias, 2007) and such movements have already been detected, especially in altitude migrations (Parmesan, 2006).

In response to these environmental changes, many plants and animals will have to move inside and outside of the protected areas until they find a suitable habitat that guarantees their persistence. Such movements will only be possible if they have adequate conditions (Garcia and Araújo, 2010; Araújo et al., 2004).

Conservation planning is currently a challenging task (Kujala et al., 2013), as there is a growing consensus that conservation strategies must anticipate climate change impacts (Araújo and Rahbek, 2006; Thuiller et al., 2007.) In this constantly changing world it is necessary to identify solutions that minimally compromise the current needs of conservation and simultaneously create higher benefits in the future (Kujala et al., 2013). Such solutions include the implementation of mechanisms for integrated management of rural areas facilitating the movement of species between areas of conservation (Araújo et al., 2011). For this purpose, it is relevant to identify connectivity corridors between suitable areas (Williams et al., 2005; Opdam and Wascher, 2004).

The importance of Keystone Species for Corridors

The regulatory role of large predators based on keystone species theory is central to the rewilding concept (Brown et al., 2011). Keystone species are defined as having a structural role in their community although disproportionate to their abundance, usually large and wide-ranging predators. Protection of 'keystone species' may have an 'umbrella' protection effect upon other species, since many 'keystone species' are wide-ranging and sensitive to disturbance, requiring large and relatively unchanged habitats (Brown et al., 2011).

There is evidence that ecosystem function can recover following the return of keystone species. Some of the most known examples are related to wolves recolonisation where a cascade effect in survival rates and population density for some herbivores, plants, and even in diversity and abundance of riparian birds was generated (Hebblewhite et al., 2005; Beschta and Ripple, 2010).

Hilty et al. (2006) pointed out that a single species may also be used to justify the connection of protected areas in order to provide space for viable populations and potential increases in biodiversity. The wolf is a powerful and widely

recognised symbol of wilderness in the northern hemisphere (Brown et al., 2011).

The Iberian wolf is currently the largest terrestrial predator within the Portuguese fauna, and is also one of the most endangered species in our country. In Portugal it is nationally classified as Endangered (Cabral et al., 2005). Although the European wolf population is a large metapopulation with several distinct fragments (LCIE, 2007), the Iberian wolf population is distributed mainly in the north of the Iberian Peninsula (Pimenta et al., 2005).

Research Objectives

The work presented herein is part of a study of an alternative strategy for conservation developed for the concept of wilderness adapted to European reality, subject to a long history of anthropogenic occupation. This strategy is based on information about human influence, oriented to the identification of areas with less human disturbance for wildlife (Gomes et al., 2011), since wild species do not usually tolerate well human presence and are sensitive to environmental disturbances generated by human activities. Those less disturbed areas are potentially suited for protection of wildlife.

The project CVS—Corridors for wildlife: spatial modeling of human pressure and its usefulness to the conservation of Iberian Wolf, funded by the Portuguese national science foundation, intends to lead to the development of a methodology that aims to contribute to break the isolation between national protected areas, through the identification of corridors, as preferentially connecting paths allowing the migration of existing wild species.

To achieve this goal, an innovative approach was developed based on spatial modeling of anthropogenic influence in the territory that generates a gradient of the environmental disturbances derived from human presence and activities. This gradient constitutes the basis for identification of corridors between protected areas, following the areas with lower anthropogenic disturbance to the movement/progression of wildlife.

Subsequently, the idea is to validate this new strategy for identifying ecological corridors through the study of the location and movement of the Iberian wolf, an endangered species considered sensitive to human presence and activities.

Methods and Results

Gradient of Human Disturbance for Wildlife

The concept of wilderness is associated with remote and natural areas which are far from human influence and where natural processes are primarily responsible for the landscape dynamics (Wild EUROPE, 2013). Inherent to the wilderness concept itself, it is difficult to set rigid limits to delineate a territory with such characteristics. However, it is possible to identify a set of characteristics that contribute to wilderness quality, that are inversely related to the measure of environmental disturbance caused by human activities.

In this project, the methodological processes for spatial modeling of environmental disturbances derived from

human presence and activities are developed based on the research work “Wilderness Areas for Wildlife Conservation” (Gomes, 2005). It is considered that the spatial modeling of human influence relies on three major themes, regarded as representative of the major environmental disturbances: human presence, habitat pollution, and land use/land cover (Gomes et al., 2011). These themes, that can be represented in a continuous way on the territory, contribute to create a gradient that may be interpreted as the difficulty of movement/progression for general wildlife (Figure 1).

Data and Model

The Human Presence factor constitutes one of the major threats to wildlife, so the resident population distribution was one of the proxy variables considered in the methodology for obtaining the gradient of environmental disturbances. It used resident population data from the 2011 Census for Portugal’s mainland, to obtain human population density distribution.

The spatial distribution of industries which are under environmental license by Portuguese Law concerning integrated pollution prevention and control, were considered as point sources of pollution, especially in terms of noise generation and release of chemicals into the soil and air. The aim was to simulate the intensity and extent of environmental disturbances to wildlife caused by these sources. Data were obtained from the Portuguese Water Institute (INAG).

The linear infrastructures such as roads, railways and airports can produce significant environmental impacts. These infrastructures directly affect wildlife through trampling and cause environmental disturbances derived from noise and gas emissions. They also cause a barrier effect, disrupting directly the movement and use of territory by the species and disrupting the habitat continuity that results in the fragmentation of the landscape. Road and railway geographical features were obtained from the Directorate-General for Territory Development (DGT).

The Portuguese Land Cover Map - COS (2007), also from DGT, was used to assign an evaluation to the land use/land cover classes according to the level of human perturbation

generated within each type of class, regarding the direct disturbance to the movement and progression of wildlife species through the territory.

All cartographic variables that constitute the spatial data base were categorized in aggregated classes and converted into the raster format with a resolution of 100mX100m, which corresponds to a 1 hectare cell size. The main spatial analysis procedures for the calculation of environmental disturbances intensity and extent in Portugal’s mainland territory, are focused in neighborhood analysis, reclassification and map algebra processes (Gomes et al., 2013). Figure 2 shows the schematic overall methodological model for obtaining the gradient of environmental disturbances.

Expert Inquiry

Considering that the evaluation criteria that reflect environmental disturbances derived from human activities varies with the different sensitivities of species and that for most cases it is not scientifically quantified, a multi-criteria expert system was developed to obtain a gradient of environmental disturbances, based in the consultation of a pool of experts with different backgrounds. The experts were selected based on their knowledge and experience in areas such as terrestrial wildlife, nature conservation, environmental impact assessment and landscape planning, as well as knowledge in Portuguese land territory characteristics. The fact that these experts represent different interests and levels of knowledge about environmental impacts, ecology and wild species limitations, contributes to a greater range of responses leading to a gradient of human disturbances in the territory which tends to better reflect the reality for these species. It was intended that experts answer the various questions of the CVS (Corridors for wildlife Project) form (Gomes et al., 2013) to assess the disturbance to wildlife on a scale from 1 to 10. They were also asked to indicate what they considered to be the maximum distance of environmental disturbances influence caused by roads and industries, as well as the minimum width of wildlife corridors.

There were obtained 51 responses through the CVS form. All experts have higher education and over 25% are PhDs.

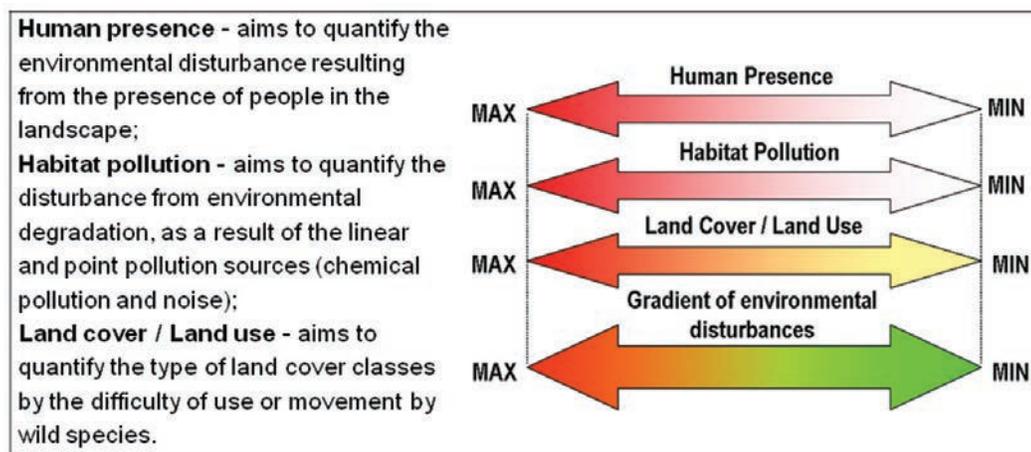


Figure 1—Factors that influence the gradient of environmental disturbances.

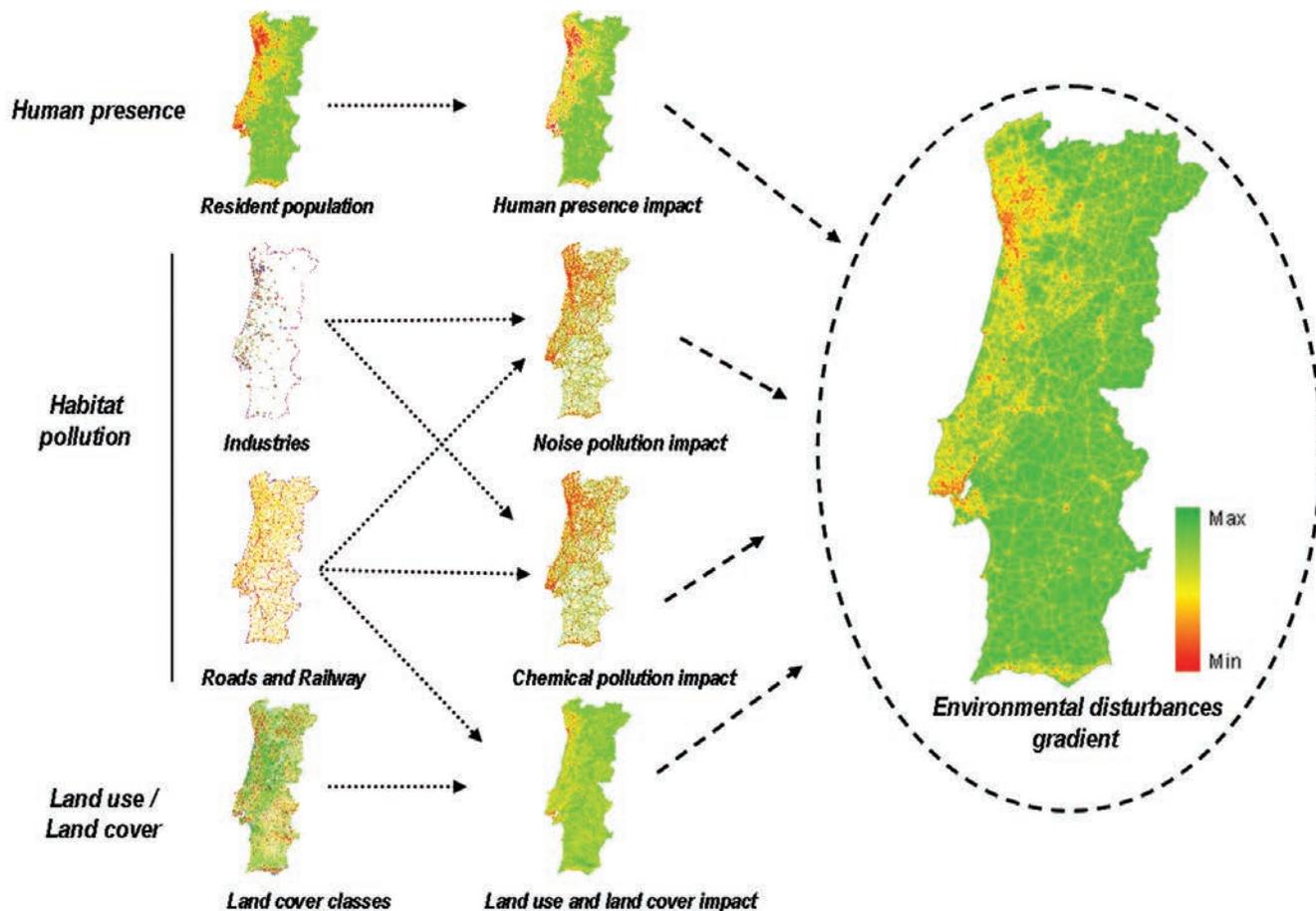


Figure 2—Methodological model: environmental disturbances gradient.

Experts were asked to answer the inquiry from a general wildlife perspective or from the viewpoint of a biological group (BG). There were 33% general answers and the other 67% were answers based on a specific BG.

Additional analysis was made to examine whether those experts should be divided into groups and if these groups had to do with the biological group on which they answered or with their academic background. In order to obtain one or more differentiated profiles of experts in the modeling of the environmental gradient, a correlation analysis was made, as well as principal component analysis (PCA) and hierarchical cluster analysis (HCA) on the distance matrix of the answers.

From the Kendall non-parametric correlation analysis between the expert answers, it was found that 95% showed a positive correlation and more than 31% of expert pairs were strongly correlated with each other (with a correlation value greater than 0.5), thus no contradictory trends among experts were observed. Analyzing the results of the PCAs and HCAs, there was no cluster trend either by biological group or by type of academic background, so the answers were grouped in a single profile for the spatial model.

As the values assigned in the expert responses did not show statistical normality in their values' distribution, it was calculated the median disturbance value from expert's answers for each question. The results are listed in Appendix 1. These

median values of disturbance were used for the reclassification of the variables, on a raster basis, in the spatial modeling. It was, then, possible to obtain a single gradient of environmental disturbances representative of all opinions of the 51 experts, which serves as the basis for identifying the least disturbance corridors between important areas for conservation.

Designing Corridors

The Portuguese National Network of Protected Areas (RNAP) and the Portuguese Natura2000 Network (resulting from the application of two European Directives) are the two essential nature conservation planning instruments in Portugal. However, these protected areas originate a fragmented set of overlapping areas that are not connected (Figure 3).

To produce the corridors using the CVS methodology it selected a pilot area involving three Portuguese classified areas for conservation - Gerês, Alvão and Montesinho. These three areas derive from the merger of the RNAP and the Natura2000 and are located in the North of Portugal (Figure 3).

A "suitability map" was produced as the inverse of the disturbance gradient previously obtained. We also avoid dam reservoirs with more than 100 ha since they are a physical barrier for a large number of species. Using CorridorDesigner toolbox v0.2 (Majka et al., 2007) that operates over ArcGis,

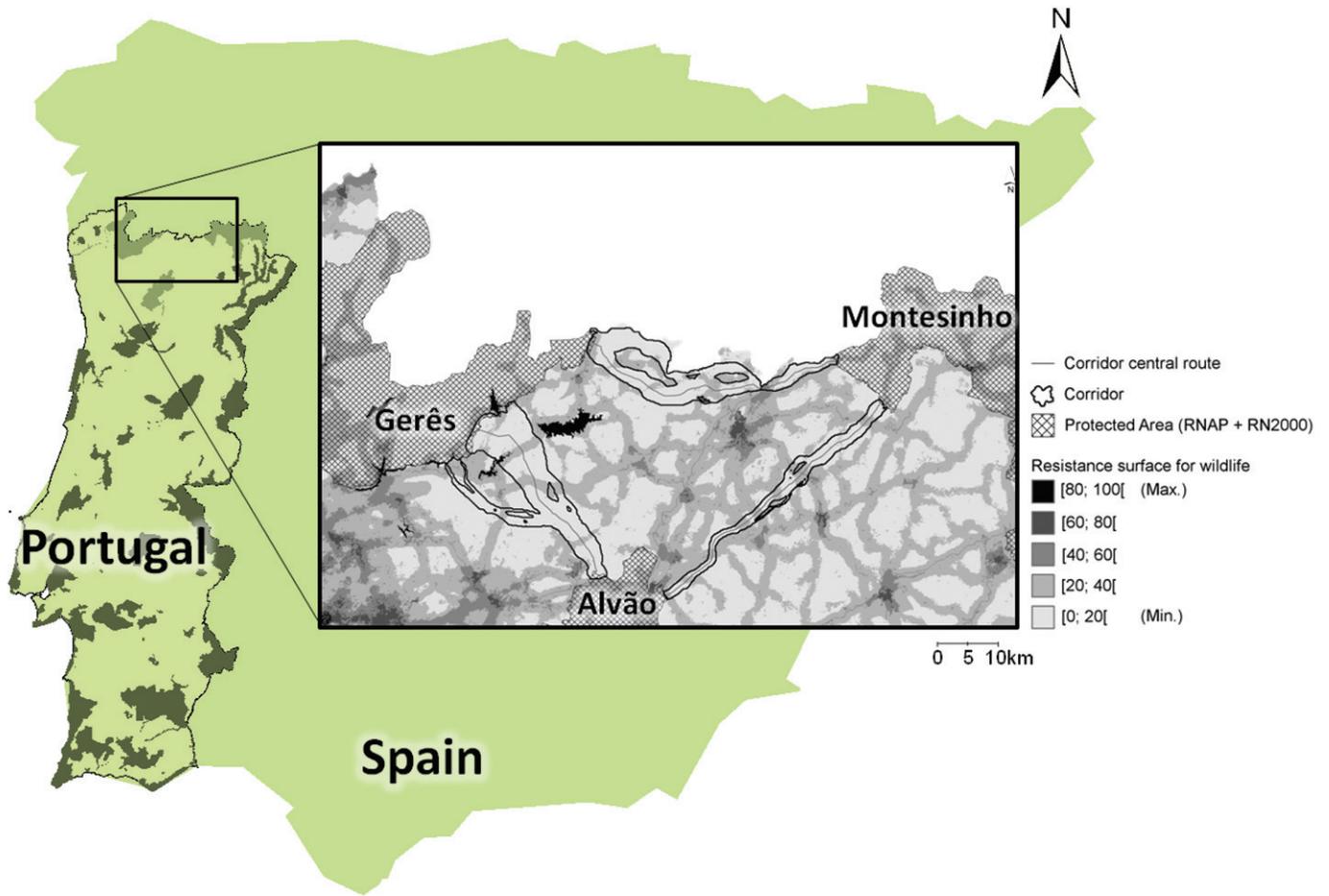


Figure 3—Proposed Wildlife Corridors (CVS) for the pilot area, between Gerês, Alvão and Montesinho.

the cost surface between each pair of areas was calculated based on the “suitability map” and a set of progressively less permeable to progression corridors was obtained. The quality of each corridor was analyzed using Evaluation Tools, an extension of CorridorDesigner Tool, used to find the best central route within each corridor and to calculate a set of statistics that allowed us to evaluate corridor width, bottleneck constriction issues and, based on the previous data, the disturbance levels, main cover classes and major barriers.

The less disturbed corridors were selected, meaning the more permeable to wildlife progression corridors, with a transversal amplitude equal or larger than the median proposed by the experts at least in 90% of the corridor length (Beier et al., 2007), 1000 m in this case. Figure 3 and Table 1 present the proposed Wildlife Corridors (CVS) for the pilot area, between Gerês, Alvão and Montesinho.

Uncertainty analysis of the model, the analysis of constraints at a regional/local scale in the identification of

Table 1 – Morphological characterization of Proposed Wildlife Corridors.

Gerês-Alvão	Gerês-Montesinho	Alvão-Montesinho
(C) – Central route length; (Lmin) – Minimum width; (Lmax) - Maximum width; (Lmed) - Average width, (%Lim) – Percentage above the width considered as minimum by the experts: 1 000 m;		
<p>C = 36 000m Lmin = 1 900 m Lmax = 7 677 m Lmed = 4 820 m %Lim = 100</p>	<p>C = 48 000m Lmin = 365 m Lmax = 4 745 m Lmed = 2 569 m %Lim = 97</p>	<p>C = 52 000 m Lmin=975 m Lmax=2 531 m Lmed=1 547 m %Lim= 99</p>

Wildlife Corridors as well as the discussion of mitigation measures for the critical points identified within CVS are some future developments.

Corridors Versus Wolf Distribution

When spatially compared with Iberian wolf distribution (Pimenta et al., 2005), the obtained corridors are very coincident with this species confirmed presence (Figure 4). This is a promising result considering that the wolf, as a keystone species, can be used as guide to the main corridor design between protected areas, and for future design refinements at a regional/local scale.

Future steps will involve more detailed wolf distribution information, identifying corridor areas with suitable habitats and habitats to avoid, and collecting information through monitoring the Iberian wolf within the proposed corridors, to identify pack locations, nesting sites or confirming pathways.

Conclusions

The legal mechanisms for conservation in Portugal derive from commitments under various international treaties, compliance with EU directives and specific national legislation. We are dealing with binding instruments, developed in accordance with the conservation strategy aimed at protecting species and habitats, associated to active territorial management in order to reduce or eliminate threats affecting species persistence.

From a conservation point of view, the choice between betting on natural processes (rewilding) or on active management will depend on the objectives and on the local context

(Navarro and Pereira, 2012). The active management tends to be the preferred option when the aim is to protect certain species or maintain priority habitats, while the passive management focuses on dynamic ecological processes that may be more sustainable at long term or more suitable for large areas of conservation. Moreover, rewilding can be seen as a less costly conservation management approach.

The improvement of connectivity between protected areas has been identified as a global priority for conservation (Brown et al., 2011) because it is gaining relevance due to climate change and loss of habitat generated by human pressures.

Abandoned lands between protected areas for conservation, as well as lands with less impact activities or regions with less human presence, are serious candidates to become areas of rewilding management. These lands may link areas with important natural values contributing to the creation of a network that can potentially favour the movements of species and landscape connectivity, preferentially designed through less disturbed areas.

This research work proposes a methodology that contributes to finding best corridors for a network of land with potential suitability for rewilding based on a gradient of human disturbance. The spatial match of the obtained corridors with the Iberian wolf confirmed presence distribution within the pilot study area is a promising result for the model fitness to human pressure since it is a species known by its sensitivity to human presence and disturbance. Top predators are pointed as good keystone species to improve local diversity and ecosystem services recovery, by their documented umbrella effect (Brown et al., 2011) so the creation of corridors adapted to wolf can potentially improve biodiversity resources indirectly.

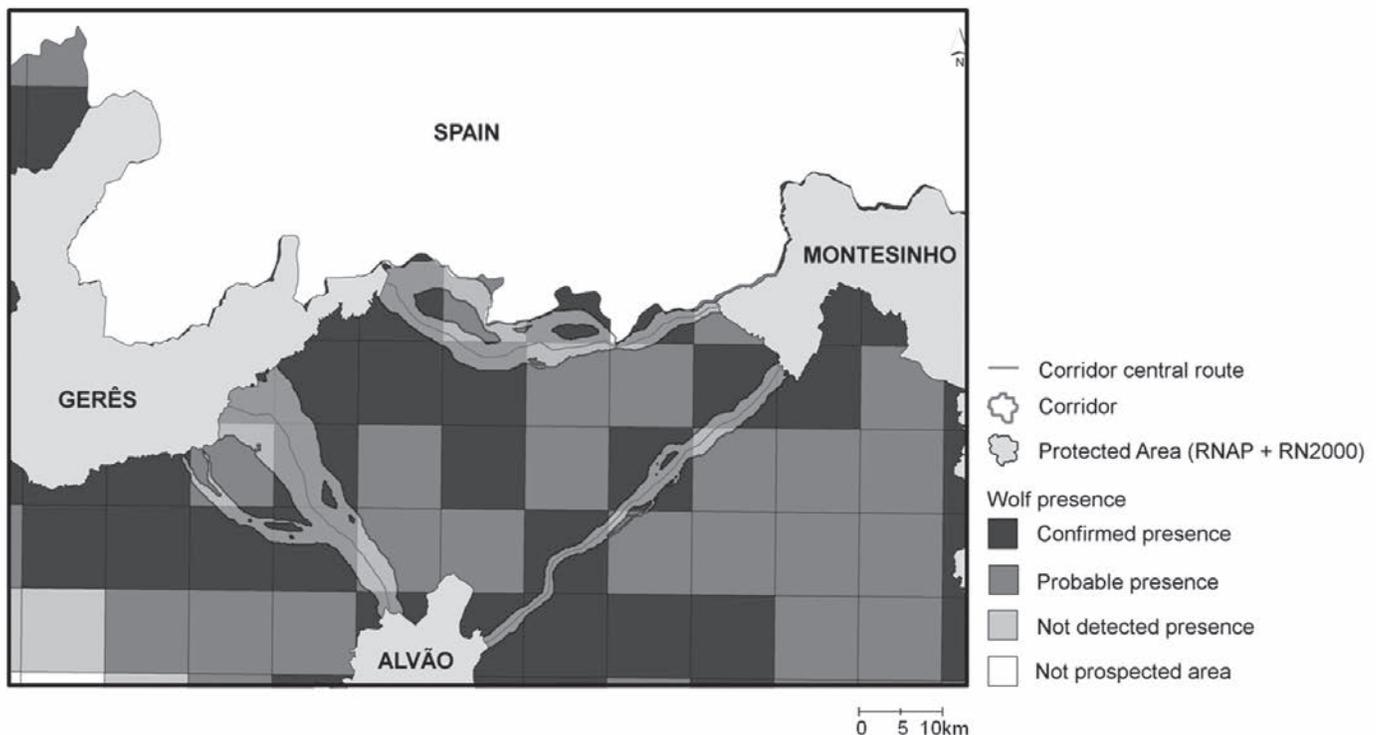


Figure 4—Iberian wolf distribution and proposed corridors.

More accurate results may be achieved when the analysis of constraints in the identification of the CVS corridors is concluded, as it will refine the corridors' design to wolf characteristics and limitations. The consideration of the mitigation measures for the critical points identified in the CVS corridors will contribute to a plausible implementation of this model in the field. The study of the temporal evolution of the environmental disturbance values is also another foreseen development aiming to improve the design quality of the obtained corridors. Further developments will deepen the analysis of the data on the wolf presence within the proposed corridors, involving not only direct observations but also scats confirmed with genetics, camera trapping photos and telemetry data, as well as wolf habitat modelling for predicting its occurrence.

Moreover the methodology will be applied to the remaining protected areas of the Portuguese mainland. The combination of the model results with the most relevant ecological habitat features distribution or particular target species suitability distribution at a regional/local scale level may convert it into a national level network of protected areas, which should be linked to the rest of the Iberian Peninsula.

The positive results already achieved in this work suggest that identifying wildlife corridors in areas with less human impact can be an additional perspective in the expeditious design of efficient corridors between protected areas, aiming to contribute to the biodiversity increase.

Acknowledgments

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Appendix—Median values from the experts' answers (CVS form)

<i>Pollution Impact (point and linear sources of pollution)</i>	<i>Noise Impact</i>	<i>Chemical Impact</i>
1: Landfill	4	5
2: Waste Incineration	5	8
3: Intensive livestock	5	6
4: Slaughterhouses	4	5
5: Food Processing	5	6
6: Ceramic/Glass	5	6
7: Cement	7	8
8: Paper Pulp / Paper	6	8
9: Textiles / Paints	6	8
10: Refinery / Hydrocarbon Production	7	9
11: Power Production	6	8
12: Metals Production and Processing	7	8
13: Chemicals / Fertilizers / Pharmaceuticals	6	8
<i>Road and Railway network</i>		
1: Highway	7	6
2: Main Roads	6	6
3: National Roads	6	5
4: Regional Roads	5	4
5: Municipal Roads	3	3
6: Single Railways	4	3
7: Double Railways	5	3

<i>Human Presence Impact (population density)</i>	
1: Less than 0,2 persons per hectare	2
2: From 0,2 to 0,6 persons per hectare	3
3: From 0,6 to 2 persons per hectare	5
4: From 2 to 6 persons per hectare	8
5: From 6 to 1000 persons per hectare	1 0

<i>Maximum distance of influence from environmental disturbance (meters)</i>	
Road and Railway Network	1 000
Industry	1 250

<i>Minimum corridor width(meters)</i>	
Minimum corridor width	1 000

<i>Land use/land cover Impact (CVS nomenclature)</i>			
1: Urban	9	23: Dense mixed forest (excluding eucalyptus and invasive spp.)	1
2: Commercial units	8	24: Open mixed forest (excluding eucalyptus and invasive spp.)	1
3: Power production plants, capture and water treatment plants	7	25: Eucalyptus forest	3
4: Industries, ports, shipyards, airports	9	26: Mixed eucalyptus forest	3
5: Mineral extraction and dump sites	8	27: Mixed invasive spp forest	3
6: Green urban areas, historical areas, sport and leisure facilities	5	28: Moors, heathland and sclerophyllous vegetation	1
7: Greenhouses and nurseries	5	29: Cuts, new plantations	4
8: Complex cultivation patterns with scattered dwellings	3	30: Burnt areas	5
9: Annual crops associated with permanent crops (not irrigated)	2	31: Beaches, dunes and sands	2
10: Annual crops associated with permanent crops (irrigated)	4	32: Bare rocks and sparsely vegetated areas	2
11: Rice fields	4	33: Wetlands (excluding salines)	1
12: Vineyards, fruit and olive trees	3	34: Salines and aquaculture	4
13: Pastures and pastures associated with vineyards, fruit and olive trees	3	35: Water courses (natural and artificial)	1
14: Agriculture with significant areas of natural and semi-natural vegetation	2	36: Water bodies (natural and artificial)	3
15: Agro-forestry areas with annual crops (not irrigated)	2	37: Coastal lagoons and estuaries	2
16: Agro-forestry areas with annual crops (irrigated)	3	38: Highways	9
17: Agro-forestry areas with pastures	2	39: Main roads	8
18: Agro-forestry areas with vineyards, fruit and olive trees	2	40: National roads	6
19: Dense broad-leaved forest (excluding eucalyptus and invasive spp.)	1	41: Regional roads	5
20: Open broad-leaved forest (excluding eucalyptus and invasive spp.)	1	42: Municipal roads	4
21: Dense coniferous forest	2	43: Single railways	5
22: Open coniferous forest	2	44: Double railways	7

Rewilding in Spain: Where is it Possible and Why is it Interesting? An Analysis From the Point of View of a Protected Area Manager

Jordi Palau

Abstract—Rewilding is a relatively new nature conservation strategy, especially in Europe, where there are virtually no experiences put into full practice yet. This approach is based on the restoration of natural processes as the main drivers of ecosystem dynamics. When developing this concept in Spain, it would be important to analyse why it is interesting and where it is possible. In this paper we provide seven main arguments that make rewilding an interesting option in the Spanish context: six conceptual (ethical-conservationist, functional, scientific, aesthetic-artistic-spiritual, educational, economic) and a seventh more pragmatic (opportunity). We also analyse the factors that make an area more or less suitable for rewilding, and have grouped them in four main categories: geographic, socio-economic, ecologic and legal. With those factors we propose an index to assess the suitability of an area for rewilding. Finally, we define which typology of areas is more suitable for such a project, and we draw some key ideas for a Spanish strategy of rewilding. In all those considerations, the point of view of a protected area manager, working for a regional government and living in a depopulated rural area, is providing a more pragmatic approach.

Keywords: rewilding, natural processes, Spain, area selection, suitability index

Introduction

The majority of Spanish protected areas, and especially the majority of the 27% of the land area that is legally protected in Spain, fall into IUCN category V (Protected Landscape), usually under the name of “Natural Park” or equivalents (Múgica et al. 2012). These protected areas are located in some of the most valuable natural areas, and their conservation approach is largely based on maintaining traditional uses (Dudley 2008).

Following a common trend in Western Europe (Sutherland 2004) and the Mediterranean (López Ornat and Pons Reynés 2007), the overwhelming predominance

Jordi Palau, forest engineer, is director of a category V protected area in the Spanish Pyrenees. This paper summarizes part of the author's MSc thesis at the Universidad Autónoma de Madrid. Address: Av. Verdaguier, 24; 25500 La Pobla de Segur (Spain). E-mail: jpalau@gencat.cat

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of the use of the category V in Spain shows that a greater degree of non-intervention management, allowing nature to take its course, is not considered necessary to achieve a good level of conservation of Iberian ecosystems. In this context, the rewilding approach can easily be perceived as not feasible, because the territory is considered too populated, too anthropized, and modified too long to be managed under the principles of rewilding.

In this paper I intend to argue that rewilding is an interesting approach for conservation in Spain, complementary to existing ones, and also that it may be viable, although neither everywhere nor in all circumstances. Therefore, I will describe the arguments that justify the interest of this approach, discuss the factors that may influence its implementation, make a proposal for the main types of areas potentially suitable for rewilding in Spain, and outline some notes for a Spanish rewilding strategy.

All this is delivered from the pragmatic point of view of a manager of a category V protected area of 700 sq. km, located in the heart of the Pyrenees, with almost 15 years of experience in mountain conservation, both from the public sector and an NGO.

What Are We Talking About?

Being an emerging issue, there are different variations and definitions of rewilding. In order to have a reference, in the present work I follow one of them, particularly an early one established by Klyza (2001), whereby rewilding is the “action at the landscape level with a goal of reducing human control and allowing ecological and evolutionary processes to reassert themselves”. This definition implies not only non-intervention management, but also a previous stage of active management to restore functionality of the natural processes suppressed by human activity, so that they can play again their role in shaping the ecosystems and their changes.

Here we also follow the concept defined by Rewilding Europe (RE 2011), which includes the three dimensions of sustainability in formulating the guiding principles for the management of these areas: Planet (conservation), People (communities) and Prosperity (economy).

The key ideas of the definition of rewilding that we use here are the following:

- Very large areas managed without consumptive use of natural resources.
- Natural processes as main drivers of change. If there are native natural processes suppressed by human activity,

they should be actively restored through management action.

- Change is not intrinsically negative: for instance, it is not necessary to have always a forest where there is a forest now.
- Rewilding is not only about species reintroduction; other processes such as fire or flooding should be restored using the appropriate techniques.
- Non-consumptive economic activities (e.g. tourism) and even villages are possible within the rewilding areas.

When we talk about natural processes as drivers of ecosystems, we need to know what processes are suppressed due to human activity. Snow avalanches, for example, have continued to operate significantly in mountainous areas, but some other processes are no longer active. The main suppressed natural processes in Spain are fire, flooding (and the free flowing of water), ecological succession resulting in old-growth forests, and almost all the large vertebrate-mediated processes (herbivory with the complete guild of native ungulates, predation and, to a lesser extent, scavenging).

It is important to note that the rewilding thus defined is not the solution to the environmental crisis we are facing. The solution to this crisis is to achieve a truly sustainable use of the whole country, not just of the portion that is legally protected. If the sustainable use paradigm is applied to the entire territory, then this paradigm would not be the main reason for the existence of protected areas, which should become, at least partially, true core conservation areas. It is in this context that rewilding can be a useful tool.

Is Rewilding Interesting for Conservation in Spain? _____

The first question we should answer is whether rewilding can make an interesting contribution to conservation in the Spanish context, because there is no need to work on this approach otherwise. To this end, we can ask ourselves the following question: what can an area managed through a rewilding approach provide?

In my opinion, there are seven main arguments that justify the interest of having at least some areas managed under the principles of rewilding (as defined in the previous section): six conceptual arguments, and a seventh rather more pragmatic.

1. Ethical-Conservationist (Intrinsic Value)

The existence of areas where nature can evolve free of extractive use and where, therefore, conservation is not conditioned by other land use options, should be considered an ethical duty towards all beings with whom we share the planet: it is worth it to have a few places where we “let nature be nature”, or at least we try to manage them with as little intervention as possible (Taylor 2004). These areas, in addition, generate different, complementary outputs from the conventional conservation based on sustainable use; for example, the specialized biodiversity present in old-growth forest stands is absent in sustainably managed stands (Paillet et al. 2010).

This argument has an added advantage: these places can become areas of conservation without conflict (Noss et al. 1999). For example, where there is no livestock or hunting, the wolf (the main driver of the process of predation on large mammals) is not a problem; where there is no need for logging or other forest products, wildfires or plagues are not a problem. In short, where there are no human interests likely to be harmed, natural processes do not cause conflicts and can freely play their ecological and evolutionary role.

2. Functional: Ecosystem Services

Some ecosystem services can be maximized only in areas where there is no exploitation of natural resources. This applies mainly to some regulating services (e.g. soil and nutrient protection, water regulation, biodiversity habitat), but also to certain cultural services (Navarro and Pereira 2012). Even some provisioning services can be favored by the existence of no-take areas (e.g. hunting), something well known for marine reserves (Gell and Roberts 2003). Resilience can also be higher in these areas: nothing is more resilient than a system that does not require human intervention for its performance (albeit if conditions change).

3. Scientific Knowledge

In my opinion, this is one of the most important arguments. Rewilding areas can become great natural laboratories, reference areas to study and understand how our ecosystems work and recover themselves in the absence of extractive uses (Leopold 1941; Noss et al. 1999). The only condition is to reestablish the drivers of the natural processes that are lost by human activity. What we can learn from these areas can be useful not only to enhance scientific knowledge per se, but also to improve the management of the equivalent anthropogenic systems. We simply do not know what happens in a large dehesa or a steppe-like area managed without livestock or agriculture but with the native guilds of herbivores and predators, and where we let run the fires caused by lightning. In this sense, universities and research centers could play a very important role lobbying in favor of rewilding areas as landscape-scale reference areas for every major ecosystem.

4. Aesthetic—Artistic—Spiritual—Healthy

An area dominated by natural processes provides numerous aesthetic, artistic, spiritual and healthy benefits (e.g. Schuster et al. 2004), associated with the wild character of its landscape, the abundance of conspicuous large animals (which even create “moving landscapes”), and the opportunities for solitude, enjoyment and the experience of a full environment (also with its derived dangers and uncertainties).

5. Educational

Today’s society does not understand how nature works and people live psychologically far from nature (Kellert 2012). Rewilding areas can generate great opportunities to educate the public about the functioning, complexities and dynamics that occur in natural systems. This education can

take place in situ and be linked with real experiences that can reconnect people with wild nature.

6. Economic

Last, but not least, there is a socioeconomic argument for rewilding, since this approach can constitute a strategic alternative for large rural areas which do not have other major opportunities for their development. Large areas of rewilding would necessarily be few, so that they could become powerful attractants for a genuine ecotourism, based on wildlife and wildness, which can make them viable. Besides tourism, other economic activities that could thrive in these areas are craft or small-scale local product making, installation of free-lance teleworkers, or the generation of jobs linked to the management needs of the area itself (Varillas 2013).

7. Opportunity

There is a seventh argument, more pragmatic than conceptual, which is opportunity. There are several current trends that make rewilding a positive and exciting approach to renew the management of conservation areas in Spain:

- Rural abandonment, especially in the most isolated and less-productive areas (Navarro and Pereira 2012).
- The ongoing wildlife comeback due to protection measures (Deinet et al. 2013).
- Conceptual crisis of present day target-driven, intensively managed conservation (Taylor 2005; Monbiot 2013).
- Recent deep economic crisis and the subsequent lack of resources to maintain both rural subsidies and active natural resources management.

So, as Rewilding Europe is stating, we have the choice of turning problems into opportunities (RE 2011).

Is Rewilding Possible in Spain? _____

To answer the second key question, it is necessary to identify which factors may explain the viability of a rewilding project, and evaluate their suitability in different areas susceptible to host this kind of initiative. In this paper I have identified 12 factors and I have grouped them into four main categories:

A) Geographic Factors

- Area: Rewilding needs an available amount of land large enough to allow all the native natural processes to operate, so that it can act as a minimum dynamic area, as defined by Picket and Thomson (1978). The species which are keystone drivers of a process should also have the space to attain ecologically effective densities (Soulé et al. 2003).
- Local ecological variability: For a given land area, it would be a better place with high ecological variability (altitudes, different facing slopes, soils, etc.) than a more uniform one.
- Property fragmentation: Since the availability of land is a crucial factor, it will be better to have a few large properties than many small ones, so that the number of landowners with which to agree is reasonable.

B) Socio-Economic Factors

- Population density: A priori an area with low population density is more favorable for rewilding than a densely populated one.
- Economic structure: If the primary sector of an area is profitable, strong and dynamic, rewilding will be very difficult there; on the other hand, a consolidated local tourist sector can find the contribution of rewilding unnecessary. The most favorable scenario will occur in areas where the primary sector is marginal and there is an incipient nature-based tertiary sector. Rewilding areas can become real economic assets in depressed rural areas where there are no other alternatives (the role that parks like Yellowstone or Kruger play as regional or even national economic engines is an example of this idea).
- Consumptive use of natural resources: A gradient can be established to assess the suitability for rewilding of the dominant land uses in a region (Table 1).
- Cultural landscape identity: If there is a strong local identity based on a cultural landscape, then it will be difficult to promote a rewilding initiative.
- Social attitude and predisposition to change: Rural communities of similar size can differ greatly in their willingness to change and the incorporation of new socio-economic opportunities. Rewilding will be easier where the key stakeholders are more open-minded.

C) Ecological Factors

- Initial conservation status: Rewilding can happen almost everywhere. A priori an area with a high conservation

Table 1—Land-use gradient to determine adequacy for a rewilding initiative in a given area.

Sense	Main land use
Better for rewilding	Abandonment
	Ecotourism
	Hunting
	Extensive grazing
	Forestry
Worst for rewilding	Intensive agriculture
	Urban - Industry

status will be better, but sometimes those areas can have strong social limitations that make them less suitable for rewilding than other areas relatively degraded but with a favorable social context. Wilderness status or a pristine precondition are not sine qua non requirements for a rewilding initiative (Noss et al. 1999), as is shown by the Oostvaardesplassen Reserve example in The Netherlands, built in a few years over completely new land gained to the sea (Vera 2009).

- Recovery potential of socially challenging drivers: Some natural processes are very difficult to recover through direct intervention due to the social opposition that can

generate, so that the potential for a natural recovery is a factor to consider. For instance, an area that can be naturally recolonized by a species as crucial as the wolf will be better than another area where this species can only be present if artificially reintroduced.

D) Legal Factors

- Protected area status: Even though the existence or establishment of new protected areas is a facilitator, especially if they match rather strict categories (I o II), it is not essential that the candidate area is legally protected.
- Flexibility of conservation goals: Since rewilding can cause unpredictable changes in the characteristics or composition of natural communities, those areas of high endemicity or protected areas with very rigid legal conservation targets of certain habitats or species, should not use this approach.

With all these factors, an index to measure the suitability of an area for rewilding can be established (a first version of this index is shown in Table 2). Among all the mentioned factors, in my opinion the two most critical are the area really available for the initiative, and the willingness of the key stakeholders, especially the owners or holders of vested rights of land use. Those two aspects are very difficult to map (especially the second), but they can determine decisively the actual viability of rewilding in an area. The later is so important that it should be an exclusionary requirement, since the key stakeholders must perceive the project as beneficial to their interests.

Where Can We Try to do Rewilding in Spain?

Rewilding is neither possible nor desirable in all areas. The matrix of the territory has to produce many goods and services demanded by our society and therefore rewilding cannot be considered a generic conservation approach for the whole country. Moreover, many apparently viable areas will not be appropriate due to lack of social support from key stakeholders or deficits in other decisive factors.

Next, I bring a qualitative assessment of the main types of zones that can be candidates to host core areas of rewilding projects in Spain, based on the conceptual application of the above criteria.

State-Owned Properties, Especially Those Devoted to Conservation

Many times, the authorities responsible for nature conservation or natural resource management are responsible for the management of extensive public lands that are likely to engage in rewilding, especially when they are included in protected areas which can become core areas for conservation. It will have to take into consideration, however, the possible legal charges existing in the form of rights to harvest natural

resources for local people (e.g. grazing or timber rights). This caption includes at least the following situations:

- National Parks, although not all of them are adequate, and they cannot be rewilded in their entirety. In this sense, it would be desirable to identify the most suitable areas to define possible pilot projects. One of the existing national parks that meets most requirements is Cabañeros (40,000 ha).
- Some estates attached to the Spanish agency for nature conservation (Organismo Autónomo Parques Nacionales), such as those in Sierra Morena (20,000 ha).
- Military ranges (or former MR). They are usually public properties in which there is no exploitation of natural resources, so they can act as good conservation core areas, as in Germany or the USA. A good candidate would be San Gregorio military range, a steppe-like area in Zaragoza (34,000 ha).
- National Heritage estates with high conservation value, such as Monte de El Pardo (Madrid), with 15,000 ha where there is virtually no use. The experimental introduction of a (sterilized?) wolf pack in this fenced area with large ungulate numbers would be an interesting scientific test to study their effects under controlled conditions.
- Lands defined as public utility transferred to the Autonomous Communities, where they meet the requirements defined in the previous section (those requirements should be evaluated on a case by case basis).

Municipality-Owned Properties

A second case is large areas owned by municipalities or other local entities, located in relatively unpopulated areas, with a very low level of use of natural resources (usually because of land abandonment processes), and where there are neither consolidated socioeconomic alternatives nor the prospects to have them in a short term. This scenario is relatively common in some inland areas (Castillas, Aragón, Extremadura...), and can lead to initiatives where local actors play a major role. A potential example in this sense is the rewilding initiative underway in some lands situated around Atapuerca (Burgos), where the recovery of some species locally present in the Paleolithic (Varillas 2013) is certainly a great addition to the cultural visits to sites and museums related with the Prehistory.

Large Private Estates

Spain, especially the southern half of the country, has large private estates that can reach over 15,000 ha and are located in areas of high natural value. Some of them are even owned by NGOs involved in heritage conservation. If this is the desire of the owners and there are no legal charges that can hinder them, these properties can be easily managed under the principles of rewilding and act as core areas. A potential example is Alinyà Reserve (5,000 ha, Catalan Prepyrenees), owned by Fundació Catalunya-La Pedrera.

Table 2—Suitability index to assess the rewilding potential of an area (preliminary version).

N ^a	Criterion	Assessment	S ^b
1	Continuous land area potentially available for management under rewilding principles	< 25,000 ha	0
		25,000 – 50,000 ha	5
		50,000 – 100,000 ha	15
		> 100,000 ha	20
2	Local ecological variability	Very low variability (flat, uniform area)	0
		Low variability	3
		Medium variability	6
		High variability (very heterogeneous area, with large altitudinal gradient, different-facing slopes, valley bottoms, diversity of substrates, etc.)	10
3	Property fragmentation	Highly fragmented property (many very small properties)	0
		Moderately fragmented property (many small properties and some large estates)	3
		Little fragmented property (intermediate size properties)	6
		Very little fragmented property (few large estates)	10
4	Population density	High (> 80 people/km ²)	0
		Medium (21-80 people/km ²)	3
		Low (6-20 people/km ²)	6
		Very low (< 5 people/km ²)	10
5	Economic structure	Strong, dynamic primary sector	0
		Primary sector important but declining	3
		Marginal primary sector, consolidated tertiary sector based on modalities other than ecotourism	6
		Marginal primary sector, incipient tertiary sector based on ecotourism	10
6	Consumptive use of natural resources (based on predominant land use)	Intensive agriculture	0
		Extensive agriculture	3
		Extensive grazing and/or Forestry	6
		Hunting	8
		Land abandonment or Ecotourism	10
7	Cultural landscape identity	Strong	0
		Medium	5
		Weak	10
8	Initial conservation status	Bad (area with signs of extreme degradation in much of its surface)	0
		Regular (mosaic of land with fairly good conservation status and degraded areas)	5
		Good (excellent conservation status)	10
9	Recovery potential of socially challenging drivers	Low	0
		Medium	5
		High	10
10	Protected area status	Part of the area included in IUCN category V protected areas focused to cultural landscape protection	0
		Unprotected land	3
		Most of the area included in IUCN categories I or II protected areas	10
11	Flexibility of conservation goals	Rigid conservation goals, area of high endemism	0
		Intermediate situation	5
		Small part of the area included in IUCN categories I or II, and most of the remaining land in category V	6
		Flexible conservation goals, lack of endemic species	10
Total (max. 120)			
12	Exclusionary requirement	Social attitude and predisposition to change (key landowners or stakeholders)	Yes/No

^aN: Criterion ID^bS: Score

Towards a Strategy for Rewilding in Spain

Assessing Land Suitability

An initial requisite is to carry out a land assessment to identify potential candidate areas. For this purpose the suggested index could be applied, where it is more important to assess the a priori factors that are more favorable to promote such a project, than to map the remaining wilderness quality. An example of a systematic approach similar to that proposed, albeit with different objectives, was the RARE process (Roadless Area Review and Evaluation), implemented in the 1970's in the USA to identify the best roadless areas as candidates for their designation as wilderness under the Wilderness Act of 1964 (Turner 2006). The result of this evaluation should allow for selecting the most suitable areas for rewilding based on opportunity.

Using a Regional Approach

A second noteworthy aspect that emerges from the analysis of the previous section is that the type of areas potentially suitable as rewilding cores rarely will achieve the minimum dynamic area (100,000-200,000 ha), necessary for some of the suppressed natural processes to fully operate as drivers of the ecosystem. For this reason, I propose a regional approach based on the design of what we might call "bioregional conservation areas", defined as large land mosaics consisting of several rewilding core areas, located in the most suitable places, and of a matrix, where land uses compatible with rewilding (e.g. hunting, extensive grazing, forestry) would be allowed. Successful rewilding projects should be based on building this kind of large conservation complexes. The Rewilding Europe pilot area of Western Iberia could be a good example in this regard.

How to Bring It into Practice?

The first step should always be to formulate and agree with a vision for a territory that meets a number of minimum desirable requirements. Administrations may recognize the rewilding approach in legislation, may develop incentives for conservation as a specific land use, and can remove obstacles to rewilding in the most favorable areas. Civil society and NGOs, in turn, can promote land stewardship initiatives that can serve as pilot projects, can work to make rewilding a "fashion" for the big landowners, and especially can

educate society about the "wild" values and raise awareness for these initiatives.

In the end, however, the formula for developing such projects affecting very large areas requires the establishment of public-private partnerships (Partington 2012), in which different public and private entities (government agencies, NGOs, businesses) work in concert to achieve a shared vision.

Closing Remarks

The main barriers for rewilding are in our minds, since presently almost no one is demanding such an approach in Spain. But conservation is a social desire, so the first step should be to raise social awareness for this vision.

Once the basic network of protected areas based on a "traditional" approach is completed, we need a paradigm shift (Table 3). Currently protected areas are selected based on their value, and are managed with the aim of making this value persist indefinitely in time. Rewilding proposes a different approach, in which areas are selected mainly based on opportunity (where is it viable to apply the rewilding principles?), and are managed to leave more room to natural processes as the drivers that shape a changing landscape. In those areas we neither want to recreate our picture of more or less distant history, nor foresee any specific future: natural processes can bring us many different results, all of which will be unpredictable but satisfactory.

Indeed, what we need now is to see beyond the current landscapes that we have found, and to imagine new conservation scenarios, more adapted to the present changing conditions and, in addition, more respectful with nature-driven processes.

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Table 3—Suggested paradigm shift from the current protected area (PA) approach to a rewilding approach.

	Current PA	Rewilding
Selection	Based on <i>value</i>	Based on <i>opportunity</i>
Main objective	To maintain this value forever	To restore natural processes for a self-willed land

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The Socio-Political Conceptualization of Serengeti Landscapes in Europe: The Case of ‘Western Iberia’

Arjaan Pellis, Martijn Felder, and Rene van der Duim

Abstract—This paper reflects on the socio-political conceptualization of ‘Western Iberia’, one of Rewilding Europe’s first pilot areas. Drawing from Actor Network Theory and social theories discussing Politics of Scale, we illustrate how ‘Western Iberia’ is continuously being negotiated through practices in different sites within / outside its geographical boundaries. We identify five different versions of ‘Western Iberia’ for illustrative purposes to claim that there is not one ‘Western Iberia’ but many. We conclude that these multiple versions are contingent and produced in networks of actors, but also limited to unique social and material conditions. Through better understanding socio-political practice in constituting, approaching, arranging and representing ‘Western Iberia’, we aim to complement on-going ecological studies that traditionally reflect upon natural processes of rewilding.

“A wheel turns because of its encounter with the surface of the road; spinning in the air it goes nowhere. Rubbing two sticks together produces heat and light; one stick alone is just a stick. As a metaphorical image, friction reminds us that heterogeneous and unequal encounters can lead to new arrangements of culture and power” (Tsing 2005, p.5)

Introduction

Subsidized agricultural production faces economic downfall and related depopulation in South/Eastern Europe. Due to these socio-economic developments, land properties are abandoned and remaining populations are aging (cf FAO 2006; Rewilding Europe 2013b). Yet for many European landscapes that currently face land abandonment, there are few economic alternatives to subsidized agriculture. Even more so, in places where abandoned land is left unmanaged, related social and environmental problems emerge. One of the most notable is the growing risk of fire connected to the

development of fire-prone scrubland on abandoned and no longer managed lands (Navarro and Pereira 2012; Terres, Nisini, and Anguiano 2013).

Rewilding Europe - a new nature conservation organization founded through a network of ARK Nature, WWF-NL, Wild Wonders of Europe, Conservation Capital and numerous locally established NGOs - aims to re-vitalise agricultural societies by means of alternative land use strategies that value wilderness as a strong business case. In order to Rewild Europe’s abandoned landscapes, Rewilding Europe has devoted itself to “support and work with five, ultimately ten, local Rewilding areas around Europe for a period of at least ten years” (Schepers 2013¹). That is the least possible time necessary “to build, together with the local partners, meaningful Rewilding examples at a scale that can inspire others to follow” (Ibid). Through these envisioned collaborations, Rewilding Europe expects Europe to become “a wilder place” with much more space for ‘natural’ and ‘wild’ landscapes. Rewilding Europe projects to transform a total of 1 million hectares of European land, particularly those being abandoned, into imagined wildernesses by 2020 (cf. www.rewildingeurope.com).

The wilderness that Rewilding Europe envisions is not just any kind of wilderness that can emerge if land literally becomes abandoned. Instead, particular natural conditions are designed to enable restoration of natural processes in order to allow spectacular wildlife species to thrive. As such, frameworks for the establishment and management of particular conditions are ‘developed’ that support the restoration of abandoned agricultural lands into a particular version of wilderness. A version of wilderness that is, as we will discuss further down, in line with discursive understandings of ancient European ecosystem time-lines and contemporary versions of large-scale wilderness that can still be found in the Serengeti’s or Yellowstones of this world. Particularly emphasising such restoration practices according to particular bodies of knowledge and visions of wilderness, we will, in this paper, use the concept of restoration in line with concepts such as ‘re-development’ and ‘management’ instead of with those related to ‘preservation’ or ‘conservation’. We choose to do so to flesh out the socio-political dimensions that are part of the contemporary formation of any re-wilding or wilderness restoration objective - and their related (passive) management frameworks (cf. Bulkens 2014) in Europe today.

Arjaan Pellis, Martijn Felder, and Rene van der Duim, are in the Cultural Geography Group, Wageningen University, the Netherlands. Email: arjaan.pellis@wur.nl

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¹<http://www.rewildingeurope.com/news/articles/rewilding-europe-now-a-beneficiary-of-the-dutch-postcode-lottery/>

As intimated earlier, science plays a significant role in the Rewilding initiative. According to Arts et al. (2013) contemporary restoration projects in Europe favour 'native' species introductions, making the 're-development' of wilderness dominantly influenced by strong restoration ecology thinking. There are, however, many other scientific and non-scientific discourses that led to diversified visions of what wilderness in Europe should be and what kind of (passive) management frameworks are required to restore such envisioned wilderness and a subset of related objectives. Some of these visions of wilderness have, we argue, very few connections to what essentially pristine wilderness would have looked like in ancient Europe. Examples vary from: e.g. the contemporary capitalisation of nature conservation (e.g. ecosystem services and eco-tourism), (back) breeding programs aimed at returning and/or recreating iconic wildlife that has been lost through past destructive (human) practices (e.g. Auroch and Tarpan²).

In this paper we argue that these processes of knowledge production and power need further attention, especially when taking into account Bulkens (2014:139) observation that different visions of what European wilderness is, together with their related restoration objectives and management frameworks, "object of controversy on different scales". Whatever discourse is put on the table to justify Rewilding practices in various European landscapes, so far little attention is given to the role of politics. As Rewilding Europe is about to expand to different regions in Europe to create parallel wilderness landscapes of the future, we expect a range of frictions to occur. It is, from our point of view, necessary to further scrutinize the socio-political forces that influence or determine Rewilding practices as they unmistakably have a powerful claim to physical developments of targeted Rewilding landscapes in Europe.

A useful conceptual tool to tie socio-political forces to physical landscapes is the concept of landscape itself. According to Görg (2007) landscape is a concept that bridges social with natural sciences in order to examine connections between different levels of knowledge production, and how these relate to both the (physical) landscape and to one another. By following Swyngedouw's 'politics of scale' and by borrowing from Actor-Network Theory and related conceptions of object formation (Duineveld, Van Assche, and Beunen 2013; Law 2004; Law and Urry 2004; Mol 1999 2002; Tsing 2005) we will look at the development of one particular Rewilding area referred to as: 'Western Iberia'.

'Western Iberia' represents a trans-boundary nature conservation region situated in between the North-east of Portugal and the East of Spain. In this paper we examine this newly imagined space for Rewilding in terms of multiple object formations taking place at various locations within and beyond its established geographical boundaries. There are, as we will argue, several realities of a 'Western Iberia' made possible through unique human and material conditions played-out at different sites in the socio-political network of (and beyond) Rewilding.

Before we describe several of these realities, we will first explain the theoretical concepts related to the politics of scale making and object formations that informed our analysis (cf Görg 2007; Swyngedouw 1997 2004). Second, based on field visits in 'Western Iberia' between 2012 and 2013, we will sketch a few example conceptualizations of multiple versions of 'Western Iberia'. These versions are currently envisioned and practiced by networks that use similar or different scales in their unique observations of 'Western Iberia'.

Theoretical Position

Scale and Object Formation

Following Görg (2007), the 'Western Iberian' landscape can be observed as both natural and social. The natural landscape is shaped by physical elements e.g. mountains, canyons, rivers, plains, oak trees and other natural forces e.g. wind, heat, cold, drought and fires. How we come to recognise, use, influence, shape, interfere-in and value such natural landscapes is the result of endless series of combinations of such natural and human elements (Fuchs 2001; Latour 2005). The outcomes, or how we come to know and use nature, is influenced by the way in which human networks are politically organised (Haraway 2001; Swyngedouw 2004). This assembling and using of nature is referred to as the metabolism of nature, as a pure social process (Swyngedouw 2004).

Scale

How we come to know a landscape and define the geographical scales of that landscape (e.g. by thinking of its borders) does not only extend over a certain geographical scale, but also over a socio-political scale: the scope of a social network in which a particular landscape (here 'Western Iberia') is known, shared or made (Meadowcroft 2002). Swyngedouw states that any social or material condition "is constituted in and through temporal/spatial social relations that operate over a certain scalar extent" (2004: 131). In theory, this means that there are different versions of a landscape produced and known over different relational spaces (e.g. a community, a coalition between NGO's, a nation, between two friends) but which might also stretch out over similar, smaller or bigger, bordering or overlapping geographical scales (e.g. the municipality of a Portuguese village, a contingent river Valley, 'Western Iberia' as a region between Portugal and Spain, etcetera). Consequently, the transformation of nature as in the example of Rewilding Europe is embedded in a series of social, political, cultural and economic constellations and procedures that operate within a nested articulation of significant, but intrinsically unstable, geographical scales" (Swyngedouw 2004: 130). Although we should not underestimate the power of local material conditions of place, these conditions can only exist in societal relations to place. "Place [therefore] matters but scale decides" (Swyngedouw 1997: 144).

² See description of the Tauros project: <http://www.taurosproject.com/>

In political ecology, scale theory is often used as a hierarchical tool to understand local-global, vertical-horizontal, configurations. Here we rather examine scale non-hierarchically to understand the development of multiple object formations that depend on interconnections of practices taking place at various sites (Marston, Jones, and Woodward 2005). A site is seen here as a context (not necessarily connected to a physical place) where exchange of knowledge/power takes place between actors during different events (cf Latour 2005; Schatzki 2005). It is at these different sites that we can see diverse developments of 'Western Iberia'. In each of these sites, we are able to identify which forms of scale making are decisive, and to what extent they influence other developments of 'Western Iberia', or more general of Rewilding, elsewhere.

Sites of Object Formation

How transformations of nature, through knowledge production and practices, emerge and are shared over social networks, has been the particular concern of researchers interested in Actor Network Theory and power (cf Duineveld et al. 2013; Latour 2005; Law 2004; Mol 2002). They are interested in processes of object formation: any object, thus also (natural/cultural) landscapes, is the result of a continuous crafting of relations between different conditions and elements, e.g. people, knowledge, meaning and natural phenomena (Duineveld et al. 2013; Fuchs 2001; Van Assche, Beunen, Holm, and Lo 2013). The observation, crafting and communication about these objects take place at different sites in socio-political networks. In these distinct sites, observers identify elements and make use of various concepts to make sense of the world (Fuchs 2001). Because of the unique social and geographical position of each observer, processes of object formation (theoretically) always result in different knowledge and use of landscape(s), constructed out of different elements and conditions at different sites (Fuchs 2001). If such practises are to be foregrounded, there is no longer a single passive object in the middle, waiting to be seen from the point of view of seemingly endless series of possibilities" (Mol 2002: 5). Instead, multiple objects can be observed that are crafted out of different elements in different practices that stretch over different geographical and socio-political scales (Swyngedouw 2004 and Görg 2007).

Obviously, some of the sites, in which conceptions of landscapes are assembled, are better connected - or more influential in the socio-political network than others: they can temporarily act as "authorities of object formation" (Duineveld et al. 2013: 2) or what Latour (2005) would call "oligoptica". Authorities of object formation exist only temporarily, as these networks are unstable and relations are continuously made, broken and altered. An assembled landscape therefore is not only situational (a limited distribution over a socio-political scale as well as a geographical scale) but also sequential in nature (Duineveld et al. 2013; van Assche et al. 2013). Temporality of object formations as such demand an examination of 'events' to understand how various possibilities of Rewilding unfold into particular stabilizing/de-stabilizing differences (Marston et al. 2005).

In the context of (landscape) governance in 'Western Iberia', theories on object formation provide a promising basis that "allows us to think about relations between power, knowledge and reality" (Duineveld et al. 2013:15). The different formations of 'Western Iberia' further help us to understand how, despite the many differences and frictions, larger and more universal projects like Rewilding can possibly stabilize or collapse over time (Massey 2004; Tsing 2005).

Illustrative Formations of 'Western Iberia'

The following will examine five interesting examples of unique formations of 'Western Iberia' that take shape at various sites; through practices in nature conservation, history, entrepreneurship, charity, and local homes.

'Western Iberia', a Spatial Site for New Wilderness Conservation

'Western Iberia' is one of the pilot areas of Rewilding Europe in the border region between western Spain and northeastern Portugal. The invention of the name 'Western Iberia', tied to a designated conservation region by regional partners of Rewilding Europe, is based on the fact that the area is situated in the western part of the Iberian Peninsula. According to one local Rewilding employee, 'Western Iberia' "has the largest [...] continuous landscape [...] [(Dehesa)] and most of the species in Europe".

When Rewilding proponents speak of 'Western Iberia', they speak of multiple land characteristics including Dehesas, Montados and Sierras; traditional farming systems and economic downfall; land abandonment and aging populations; fire risks and biodiversity loss due to uncontrolled scrubland densification (Rewilding Europe 2013b).

In both sides of the Portuguese/Spanish borderland, thousands of people live dispersed in relatively small villages. Land ownership is scattered, and often it is unknown to whom particular land belongs. Two local NGOs (FNYH in Spain and ATN in Portugal) started their conservation activities in two privately owned reserves (varying each between 600-800 hectares): Campanarios de Azaba and Faia Brava (see figure 1). Rewilding Europe and both NGO's not only aim to reintroduce keystone species but also aim to transform 100,000 hectares of land into new wilderness landscapes, a genuine challenge (cf Jobse, Witteveen, Santegoets, and Stobbelaar 2013).

Figure 2 shows a corresponding future vision of this region as depicted by Rewilding Europe. The poster clearly illustrates 'Western Iberia' as a habitat for wild horses, wild cows, deer, Spanish Imperial Eagles, Egyptian vultures, and the Iberian Lynx. If one looks carefully, tented camps and safari trucks indicate the presence of wilderness tourism in the midst of this 'Serengeti-like landscape' that extends over Spain and Portugal. However, agricultural practices are absent in this poster.

This ideal picture of 'Western Iberia' is the result of particular modes of observing, which are challenged by or to be combined with others.



Figure 1—'Western Iberia' on Google Maps (c.f. www.rewildingeurope.com).



Figure 2—Artistic vision of 'Western Iberia', by Jeroen Helmer (ARK Nature/Rewilding Europe).

'Western Iberia' as a Historical Reference

Especially ecological and biological observers have conceptualised the 'Western Iberian' landscape by making use of historical references. Navarro and Pereira (2012) were among the very first to report on Rewilding Europe in academic circles. They indicate that in order to introduce large herbivore species, certain open natural landscapes need to be created to allow nature to 'do its work'. Rewilding Europe wants to create such landscapes by referring to authentic natural heritage of European landscapes as they used to exist millennia ago. Even though Rewilding claims that they do not want to stick to a particular time period, they often propose eco-system transformations that have similar characteristics to e.g. (Frans Vera's) half open, grassland like, landscapes in the Oostvaardersplassen (cf Rewilding Europe 2013a; Vera 2009). Vera's timeframe relates to 6000/8000 years ago (the mid-Holocene). It is around this historical turning point that agriculture was about to change the European landscape. As stated by Rewilding Europe: "Let the natural processes continue unaltered, and reintroduce the missing wildlife species and let them multiply as they can, unmanaged. Then we will all see in a few decades time what those parts of Europe possibly may have looked like when man first came onto the stage" (Rewilding Europe 2013a). In this quote at least a strong restoration ethic surfaces that refers to a pre-human interference in the European landscape.

Locally, 'Western Iberia' incorporates references to the well-known UNESCO world heritage rock engraving of the COA valley: Côa Valley Archaeological Park (PAVC) and the Côa Museum³. These engravings are believed to exist since 22,000-8,000 BC, and represent images of Auroch, horses, and various other animals as well as humans. The Auroch and horses are considered as foundational species of half open, grassland, eco-systems that existed in Europe before large scale human interferences. As such, the Auroch has become to symbolize much of Rewilding's experiments in Europe. The Auroch is the species from which many domestic cattle breeds in this world have evolved. Historically, attempts have been undertaken in order to breed back the Auroch by selective breeding programs (Heck 1951 in lorimer and Driessen 2011). More recently a joint initiative between, amongst others, the Taurus foundation and Rewilding Europe, has started to selectively breed back Auroch-looking bovines by using primitive cattle breeds and repopulate European wilderness areas with these (Tauros programme 2013⁴). In Campanarios de Azaba, a Spanish reserve that is part of 'Western Iberia', one of these primitive breeds, the Spanish Sayaguesa cattle, have recently been introduced.

'Western Iberia' as a 'Charitable Duty to Bring Wildlife Back'

The return of wildlife in 'Western Iberia' has also been conceptualized as a 'charitable duty'. In November 2012, the Dutch television broadcasted an episode of 'Kanjers van

Goud⁵, dedicated fully to 'Western Iberia'. Martijn Krabbé, a well-known Dutch TV host, visited 'Western Iberia' to see how Rewilding Europe is creating, "with help of the Postcode Lottery⁶ [...] spectacular wilderness areas at places that are abandoned by people" (translated from Dutch) (Kanjers van Goud 2012). In this documentary Martijn Krabbé is taken by one of Rewilding's directors, Staffan Widstrand, to 'Western Iberia' to experience "safari in Europe", to see nature being given back to agricultural areas that are being abandoned, to visit wild vultures at a feeding station and hideout in order to make "our natural heritage more accessible" (Staffan Widstrand, interviewed by Martijn Krabbé). A main story told in this short episode, is the fact that Rewilding Europe aims to make nature more profitable, a vision that has never been practiced before in Europe. Staffan Widstrand underlines that with the funding of the Postcode Lottery something very ambitious can be 'jump started' in order to develop the 10 different Serengeti parks in Europe. Being asked by Martijn Krabbé why Auroch need to be reintroduced in places like 'Western Iberia', Staffan Widstrand explains that the Auroch was killed / eaten by us humans, and that it is therefore "our duty to bring them back".

'Western Iberia' as a 'Business Concept'

Rewilding Europe is furthermore inspired by African experiences in securing land for wilderness conservation. Vast experience from African nature conservation organisations like the African Wildlife Foundation (particularly in the practice of conservation enterprises) influences how newly envisioned wilderness, as an alternative productive land use, is framed in Europe. One of Rewilding Europe's founding partners is Conservation Capital. Conservation Capital is specialised in making community-private partnership deals to increase economic returns out of land use through nature-based economies. As Giles Davies (personal conversation in April 2013), the founder of Conservation Capital argues: "I would like to see much more wildlife (...) and that is our job, our job is to build the businesses and revenue flows that help pay for it all". Examples are the development of high-end lodges that overlook great African and now also European plains, full of wildlife. But increasingly, also more combinations between agriculture and nature conservation are being sought. Such land use either complements or replaces more traditional agricultural uses of land owned or managed by local communities.

African experiences are shared with local Rewilding organizations that plan similar kinds of Conservation enterprises to help finance nature conservation. The particular choices made here, influence the ultimate shape of physical landmarks as particular eco-tourism structures are being built and new infrastructures are demanded, e.g. high-end eco-lodges and accessible roads. At the same time other existing

⁵ <http://www.rtl.nl/xl/#/u/b5e4cbc6-ac9f-3628-80a3-d35a61197412>.

⁶ The Postcode Lottery, part of Novamedia/Postcode Lotteries, donates 50 % of its stakes to charity foundations. The mission of Novamedia is "to set up and operate Charity Lotteries all over the world to raise funds for charities and increase awareness for their work". Rewilding Europe is one key receiver of charity income from the Postcode Lottery (3.6 million euros in 2011, and since February 2013 became a beneficiary of the Postcode Lottery receiving 500,000 euro's annually for five years).

³ <http://www.arte-coa.pt/index.php?Language=en&Page=Gestao&SubPage=Fundacao>.

⁴ <http://www.taurosproject.com/>

buildings might need to be demolished, existing businesses need to alter their way of working to cater for new kinds of visitors, and well-trained personnel are required.

'Western Iberia' as 'Home'

'Western Iberia' has been inhabited by people for thousands of years (e.g. Côa Valley). Nowadays, it is a rural area that allows for different agricultural practices; pig breeding, sheep herding and Mediterranean agriculture (olives, almonds and vineyards).

Even though different landscape usages exist, the region is slowly becoming abandoned. Not only people leave, also wildlife numbers have plunged. Some are afraid that the knowledge that exists about how to work the land e.g. where to plant crops, where to feed pigs and when to butcher them will be lost. "People should increasingly understand that this is the land that delivers everything, then, in the near future I believe that our land will be able to produce again like it did in the past" (local bar owner in Portugal).

In order to revitalise the region, most residents welcome tourism as an alternative source of income. Bar and hotel owners will have more visitors and butchers as well as farmers will sell regional products. For some farmers however, land abandonment is also seen as an alternative opportunity. "Here in my village it is still possible to make good deals. I have bought a lot of land already, something over a hundred acres, but I still expect to expand" (local farmer). Like Rewilding, they aim to buy-up unused lands and extend their area. At the same time, they have mechanised their farming practises and use more lands by hiring less people. In this way, land abandonment is by the farmers seen as a good business opportunity. "I think that agriculture is an industry with a future (...) there is a whole variety of manners to make money out of the products (...) there are people who already did so and now they sell their product to the rest of Europe, Brazil and even China" (local farmer).

Conclusion

The examples in this paper briefly sketched a few different sites that co-produce the existence of a 'Western Iberia'. But there are numerous other related sites (with their own networks of observers: hunters and their hobbies, European politicians with their legislations, NGO's with their visions, etc. etc...) where 'Western Iberia' is being negotiated and practiced into different objects that each materialize through continuous change. We summarize our brief journey by means of three conclusions.

First, the sum of the variety of formations does not equate to one Rewilding concept of 'Western Iberia'. Where we understand the challenge and excitement of a powerful rewilding vision for 'Western Iberia', 'rewilding' must be understood as one possible scenario in friction with other scenarios on different and possibly overlapping scales and time-lines. Following Mol (2002), the multiple formations of landscape are differentiated, potentially competing, cooperating and locally embedded, but also related to more global developments. The temporal and situational outcomes of these formations of 'Western Iberia' are strongly political (Marston et al. 2005) and have serious consequences for the

physical and socioeconomic configurations of the current and future landscape in 'Western Iberia'. The current ecological vision of Rewilding Europe in 'Western Iberia' lacks a strong vision for social inclusion, and as such runs the risk of not understanding other versions of a 'Western Iberia'. In the end we must not forget that rewilding needs to take place in the back gardens of hundreds of villages still existing in 'Western Iberia' or elsewhere.

Second, the establishment of 'Western Iberia', as a trans-boundary conservation region, is in itself a result from co-operation between locally established Portuguese/Spanish NGOs and Rewilding Europe. Even within this conservation network, there are multiple formations of what 'Western Iberia' is or should become. Yet it is through distinctive local practices and through the partnering between local conservation agencies that the whole idea of 'Western Iberia' and Rewilding can materialize.

Third, even though Rewilding landscapes such as 'Western Iberia' – now and in the future – are dependent on political interrelatedness of different sites with different scalar reach, we also stress that Rewilding landscapes remain attached to physical and non-physical characteristics of local places. These have, for example, been literally carved into the COA rock engravings. But also more contemporary physical developments in 'Western Iberia' constrain the current unfolding of a European wilderness dream; e.g. scattered land properties due to long standing inheritances, contemporary natural processes and connected native species, limited social involvement and understanding of new wilderness establishments in rural societies, the general lack and natural conditions that enable (spectacular) wildlife to survive, or an underdeveloped (wildlife based) tourism infrastructure in Europe.

This paper has aimed to flesh out some of the many socio-political dimensions involved in the re-development of wilderness and the framing of restoration objectives and (passive) management schemes in Europe. In doing so, we have aimed to argue for reflexivity in the way in which rewilding practices are currently being introduced and implemented in different places and on different scales. Such a call for reflexivity is not aimed at besetting rewilding practices right from the start. Instead, we aim to contribute to an understanding of the socio-political arena in which such practices are conceived, developed, implemented and reflected upon; our own work included. Such an understanding might prove fundamental in order to oversee, respond to and embed different versions of landscape and wilderness and their subsets of restoration objectives and management frameworks as rewilding in Europe expands to different sites and over different scales.

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Educating the Next Generation of Nature Entrepreneurs

Judith C. Jobse, Loes Witteveen, Judith Santegoets, and Daan van der Linde

Abstract— With this paper, it is illustrated that a focus on entrepreneurship training in the nature and wilderness sector is relevant for diverse organisations and situations. The first curricula on nature entrepreneurship are currently being developed. In this paper the authors describe a project that focusses on educating the next generation of nature entrepreneurs, reflect on the Erasmus Intensive Program ‘European Wilderness Entrepreneur’ and the Wild10 World Café on nature entrepreneurship training. Sharing and learning from experiences is highly recommended to further develop and strengthen the curricula while considering the dynamic context of nature conservation and restoration of ecological processes.

Introduction

Traditionally nature conservationists are not trained in business development and entrepreneurship. It is often assumed that nature conservation related professions are principally guided by ecological and sustainability principles, which therefore define the educational design of nature conservation curricula. However, the context of dwindling subsidies, uncertain financial contexts for nature conservation and persistent competing claims by diverse stakeholders, require alternative professional competences to address current conservation challenges. Several actors

Judith C. Jobse is lecturer at the (Tropical) Forestry and Nature Management Program, Van Hall Larenstein University of Applied Sciences (VHL), Velp, The Netherlands, Phone: +31263695541, email: judith.jobse@wur.nl. Loes Witteveen is senior lecturer Rural Development and Communication, VHL, Wageningen, The Netherlands. Phone +31317486301, e-mail: loes.witteveen@wur.nl. Judith Santegoets is project assistant Integrated Nature and Landscape Management, VHL, Velp, The Netherlands. Phone +31263695817, e-mail: judith.santegoets@wur.nl. Daan van der Linde is lecturer Regional Development at the Forestry and Nature Management Program, VHL, Velp, The Netherlands. Phone: +31263695723, email: daan.vanderlinde@wur.nl.

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in European wilderness conservation and restoration are adopting conservation strategies that aim to achieve economic sustainability. For instance, Rewilding Europe included wilderness-based entrepreneurship in their main objectives¹, and the NGO Wild Europe² launched an economic benefits group in 2013 to stimulate “a new breed of wilderness warrior”. Due to the rise of these new European wide conservation initiatives there is a need to train students and professionals in wilderness or nature entrepreneurship.

In this paper and the book chapter by Jobse et al. (in press) the terms wilderness and nature entrepreneurship are used. Currently, nature entrepreneurship is defined by the authors as an individual’s ability to turn sustainable ideas that contribute positively to nature management goals into action. Wilderness entrepreneurship is very similar to nature entrepreneurship, but with the difference that wilderness entrepreneurship is related to wilderness or areas in the process of becoming wilder instead of all areas that are considered ‘nature’. One could argue that in the context of the study area Western Iberia, as described in Jobse et. al (in press), the term ‘rewilding entrepreneurship’ might be more suitable but in the context of this paper wilderness entrepreneurship is seen as a broad concept which also applies to rewilding areas which are not considered wilderness at this moment.

To educate the next generation of nature conservationists it is necessary to develop curricula that incorporate innovative learning approaches that are consistent with new and upcoming contexts and requirements. Van Hall Larenstein University of Applied Sciences (VHL) leads a project that focusses on educating the next generation of nature entrepreneurs. This paper aims to briefly describe this project and some of its outcomes. The paper starts with an overview of the various strategies that nature conservation organizations have applied over time and then describes the project outcomes with a focus on the newly developed curricula on nature entrepreneurship. The paper concludes with the results from the World Café session on “Educating the next generation of nature entrepreneurs” organized at Wild10.

¹ rewildingeurope.com last retrieved on 2-7-2014.

² wildeurope.org last retrieved on 2-7-2014.

Conservation and Sustainable Development

In the 1980's the more socially-oriented goals of sustainable development were linked to the traditional nature-centered agenda of biodiversity conservation. Conservation NGOs started incorporating agroforestry, ecotourism, and various models of sustainable use in their Integrated Conservation and Development projects (ICDPs) (Alpert 1996; Miller 2011). This approach is heavily debated using parks vs. people/biodiversity protection vs. sustainable development arguments (Miller 2011). "Nature protectionists" who support a strong protected area's (parks) approach with no human presence are against ICDPs (Miller 2011). "Social conservationists" argue that rural development strategies should be integrated into conservation strategies in developing countries because conservation would fail if poverty is not addressed (Alpert 1996; Miller 2011). ICDPs were definitely not successful everywhere but "people-oriented" conservationists argued that ICDPs could work if they are well planned and designed and adaptive to changes (Miller 2011).

Many international conservation organizations have moved further into "neoliberal conservation" (Igoe and Brockington 2007). International conservation NGOs, like IUCN, WWF and Conservation International, started to build partnerships with business and industries to help this private sector to adopt strategies that benefits biodiversity³ but not without protest from other NGOs (MacDonald 2010). Also European national governments and the European Commission stimulate private public partnerships and other engagements to link EU business with biodiversity. NGOs are in the process of expanding these type of activities to the increased demand of the private sector. Another aspect of neoliberal conservation is the serious quest for market-driven conservation which emerged since the concept of ecosystem services was put on the international policy agenda by the Millennium Ecosystem Assessment (2005). So far most conservation actions in protected parks as well as ICDPs (Alpert 1996) were largely depended on funds from foreign donors or taxpayers. Payments of ecosystem services schemes are thought to be an important tool to incorporate economic sustainability into biodiversity conservation strategies.

The recently founded NGO Rewilding Europe incorporates economic sustainability into their strategy and therefore Conservation Capital⁴ became their partner to develop business strategies that could promote rewilding processes of European landscapes. Conservation Capital draws heavily from African conservation examples. Educational and academic partners joined Rewilding Europe's effort on this theme by organising the symposium "The Business of Nature Conservation. What Europe can learn from Africa"⁵. During the symposium The African Wildlife Foundation (AFW) presented their lessons learned from their conservation enterprise strategy which they introduced in the 1990's.

³ iucn.org last retrieved on 2-7-2014.

⁴ conservation-capital.com last retrieved on 14-7-2014.

⁵ vanhall-larenstein.com/News/181/African-nature-management-an-example-for-Europe-.aspx last retrieved on 2-7-2014.

AFW first developed enterprises in the field of tourism (mostly Eco lodges), later they diversified the conservation enterprise model to include other sectors such as agriculture, bio-enterprises and livestock-based enterprises (Nthiga et al 2011). AFW's challenges with the Conservation Enterprises Strategy include "financing, governance, benefit sharing as well as skills and management transfer modalities by the private investors to the communities" (Nthiga et al. 2011). The above mentioned symposium marked the start of the project 'European Nature Entrepreneur'.

Project 'European Nature Entrepreneur'

In the project 'European Nature Entrepreneur' the NGO Rewilding Europe and three Dutch educational institutes (Helicon, Van Hall Larenstein University of Applied Sciences (VHL) and Wageningen University), who deliver life sciences, rural development and nature education from vocational to PhD level, collaborate to develop innovative curricula. The project envisages having nature entrepreneurship included in curricula and creating learning environments where students of different educational levels and background collaborate with each other and with professionals in Rewilding Europe's pilot areas. The new curricula emerge from a collaboratively developed research agenda for the Rewilding Europe pilot area in Western Iberia. Scientists and lecturers in social and environmental sciences, ecology and economy collaborated with leaders and managers in nature conservation and management active in this pilot area.

The first batch of students have conducted internships and thesis projects as part of the collaborative research program. Their output includes reports on "Rewilding and Tourism: Analysis of an Optimistic Discourse on Nature Conservation" by Margaryan (2012), "Implementing Rewilding in Western-Iberia. Analysing the stakeholder context." by Poppen (2012), "The cadastre of Rewilding Europe in Portugal: Reinventing the Portuguese cadastre with Associação Transumância e Natureza" by Beukers (2013), "Facilitating social learning to increase levels of local involvement: the case of Associação Transumância e Natureza in Portugal" by Leuvenink (2013) and "Negotiating the Production of Space: the implementation of Rewilding in Northeast Portugal" by Walet (2014). Most of these studies indicate the difficulty of implementing the concept of rewilding in this region due to the different world view that most locals have compared to the view of Rewilding Europe and its local partners. The studies share the recommendation that to get support of local stakeholders with a very different world view much more effort should go to planning and facilitating stakeholder involvement processes than has been the case so far by Rewilding Europe. More attention to stakeholder involvement can also help to stimulate local entrepreneurship with benefits for nature conservation. Workshops around nature or wilderness entrepreneurship could be part of a successful stakeholder involvement strategy as experienced during the Erasmus Intensive Program 'European Wilderness Entrepreneur' (Jobse et al. in press) and the workshops initiated by Leuvenink (2013).

New Curricula on Nature Entrepreneurship

Curriculum outputs of the project with a focus on nature entrepreneurship are a 30 ECTS bachelor minor International Nature Entrepreneur at VHL University of Applied Sciences and Wageningen University, and a 14 day long Erasmus Intensive Program 'European Wilderness Entrepreneurship' (in cooperation with universities in Bulgaria, Croatia, Portugal, Spain and Sweden), which both ran for the first time in the spring semester of 2013. The learning strategy for these new curricula is competence based and simulates professional situations, which require students to learn and use relevant knowledge, skills and attitude, while practising diverse professional roles. This implies that learning outcomes for students do not focus exclusively on enhanced subject-specific knowledge but focus on composite learning outcomes such as entrepreneurship, networking, stakeholder consultation, conflict management, and intercultural communication. The new curricula are developed to achieve nature entrepreneurship competences for students of various levels with an interest in nature, forests, wildlife, animal sciences, rural development, tourism, recreation, sustainability, and business development.

For the new bachelor minor International Nature Entrepreneur, VHL developed a course titled International Nature Entrepreneur (INE). Students taking the new INE course are trained in competences for international nature entrepreneurship, defined as: an individual's ability to turn sustainable ideas that contribute positively to nature management goals into action while working with individuals from linguistically and culturally diverse backgrounds. As a main assignment of the course students have to write a business plan that deals with the socially, ecologically and economically sustainable use of an area that has high (potential) ecological value or that contributes positively to the goals of a nature organization in general. In addition, students have to write a personal development plan to acquire entrepreneurship competences throughout the course and beyond.

Within the framework of this same minor the Erasmus Intensive Programme 'European Wilderness Entrepreneurship' (IP EWE) has been developed to give students a hands-on experience of how new entrepreneurial activities may be created and implemented locally. In 2013 and 2014, IP EWE was funded by the European Commission's Lifelong Learning Programme⁶ (LLP). LLP subsidized travel and subsistence costs of participating students and lecturers. During the IP EWE, students explored a specific region, which Rewilding Europe envisages to 'rewild', and interacted with stakeholders engaged in the development of the region. The chosen region in 2013 and 2014 is currently is not considered wilderness but Rewilding Europe and it's local partners have the ambition to restore ecological processes in such a way that the area has a chance to turn into wilderness over time. Developing an economy around this trajectory towards wilderness is one of the main strategies of the Rewilding Europe to reach their goal.

⁶ ec.europa.eu/education/erasmus/ip_en.htm retrieved on 13-11-2013

Lessons Learned for Wilderness Entrepreneurship Education

The first edition of the Erasmus Intensive Program 'European Wilderness Entrepreneurship' (IPEWE) is described in the chapter "Preparing a new generation of wilderness entrepreneurs: lessons from the Erasmus Intensive Programme 'European Wilderness Entrepreneurship' 2013" (Jobse et al. in press) in the book *Rewilding European Landscapes* (Pereira and Navarro in press). In the next section the lessons learned as described in that chapter will be summarized and supplemented with some examples.

A first lesson learned refers to competences that should be attained in wilderness entrepreneurship: opportunity competence, social competence, normative competence, complexity competence and business competence. The authors indicate that two aspects might be missing in this set of competences which are critical: reflection and conflict transformation. For example, dealing with conflicts between opposing stakeholders, such as sheep farmers and a wolf watching company, requires professional competences on mediation and conflict management.

The second lesson learned elaborates a need for a learning strategy that focuses on the involvement of diverse actors in meeting and engaging in exchange of knowledge, expertise, opinions and other communicative resources. This leads to a learning context in which students meet and engage with diverse stakeholders as they visit rural communities and farms, attend municipal activities, local festivals and markets, and participate in tourist activities. For example, action research methodologies such as transect walks and immersion can be applied.

The third lesson learned also influences the learning strategy as it concludes that learning about European wilderness entrepreneurship takes place where the practice is discernible and that aspects of dissonance should be added to this learning environment, such as intensiveness and exposure to different cultures, disciplines and backgrounds. The environment should challenge both learners and lecturers in a way that learning takes place at the boundaries of comfort zones, building on positive friction between self and external regulation. For example, if Rewilding Europe wants to attract more international visitors to a region such as Western Iberia, entrepreneurs have to understand and able to deal with the (cultural) differences and interests between the potential visitors, the inhabitants of the region and the staff who will interact with both groups. IP staff and students experienced these differences themselves and were expressed in statements like "...biologists spend too much time looking at all kind of creatures when walking a trail", "I can't work with my group members because they have very different ideas and opinions...", and "...in the end we did manage to come to an agreement about our idea and it was not what I had expected beforehand".

The three lessons learned relate to each other and provide tools to use for curriculum design on wilderness entrepreneurship. To learn wilderness entrepreneurship competences, an environment should be created in which students, teachers and stakeholders learn from each other in a challenging way. This means in this context a call for outdoor lecturing with all conveniences involved such as exposure to the environment in which wilderness entrepreneurs might have

to operate. Creativity and out of the box thinking, both essential for building a new future for wilderness entrepreneurship, need unique experiences in which learners embark on unknown activities with a basic feeling of comfort. This consideration of comfort zones coincides with Wals (2007) whom states “The trick is to learn on the edge of people’s individual comfort zone with regards to dissonance: if the process takes places too far outside of this zone, dissonance will not be constructive and block learning. However, if the process takes place within peoples’ comfort zones –as is the case when homogenous groups of like-minded people come together – learning is likely to be blocked as well”.

Designing IP EWE 2014

The learning environment for the IP EWE 2014 was similar to the 2013 version. Universities from 6 EU countries participated in a 14 day long intensive programme in the Western Iberian pilot area of Rewilding Europe’s. During the IP staff and students worked in intercultural and multidisciplinary groups on a variety of activities. The common goals for organizing and executing IP EWE 2014 were formulated based on the institutional goals of each partner university. The common goals were stated in the IP EWE 2014 staff manual (Jobse et al. 2014) as follows: “...

1. To educate the future generation of wilderness entrepreneurs in the diverse study programmes of the European partner universities;
2. To expose students and staff to an international experience and create new creative inroads in their thinking processes;
3. Increase competence levels of staff in designing and implementing in wilderness entrepreneurship;
4. Through social contact with other students and staff, open students’ horizons and ability to experience companionship and grow cross-cultural curiosity and tolerance;
5. Create networks with participating universities and stakeholders for future cooperation on research and training projects;
6. To gain experience in collaboratively organised Intensive programs which staff members can share within their own university.
7. To develop and evaluate curricula and learning strategies for wilderness entrepreneurship.”

For the IP EWE 2014 VHL aimed to elaborate a framework where the wilderness competences are used to formulate a set of comprehensive and matching set of learning outcomes. VHL envisaged the realisation of learning outcomes to be directly linked to learning strategies and the constructed learning environment. The programme elements, learning outcomes, the learning activities and the learning strategy followed design principles formulated in the IP EWE 2014 staff manual (Jobse et al. 2014). VHL worked with the competences indicated above and defined for each competence a set of learning outcomes. The learning outcomes were coupled with learning strategies and learning environments (Table 1). This iterative process was influenced by the vision that experiential, reflective and social learning should be discernible.

Results From Wild10: Building Blocks for Nature Entrepreneurship Training

At Wild10, Van Hall Larenstein University of Applied Sciences, as the main IP EWE organizing university in 2014, organized a round table session ‘Educating the next generation of nature entrepreneurs’ using the World Café format (Brown et al. 2002). During the Wild World Café Training for Wilderness Entrepreneurship, WILD10 participants with an interest in this topic gathered. The session was organized to network and brainstorm on possible building blocks of a nature entrepreneurship training network. About 20 people from 7 different countries in North America, Europe and Asia participated and worked in four groups. Each group started with getting to know their group members by explaining backgrounds, involvement with nature entrepreneurship and the reason for attending the session. This was followed by brainstorming about what should be covered in a nature entrepreneurship training network (Fig. 1). These were referred to as building blocks. Each group selected two building blocks to share with all World Café participants (Fig. 2).

Participants of the World Café at WILD10 recognized the need for nature entrepreneurs. When comparing the presented building blocks (Fig. 2) with wilderness entrepreneurship competences described by Jobse et al. (in press) a link to two of the five competences can be observed. One group emphasized that marketing and presentation (communication) skills are needed to promote wilderness or rewilding which refers to both the business and social competence.

The building block “Plan” is related to business competence. The group representative explained the need for this building block: “Planning is necessary to start up an organisation. This could be a business plan or a strategic plan. Project management is necessary, just as promoting your organisation for donors.”

The building block “Building friendships” was explained as “Friendships are necessary for fundraising. Possible actions include public relations, media relations and crowd sourcing.” This building block seems related to social competence, which includes according to Lans et al. (2013) “the ability to build up and maintain relationships externally as well as internally”.

The building block “Fun opportunities” may link to social competence, although it may also be linked to business competence, because in its explanation a reference to the FISH! Philosophy was made. The FISH! Philosophy contains “four simple practices that help energize a team, deliver remarkable customer service and increase employee retention”⁷.

The building block “Full spectrum mentoring” can be seen as a way to create a learning spectrum environment in such a way that facilitates learning of social competence. By providing students with an “entrepreneurial” mentor that serves as a role model, as well as, a facilitator for networking opportunities, enhances learning for social competences.

⁷ charthouse.com retrieved on 13-11-2013

Table 1—Overview of competencies, their learning outcomes and general learning activities of the Erasmus Intensive Programme European Wilderness Entrepreneur (IP EWE) 2014 as described in the staff manual from 22 March 2014 (Jobse et al. 2014).

Competence	LO #	Learning outcome (LO)	General learning activity
Opportunity competence	1.1	Problem spotting	Explore the Western Iberia context
	1.2	Eye for innovation	Draw landscapes from different perspectives
	1.3	Sense of creativity	Imagine landscapes and rural livelihood options
	1.4	Foresight thinking	Invent business model proposals
	1.5	Action-orientation	Pitch and promote business model
	1.6	Self-efficacy	Consult local stakeholders on business proposal
Social competence	2.1	Dealing with diversity	Work in international and interdisciplinary groups
	2.2	Dealing with multi-stakeholder contexts	Meet local stakeholders
	2.3	Communication	Deal with language diversity in group work, communicating with IP staff and locals
	2.4	Facilitation	Facilitate own wilderness experience
	2.5	Enabling participation	Facilitate own wilderness experience
Normative competence	3.1	Dealing with sustainability	Articulate different scenarios for rural development
	3.2	Decision making for sustainability	Choose a scenario for rural development
	3.3	(EU) citizenship	Share images of wilderness entrepreneurship from diverse EU backgrounds
Complexity competence	4.1	Identify and analyse (sub)systems and domains	Scope the region ecologically and socio-economically
	4.2	Understand and reflect on boundaries and interdependencies	Identify and elaborate on actor and ecosystem analysis
	4.3	Exploring uncertain futures, recognising and articulating intergenerational livelihood differences	Capture, share and reflect on life stories in Western Iberia village
Business competence	5.1	Realise business opportunities	Elaborate on a selected business model using the Business Model Canvas as a tool
	5.2	Manage business opportunities	Share the business model with local stakeholders

The complexity competence was not specifically mentioned during the group presentations but a reference was made to it at the end of the Wild World Café when Anish Andheria (President of the Wildlife Conservation Trust, India) was asked to respond to the buildings blocks which were posted on the wall: “I recognize everything. Conservation issues are people issues. Therefore, you need a 360 degree understanding of the subject. This includes social capacities to interact with indigenous people, understanding of the law, capacities to train other (local) people and the skills to gain substantial finances.” In his answer the complexity competence emerges when he mentions the need for a 360 degree understanding of the subject.

This leaves the normative competence unmentioned, which is a much harder competence for most people to appreciate. In Jobse et al. (in press), the normative competence was described as “the ability to deal simultaneously with diverse dimensions. These dimensions may be perceived as conflictive yet require to be integrated in a sustainability perspective

such as economic, ethic, political social and environmental dimensions. This integrative view on society and environment makes that this competence also deals with moral decision-making and citizenship (Closs and Antonello 2011).”

A suggestion that resulted from the World Café was the recognition of volunteers as a relevant group who could benefit from nature entrepreneurship training. Organisations like The Conservation Volunteers⁸ could offer training and mentoring in entrepreneurship to their volunteers. Also brought on stage during the World Café by “adults allies” of the GENwild young participants (13 to 18 year olds) was the fact that the youngsters who came to Salamanca developed their entrepreneurship competences, like networking and fundraising, in the process of preparing for and attending WILD10.

⁸ tcv.org.uk retrieved on 13-11-2013



Figure 1—At each table group members get to know each other and brainstorm on building blocks for nature entrepreneurship training during a Wild10 World Café (photo by Daan van der Linde).



Figure 2—Selected “building blocks” by four groups after brainstorming on nature entrepreneurship training during a Wild10 World Café (photo by Daan van der Linde).

Conclusions

Participants of the World Café at WILD10 recognized the need for nature entrepreneurs. In the World Café, competences for this new type of entrepreneur that were considered important in training coincide with the social and business competences as identified by Jobse et al. (in press). Educational programmes have to facilitate learning for entrepreneurship competences, to train people and organisations to achieve new business opportunities for nature. Challenging learning environments with diverse actors involved are necessary.

This paper illustrates that a focus on entrepreneurship training in the nature and wilderness sector is relevant for diverse organisations and situations. The first curricula on nature entrepreneurship are currently being developed, involving a diverse and international group of universities and other actors. Sharing and learning from these experiences is recommended to further develop and strengthen the curricula while considering the dynamic context of nature conservation and the restoration of ecological processes.

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Green Belt Europe: Borders Separate, Nature Unites

Uwe Friedel

Abstract—During the period of the Cold War between 1945 and 1989, a “Green Belt” of valuable pristine landscapes developed along the border line between Eastern and Western Europe, the intensively fortified and guarded so called Iron Curtain. Due to the remoteness of the border areas, a high number of national parks and other large conservation areas can be found there. They are connected by small conservation areas and linear structures along the borders which are to a high percentage natural, semi-natural and/or extensively used areas. The Green Belt is a cross section of all European biogeographical regions and a model for European Green Infrastructure (European Commission 2013) which should be further developed as such. Moreover the Green Belt is an outstanding memorial landscape of European relevancy with a great potential for trans-boundary cooperation, sustainable regional development, the support of understanding among nations and the merging of Europe. Communication and lobbying is essential for preserving the wilderness values of the Green Belt. The common historical and cultural heritage of the Green Belt is an important argument for its protection apart from the conservation aspect. The Green Belt initiative is a geopolitical challenge and change; it connects 24 European countries and stakeholders from governmental and non-governmental organizations from the local to the international level.

Introduction—From Death Zone to Life Line

‘Nature knows no boundaries’ is an often stated truism, but absolutely pertinent in Europe with its densely packed political borders which frequently follow natural features such as mountain ranges or river systems. Regarding the European Green Belt, nature does not only know no boundaries, it even unites across borders: people, organizations and states, large pristine areas through the continent, animal and plant populations as well as Europe’s history and future.

U. Friedel is Geo-Ecologist at BUND-Project Office Green Belt, Hessestrasse 4, 90443 Nuremberg, Germany, E-Mail: uwe.friedel@bund-naturschutz.de

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In the 20th century, European landscape was changed dramatically by human impact. The growth of the European population, the industrial agriculture and fast construction of traffic infrastructure led to the destruction and fragmentation of natural and semi-natural habitats. Wilderness was pushed to the margins and remote areas of the continent. But between the end of World War II and the collapse of the Eastern bloc in 1989, a North-South-corridor throughout Europe escaped this impact: the border zone along the so called Iron Curtain between the politically separated eastern and western part of Europe. Along the Iron Curtain a “Green Belt” of valuable pristine landscapes developed. Due to the remoteness of the border areas, a high number of national parks and other large conservation areas can be found there. An outstanding ecological network and living memorial landscape developed. Despite its brutal inhumanity, the Iron Curtain granted nature a pause for breath along over 12,500 kilometers from the Barents Sea at the Russian-Norwegian border, along the Baltic Coast, through Central Europe and the Balkans to the Black Sea (see figure 1). Due to the politically special status of former Yugoslavia and Albania, the Iron Curtain did not only separate the East from the West but also surrounded these two countries.



Figure 1—The Green Belt Europe connects 24 European countries. Copyright: BUND-Project Office Green Belt

A lack of conventional land use and agriculture as well as the absence of most human-made disturbances along large parts of the Iron Curtain and also in its surroundings led to the conservation and development of large wild nature areas (see figure 2) and a connected system of various nature related habitats and landscapes. Riecken et al. (2006) point out that in the former Eastern Bloc countries the utilization of border land was mostly prohibited, in some areas villages at the border were raised to the ground and people were forcibly resettled in the inland, whereas on the western side remote border areas were less attractive for investors, sparsely populated and no major infrastructure was needed.

Background of the Initiative

Unwittingly the Iron Curtain supported the conservation and development of valuable habitats and therefore served as a retreat for many endangered species. The richness of nature related habitats became obvious long before its fall. Years before the breakdown of the Iron Curtain, conservationists in several areas of Europe focused on the flourishing nature. Therefore the establishing of the European Green Belt initiative was more or less a merging of different existing regional initiatives into a European one.

In the year 2002 BUND (Friends of the Earth Germany) suggested the creation of a Green Belt all along the former Iron Curtain for the first time. It succeeded in bringing together the different approaches by implementing first conferences on the European Green Belt supported and organized by the German Federal Agency for Nature Conservation (BfN) and the World Conservation Union (IUCN) in 2003 and 2004. The three main origins of the European Green Belt initiative are - from north to south - the activities along the Fennoscandian Green Belt, the German Green Belt and along the Green Belt in the Balkans.

Fennoscandian Green Belt

Already in 1970 satellite pictures showed a dark green belt of old-growth forest on the Finnish-Russian border. Nature conservation cooperation between Finland and the Soviet Union started in the 1970s when a scientific-technical cooperation agreement was signed (Haapala et al. 2003). Furthermore a joint Finnish-Russian working group on nature conservation was founded, which led to the successive establishment of a series of twin parks along the border in the mid-1980s. An inventory project on border forests conducted between 1992 and 1994 showed the ecological value of this border area with regards to ecosystems and species in the boreal forest zone and led to the idea of establishing a network of separate protected areas on each side of the border. In this connection it was firstly discussed to develop a Fennoscandian Green Belt covering also the border of Norway and Russia. Core of this Fennoscandian Green Belt are the numerous and large nature reserves along the border (see figure 3). The concept of the Fennoscandian Green Belt includes also a joint environment policy in the border area (Hokkanen 2004).

The Fennoscandian Green Belt is a mosaic of forests, bogs and lakes; it covers a wide range of ecosystems from the Arctic tundra on the Barents Sea coast to mixed broad-leaf forests covering the islands in the Gulf of Finland. The largest part is northern coniferous forest, known as the boreal zone. The area comprises also the last tracts of old-growth taiga in the European part of the continent and highly interesting geological structures and relief as part of the ancient Baltic crystalline shield. Karivalo and Butorin (2006) show that the Fennoscandian Green Belt contains the last large massifs of old-growth taiga typical for Fennoscandia, which mainly consist of dry pine forests.



Figure 2—A great number of pristine and nature related landscapes like the Thaya valley (trans-boundary national park Czech Republic, Austria) are part of the Green Belt Europe. Picture: Christian Übl.



Figure 3—Existing and planned nature reserves along the Fennoscandian Green Belt. Map from Hokkanen, 2004.

Because of the large pristine areas and forests, the Green Belt of Fennoscandia serves as a retreat for several large and endangered carnivores like the Wolverine (*Gulo gulo*), the Eurasian Lynx (*Lynx lynx*), Wolf (*Canis lupus*) and Brown Bear (*Ursus arctos*). Large carnivores are an indicator group of animals which has been carefully studied for decades and shows the high value of the Fennoscandian Green Belt.

Central European Green Belt and Green Belt Germany

The Central European Green Belt crosses a variety of cultural landscapes, some of which are intensively used by agriculture. It passes the Bohemian massif with its well-wooded transboundary national parks such as the Bavarian Forest/Šumava, and follows the courses of near-natural rivers such as in the floodplains of the Mura and Drava. After passing through the long mountain ridge of the Karavanke Mountains and the Julian Alps, the Green Belt ends on the Adriatic Sea coast. In the intensively used cultural landscape of Central Europe, the Green Belt is a last retreat and structural element for many endangered species. It forms a bridging element between grassland fallow and wetlands, between dry grassland and stands of mature woodland. The German part of the Central European Green Belt is a special case because it divided one country rather than separating countries from each other. German governmental and non-governmental organizations have been very active for its preservation and have been gathering comprehensive scientific data for more than 30 years. Therefore a special focus is put on the German Green Belt in this chapter.

The border fortifications of the Iron Curtain were most strongly expressed in the formerly divided Germany. The GDR (German Democratic Republic) used 3,000 kilometers of fences, 200 kilometers of walls, 800 kilometers of anti-vehicle ditches, 1,800 kilometers of patrol routes 850 watchtowers, 1.2 million tons of concrete and 700,000 tons of iron, land mines and spring guns to “secure” their border against West-Germany.

First observations of the border areas, only possible from the western site, from 1975 on and a systematic ornithological survey in 1979 on a stretch of 140 kilometers along the inner-German border conducted by young conservationists of Bund Naturschutz (BN), the Bavarian branch of BUND, showed the great richness of biodiversity. The ornithological survey covered the immediate border zone to Thuringia (GDR) and large areas of adjacent farmlands in Bavaria for comparison (Meyer et al. 2011). Beck and Frobel (1981) found that 90% of the recorded, highly endangered bird species like Whinchat (*Saxicola rubetra*, see figure 4), Red-Backed Shrike (*Lanius collurio*), European Nightjar (*Caprimulgus europaeus*) and Woodlark (*Lullula arborea*) preferred to breed inside the border strip. Since then, it was clear, that the inhuman border line had developed into a last retreat for species avoiding intensively used agrarian areas. Further activities followed, e.g. first land purchases at the western side of the border by BN and attempts to get in contact with conservationists from the eastern side (Frobel et al. 2009).

The Iron Curtain fell in 1989. One month after the Berlin Wall was officially opened; BUND organized the first meeting of nature conservationists from East and West Germany. The approximately 400 participants passed a resolution that requested priority protection as a “Green Belt” – an ecological backbone of Central Europe – for the border strip between the Federal Republic of Germany (FRG) and the German Democratic Republic (GDR). Thus, the Green Belt Germany-project was born. Right from the start, it was not only Germany’s first nationwide nature conservation project but also a living memorial to recent German history. The first years of the Green Belt in Germany were marked by



Figure 4—In intensively used agricultural areas like Germany, the Green Belt is irreplaceable as ecological network and often last retreat for endangered species like the Whinchat (*Saxicola rubetra*). Picture: BN-Archive

a positive interest by the media, environment politicians, who took up the idea, and committed nature conservation authorities in the new states (the former GDR-countries), who designated nature reserves along the former Iron Curtain. But these times were also characterized by rapid intervention and destruction of valuable areas. E. g. habitats that had been unused for decades were ploughed up in a few days mostly by Western farmers.

It was not until 2001, that a habitat survey of the entire former inner-German border line carried out by the German Federal Agency for Nature Conservation (BfN) together with BUND (Schlumprecht et al. 2002) brought a decisive breakthrough. The results proved the Green Belt to be of high value for German nature conservation. The survey identified 109 different habitat types along the 1,393 kilometers long and 17,656 hectares large central Green Belt Germany between the former borderline of FRG and GDR and the road for military vehicles. 60% of the Green Belt Germany consisted of streams, rivers and inland waters, various types of forest, extensively used mesophilic grassland, unused fallow land and species-rich moist and wet grasslands. Half of the area consisted of endangered habitat types of the Red List for Germany, e.g. xerophilic grassland, moors and wetlands, semi-natural riparian zones and alluvial forests. At the same time, 85 % of the area and 80 % of the length were regarded as intact (Schlumprecht et al. 2002). Currently a follow-up habitat survey concentrating on the open landscape habitats is being conducted. First results show that intensification of agriculture and natural succession are still a major threat for many of the valuable habitats and species. However the gap area, i.e. area where the Green Belt is considered destroyed has been reduced from 15 to 13 % compared to the first survey. It is not clear in how far this reduction is a result of methodological differences of the two surveys. A project funded by the Federal Agency for Nature Protection

with funding by the “Bundesprogramm Biologische Vielfalt” concentrates on closing the gaps in three model regions by restoring the habitat corridors as shown in the example in figure 5.

Even if a systematical survey on the species level so far could not be conducted for the whole area of the Green Belt, the gathered data from several local and regional surveys and observations shows that 1,200 species listed in the nationwide or regional Red Lists of Germany occur in the Green Belt. Amongst these are *Polysarcus denticauda*, Sand Lizard (*Lacerta agilis*), Natterjack Toad (*Epidalea calamita*, formerly *Bufo calamita*), Tree Grayling (*Hipparchia sttilinus*), *Eresus cinnaberinus*, *Arnica montana* and the European Otter (*Lutra lutra*).

The Green Belt Germany is a backbone of a nationwide ecological network. There are 150 nature conservation areas along the Green Belt, most created after 1989, and further 125 conservation areas in the vicinity. According to Geidezis and Kreutz (2009), the ecological network area is multiplied by 12.5 (=2,232 square kilometers) if the 150 conservation areas directly adjacent to the Green Belt are included. In the long run, the aim is to protect and develop not only the partly narrow central German Green Belt as ‘backbone’ of the ecological network but also adjacent conservation and nature-related areas as ‘ribs’ on both sides.

Balkan Green Belt

In South-Eastern Europe the Iron Curtain separated several countries, not just the two political blocs. Yugoslavia was not part of the Eastern Bloc and people were allowed to travel. The border between former Yugoslavia and Greece was heavily controlled and only a few border crossings were open. Albania closed its borders and was isolated from the rest of Europe since the early 1970s. This special situation led to the fact, that on the Balkan Peninsula the Green Belt follows not only the borders of the Eastern Bloc, but also those of Albania and former Yugoslavia forming a “Y” from the Danube to the Mediterranean and the Black Sea. As in other parts of the Green Belt these borders largely preserved nature from destruction by human activities (Schneider-Jacoby et al. 2006). After the collapse of communism also on the Balkan Peninsula, the European Nature Heritage Fund (EuroNatur) began building support among governmental and non-governmental organizations in the early 1990s, with the aim of protecting transboundary areas of high ecological value.

From the Pannonian Plain to the Mediterranean and Black Sea coast, the Balkan Green Belt forms an extremely heterogeneous, but mostly natural corridor. Alluvial wetlands, steppe areas, mountains, lakes and nature related cultural landscapes form a unique mosaic of valuable habitats. Along the Balkan Green Belt different valuable habitats are connected. For example, mountain national parks are linked with the protected Lakes Prespa and Ohrid in the border zone of Albania, FYR Macedonia and Greece (Vasilijević and Pezold 2011). On the coast, marine habitats such as beaches and lagoons are interrelated with the freshwater ecosystem of Lake Skadar (Montenegro, Albania) or the alluvial wetlands of the Evros-Meric River (Greece, Bulgaria, Turkey). Although many wetlands are situated at the border, the biggest part of the Balkan Green Belt is formed by mountain chain and



Figure 5—Green Belt between Thuringia and Hesse near the village Obersuhl (left). Picture: Klaus Leidorf

forest complexes. No large towns or industrial zones are located along the formerly strictly controlled border. The range offers excellent opportunities for the establishment of large-scale protected areas.

The Balkan Green Belt is part of an extensive connected habitat system and forms an important ecological corridor. It is a retreat for numerous rare species like Dalmatian Pelican (*Pelecanus crispus*), Imperial Eagle (*Aquila heliaca*) and Balkan Lynx (*Lynx lynx balcanicus*) (Schwaderer et al. 2009).

Trans-Boundary Network and Cooperation

During the international conference “Perspectives of the Green Belt” in Bonn (Germany) conducted by the German Federal Agency for Nature Conservation (BfN) in July 2003, the vision of a Green Belt through Europe was officially discussed for the first time. A very big step for the Green Belt Europe was the international conference in Hungary in September 2004. The World Conservation Union (IUCN) and BfN jointly organized a conference that took place in the trans-boundary protected area of the Fertő-Hanság National Park in Hungary. Over 70 participants from 17 countries attended. The two main outcomes of this conference were a common structure for the coordination of the Initiative and a Programme of Work.

Today a huge number of associations, groups and authorities in 24 countries are working within the European Green Belt initiative. Currently there are four distinct areas

of activity: The Fennoscandian Green Belt, with Norway, Finland and the Russian Federation. The Baltic Green Belt with Estonia, Latvia, Lithuania, Poland and the German coastline of the Baltic Sea. The Central European Green Belt in Germany, the Czech Republic, Austria, Slovakia, Hungary, Slovenia, Croatia and Italy. The Balkan Green Belt; running along the barrier that separated the Balkan countries—Serbia, Montenegro, Kosovo, FYR Macedonia, Romania, Bulgaria, Albania, Greece, Turkey -, ending at the Black Sea. The four main regions are attended by Regional Coordinators: The Association of Zapovedniks and National Parks in Northwest Russia for Fennoscandia, BUND for the Baltic and Central Europe and EuroNatur for the Balkan region. IUCN took over the patronage of the initiative. Furthermore, in every country so called National Focal Points, mainly from ministries, are persons in charge.

The European Green Belt connects 16 EU-countries, four candidate countries, two potential candidates and two non EU countries with Russia and Norway. The initiative is an extraordinary chance of geopolitical, ecopolitical and cultural relevancy for the EU. The initiative offers outstanding possibilities for trans-border cooperation between states and regions as well as for the establishment of sustainable regional development, especially through ecotourism, considering the outstanding connection of nature, culture and history as a unique selling proposition and competitive advantage particularly important for structurally weak areas along the Green Belt. The great potential of this initiative for the historical documentation and clarification of the Cold War as well as for the merging of old and new EU-member

states, candidate countries, potential EU-candidates and non-EU-countries is obvious.

In addition to the numerous local trans-boundary nature conservation, environmental education and nature-tourism projects along the Green Belt, EU-funded projects covering large parts of the European Green Belt were and are implemented. Two examples are the Baltic Green Belt project (January 2009 - January 2012, www.balticgreenbelt.net) with 22 partners (13 partners and 9 associated partners) from Germany, Poland, Russia, Lithuania, Latvia, Estonia and Sweden (Coalition Clean Baltic) supported within the Baltic Sea Region Programme and the project GreenNet (April 2011 - March 2014, www.greennet-project.eu) with 22 Project partners (thereof 11 associated partners) from Czech Republic, Germany, Austria, Slovakia, Slovenia and Italy, supported within the Central Europe Programme.

Chance and Challenge for European Nature Conservation

The conspicuous accumulation of large scale nature reserves along the 12,500 kilometers of the former Iron Curtain make the outstanding importance of the Green Belt Europe for the European ecological network: 39 national parks are situated directly along the Green Belt, 16 of them are trans-boundary national parks. Schlumprecht et al. (2009) found that more than 3,200 nature protected areas can be found within a 25 kilometers buffer zone on either side of the Green Belt. Furthermore, this ecological network connects all European biogeographical regions. The European Green Belt is a retreat for many endangered and rare habitats as well as animals and plants and a very important corridor for the migration of endangered large mammals. Therefore it represents a unique European nature heritage.

The implementation of the Green Belt Europe as one of the largest European and trans-boundary ecological networks is one of the main challenges of European nature conservation in the next decades. The existing nature reserves and pristine landscapes should be conserved as core areas and the landscapes next to and between them need to be developed as stepping stones for species. In this way, the European Green Belt contributes to the implementation of the Convention on Biological Diversity (CBD) and Natura 2000 (EU Habitats Directive 92/43/EWG). Furthermore the European Green Belt will contribute to the implementation of the six main aims of the EU-Biodiversity Strategy for 2020.

Leibenath et al. (2009) and the European Environmental Bureau (2008) describe the importance of the Green Belt in combination with other large scale ecological networks, like the Alpine-Carpathian network or the ecological network along the Rhine river. The mentioned large scale ecological networks do not only support trans-boundary cooperation, they also are a chance to halt the loss of biodiversity at least in parts.

Conclusions

The further protection and development of the Green Belt Europe as Pan-European ecological network and historical heritage is a big challenge for the next decades. Therefore

the EU is asked to support the Green Belt, referring to target 2 of the EU-Strategy on Biological Diversity. To achieve these objectives, further trans-boundary projects need to be supported by the European countries as well as by the EU also including EU-candidates and non EU-countries. Regarding the EU-level, this requires a special priority for the preservation and support of the ecosystem function of the European Green Belt in currently implemented and future infrastructure projects; as well as the trans-boundary harmonization of conservation area management, the closing of gaps within the ecological network and the establishment of additional trans-boundary protected areas as core areas and buffer zones. Moreover an adaption of the EU-subsidy policy is urgently necessary; e.g. the comprehensive coordination and restriction of biomass production and industrial agriculture, which currently endangers the ecological network of the Green Belt and its unique landscapes. Instead, a support of ecological land use and sustainable regional development along the Green Belt is needed.

Above its uncountable value for nature conservation, the European Green Belt is also a European cultural heritage of invaluable asset. It is both a commemorative landscape and a living monument for the overcoming of the Iron Curtain and the Cold War just as it is a symbol for the overcoming of the separation of Europe. Therefore the long-term objective is to nominate the European Green Belt as UNESCO (natural and cultural) World Heritage.

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Spruce Bark Beetle in Šumava NP: A Precedent Case of EU Wilderness Protection, the Role of NGOs and the Public in Wilderness Protection

Jaromír Bláha, and Vojtech Kotěcký

Abstract—Šumava National Park, in the Czech Republic, is, along with the adjacent Bayerischer Wald NP in Germany, one of the largest wilderness areas in Western and Central Europe. Mountain spruce forests here have been heavily influenced by natural disturbances. Following years of debate about conservation management in the national park, logging operations on the Czech side were stopped by massive public protests, including a logging blockade, in 2011. Meanwhile, the Ministry of the Environment Minister and the National Park Director proposed changes that would legalize logging in areas which were previously left to natural processes, reduce the national park's long-term goal of extending the core zones and facilitate development activities (i.e. new ski lift in a core zone of the NP). A survey among visitors of the Šumava NP was carried out in summer 2011. The results show that views of logged clearings bother tourists more than dead trees in wilderness zones. The most effective public awareness measure seems to be direct wilderness experience. The results also confirm that wilderness might significantly boost the region's economy.

Keywords: wilderness protection, national park, visitor questionnaire, public awareness campaign

Introduction

Šumava National Park, designated and administrated by the national government, was established in March 1991, in the central part of a mountain range running along the border between Germany and Austria – see Figure 1. It extends over an area of 690 square kilometres. Forests cover almost 84% of the national park, with meadows and pastures accounting for 7%. Altitude of the park stretches from 600 metres above sea level to 1,378 metres. About 1,000 square

kilometres of Šumava Protected Landscape Area serve as the national park's buffer zone and protect some natural features of the region that lie outside the park.

The national park is a mosaic of old growth forest fragments (montane spruce, mixed spruce and beech, montane beech and waterlogged spruce forests), peat-bogs and peat meadows, glacial lakes, wild rivers, forests more or less changed by humans and succession vegetation in abandoned former villages. There are only several small villages within this natural complex. The overwhelming majority of settlements ceased to exist after a forcible resettlement of the German minority after the Second World War and after part of the territory ended up behind the Iron Curtain and was thus made inaccessible by the Communist regime.

After the political changes in Central Europe and opening of the Iron Curtain, designation of the National Park in 1991 presented a unique opportunity to renovate the undisturbed natural processes in a relatively large area in Central Europe, to study interactions among diverse ecosystems and to create a vital space for rare species such as the lynx (*Lynx lynx*) and, potentially, also the wolf (*Canis lupus*) and the brown bear (*Ursus arctos*). IUCN described the national park as “part of the largest, best conserved and most species-rich forested area in Central Europe” (Fischborn 2012).

Šumava NP is home to the only viable population of the western capercaillie (*Tetrao urogallus*) in the Czech Republic. Flagship species, such as the lynx, the black grouse (*Tetrao tetrix*), the European elk (*Alces alces*) and the Ural owl (*Strix uralensis*), usually receive most of the attention, but perhaps the most unique fauna of Šumava National Park is the relic and endemic insect fauna of isolated peat bogs, stony habitats, waterlogged spruce forests and remaining fragments of montane forests (Spitzer 2001). Šumava peat bogs and waterlogged forest are a wetland of international importance under the Ramsar Convention.

The German Bayerischer Wald National Park, designated and administrated by the regional (land) government of Bavaria, was established in 1969. It originally covered an area of 130 square kilometres. Its highest areas are covered by montane spruce forests, with montane mixed (spruce and beech) forests on the slopes and mostly waterlogged spruce forests in valleys. In 1997, the Bayerischer Wald NP was extended towards the west and so today it covers an area of 242 square kilometres. The establishment of both Šumava NP and Bayerischer Wald NP provided a unique opportunity for restoring and protecting a large wilderness area in Central and Western Europe.

J. Bláha is forest and nature conservation campaigner at Hnutí DUHA (Friends of the Earth Czech Republic), Lublaňská 18, Praha, 120 00 Czech Republic. V. Kotěcký is at Charles University in Prague, Faculty of Humanities, U Kříže 8, Praha 5, 150 00 Czech Republic, and Hnutí DUHA (Friends of the Earth Czech Republic). E-mail: jaromir.blaha@hnutiduha.cz.

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Figure 1—Sumava NP (red area) and Bayerischer Wald NP (blue area)

In Bayerischer Wald, political agreements are respected and the area left to natural processes is gradually being extended and by 2027 the non-intervention zone should cover 75% of the park. The natural zone with no human intervention currently covers 56% of the park's area.

Bark Beetle and Wilderness: Lessons Learned for Scientists and Foresters

The central part of Šumava consists of an ecosystem comprising mountain spruce forests, waterlogged spruce forests, and peat bog spruce forests interspersed with raised bogs. The vegetation of the individual forest types and peat bog formations create a spatially and functionally complete mosaic in a large area. While there are substantially modified forests, spruce monocultures and semi-monocultures in the peripheral parts of the national park, recent research by Czech scientists and Friends of the Earth has shown that 50% of the national park consists of natural habitats that can be immediately included into a wilderness zone without human intervention (Bláha et al. 2013).

Montane spruce forests of this area are continuously affected by natural disturbances – the wind and the spruce bark beetle (*Ips typographus*) outbreaks (Svoboda et al. 2010; 2012). The spruce bark beetle is considered to be a keystone species of this forest type (Müller et al. 2008).

Since the very beginning of the Šumava NP decisions about its management have been bogged down in never-ending discussions about whether bark beetle infestations should be controlled or a strict 'non-intervention' policy adopted in a core zone (Křenová and Vrba 2013). The traditional forestry

approach applied in commercial forests in order to reduce the activity of the spruce bark beetle, prevent its outbreaks and slow down the montane forest disintegration stage by means of cutting down the infested trees was also applied in Šumava NP between 1995 and 2006. It led to the thinning of the forests and therefore to their lower stability or to the creation of clearings and forest stands walls.

However, subsequent windfalls substantially accelerated the forest disintegration stage. Figure 2 shows the spruce bark beetle outbreaks between 1996 and 2001 – the most extensive cutting of the infested trees happened in 1996 and 1997. Other gales, which were not so strong, caused windfalls mainly in such stands where clearing had been created as part of the fight against the spruce bark beetle – see Figures 3, 4a and 4b. This stage was finished by the Kyrill storm in 2007. In those national park forests that had not been affected by logging the storm caused mainly individual or group windfalls or breaks – see Figure 5. However, the montane forests affected by previous logging were literally swept away (Bláha 2012). An impact assessment search after the Kyrill storm suggested a significant negative influence of the removal of windfalls and bark beetle infested trees on the acidophilous and peat bog spruce forests in the core habitat of the western capercaillie (*Tetrao urogallus*) (Bejček et al. 2007). In most of these stands no other cutting has been carried out.

The results of the monitoring of natural regeneration in the non-intervention areas show that the spontaneous forest regeneration after spruce bark beetle outbreaks is fast and more than sufficient. The average density of the regeneration is 4,848 spruce and mountain ash seedlings per hectare (Čížková et al. 2011).

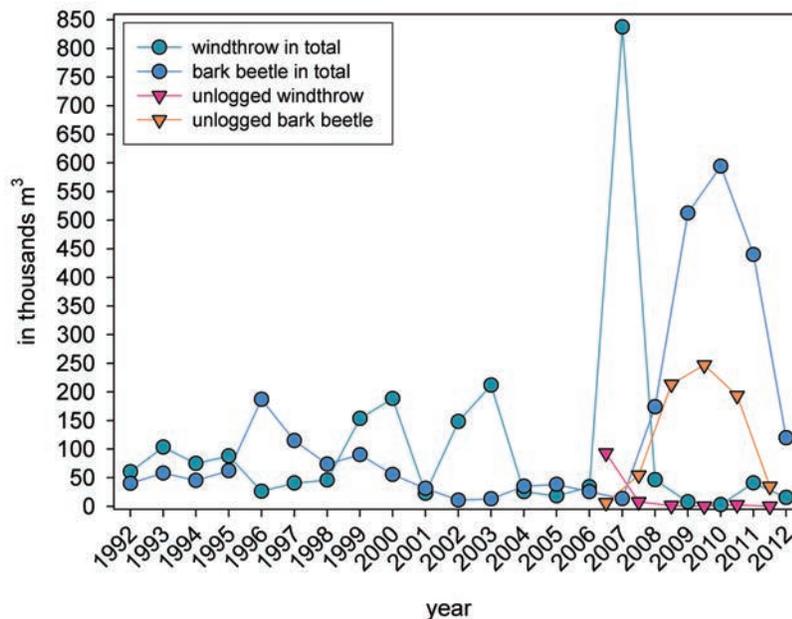


Figure 2—Windfalls and spruce bark beetle outbreaks (*Ips typographus*) are “communicating vessels”. Up to 2007, all trees attacked by bark beetle and fallen/broken by wind were logged in II. zone of Sumava NP. In 2007 some parts of forest stands destroyed by windstorm Kyrill were left without intervention. From August 2007 to 2012, increment of area covered by newly fallen or attacked trees was counted from aerial photos. This area is converted to total timber volume (m^3) in individual years by multiplication with average growing stock ($300 m^3 \cdot ha^{-1}$).



Figure 3— A new road created in 1989, i.e. before the establishment of Šumava NP, opened the stands adjacent to Trojmezrná Old Growth Forest. The spruce bark beetle then began to breed on the edges of the stands. The cutting of the infested trees resulted in clearings, which were further extended by the wind. Photo: Jaromír Bláha / Friends of the Earth Czech Republic

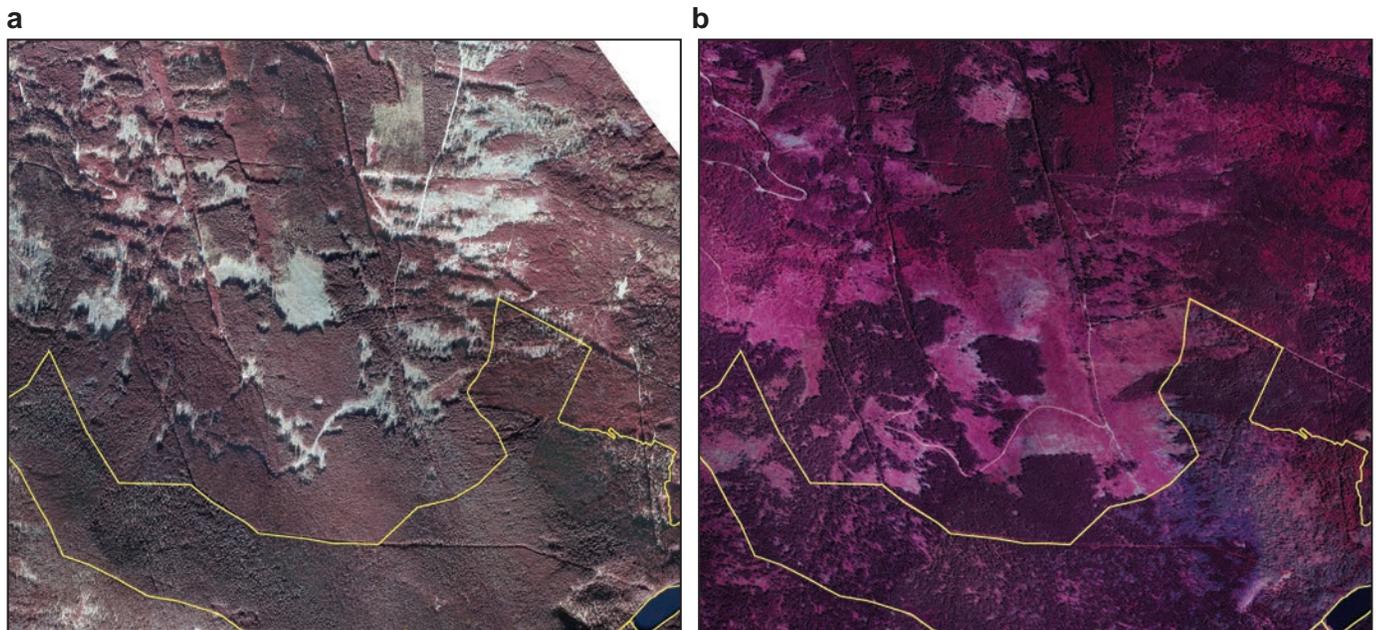


Figure 4a, b—Aerial photographs show the extension of the clearings (especially of those created by the wind) near Trojmezrná Old Growth Forest (marked by the yellow line) in 1996–2006.



Figure 5—In Trojmezna Old Growth Forest, Šumava NP no action against the bark beetle was carried out and the wind affected the area only insignificantly. Photo: Jaromír Bláha/Hnutí DUHA – Friends of the Earth Czech Republic

Conflict of Interests

Friends of the Earth Czech Republic has recognised that the complicated problem with spruce bark beetle in Šumava NP is a precedent case for wilderness protection in protected areas – national parks (IUCN PA category II) and natural reserves (PA category I. by IUCN) – in the Czech Republic and Central Europe. Intervention in natural disturbances contravenes the very principle of national park core zones. Furthermore, it also damages the key habitats of endangered species, such as the capercaillie (Bejček et al. 2007).

However, wilderness protection in Šumava National Park also faces strong logging and construction pressures. In the case of the calls for logging leading to the reduction of wilderness areas a combination of factors is in play – high prices of timber, surplus of timber processing capacity, surplus of the capacity of logging work suppliers, and large reserves

of timber in the national park that can be logged instantly. Of the total area of 48,749 hectares of the government-owned forests in Šumava National Park, 17,628 hectares of forests were older than 100 years as of 2010 (Krejci 2010). If they had not been part of the national park they would have been logged immediately. Based on current average timber value in Šumava NP, value of timber in forests above 100 years is estimated at € 300 million.

There are even stronger pressures on building more boarding houses, hotels, private holiday resorts as well as residential houses. Due to the very attractive natural environment and the large number of visitors to the park (two million visitors a year: Dickie and Whiteley 2013) the prices of the land potentially available for construction are very high in Šumava National Park. That results in land speculation and pressures on development in the areas of pastures, meadows and forests. Ironically, Šumava NP belongs – along with Krkonoše NP and with the Prague suburbs – among areas with the highest number of completed homes per capita in the Czech Republic in the last decade (Ouředníček et al. [eds.] 2011).

In the southern part of Šumava NP development interests and local politicians are trying to push through the construction of a ski resort in one of the key capercaillie breeding sites and across lynx and European elk migration routes (EIA Servis 2011) – see Figure 6.

These commercial interests are in conflict with the public interest in preserving biodiversity as well as the informational value brought by the spontaneous ecosystem development, of interest of the national park's visitors, who come to admire the wilderness areas, and theoretically to some of the local inhabitants who profit from the tourist industry. A comparison of the economic effect of soft tourism with the effect of the traditional logging and forestry use of the forests in the adjacent Bayerischer Wald NP has shown that the profits

generated by the specific national park tourism – i.e. by those tourists who visit the area because of the national park – are higher than the lost profits from logging and forestry activities (Mayer and Job 2011). That is reflected in the income of local communities as well – communities within Šumava NP have at least twice as much profit as communities immediately beyond the border of the national park (Zeman 2008).

However, policy decisions in the Czech Republic are often distorted by what the country's intelligence service described as “calculated, illegitimate influencing of the legislative process” by shadowy interests with links to political parties and government bodies, with environmental protection as one of the most at risk areas (BIS 2012). Therefore, permanent wilderness protection in Šumava NP requires strong support by the public and especially by local inhabitants and by park visitors in order to be viable.

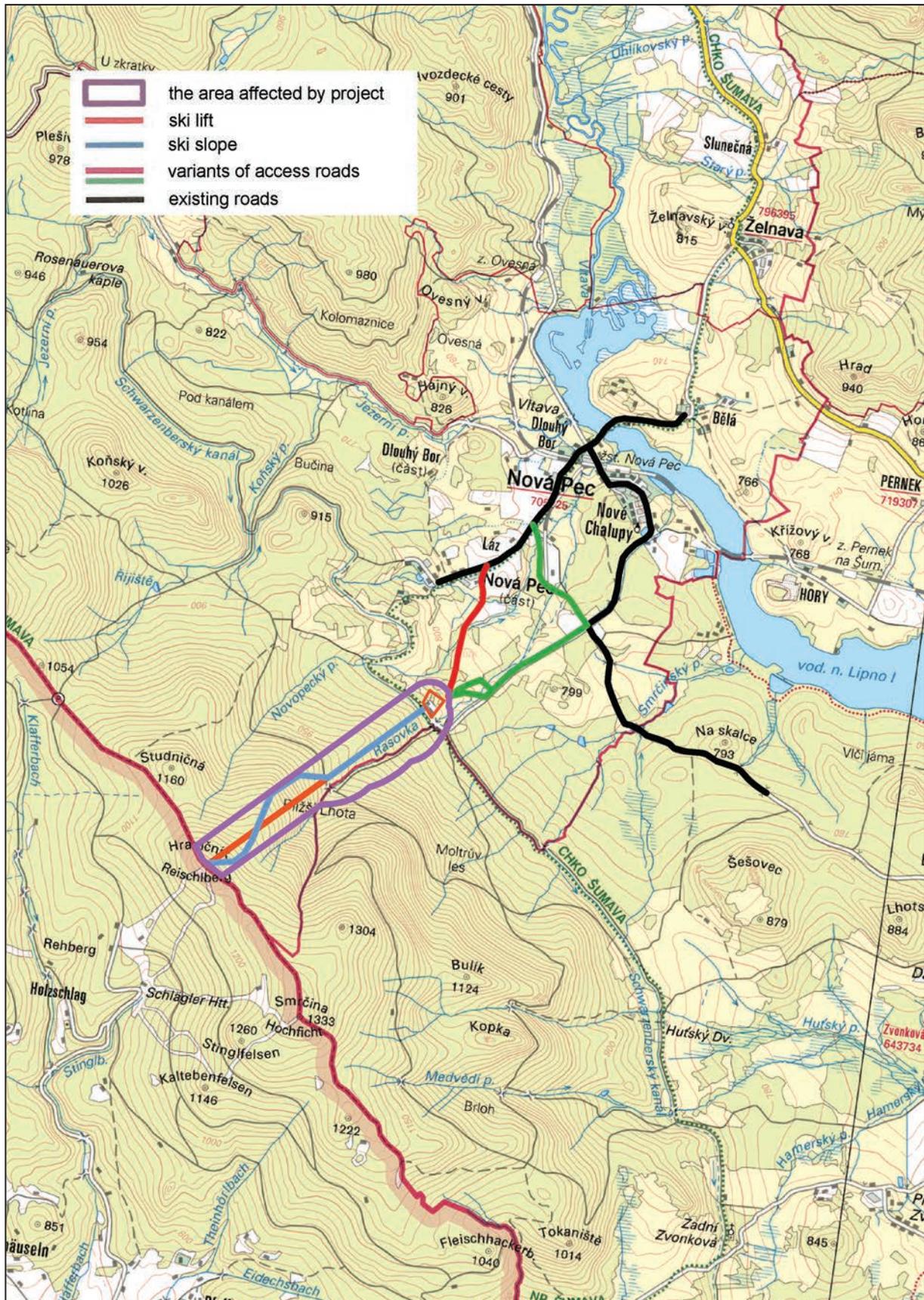


Figure 6—Project of ski resort development in southern part of Sumava NP.

Friends of the Earth's Advocacy Work to Restore Wilderness in Sumava NP

Friends of the Earth Czech Republic has advocated for wilderness protection in Sumava NP since 1994. Its work is focused on the general public as well as on selected key actors—i.e. the local inhabitants and park visitors.

A combination of strategies and means was used in the campaign to protect Sumava NP: Intensive media work including press conferences and media releases, briefings for journalists, excursions for journalists and other media events; a petition (20,000 signatures collected); a concert; celebrity involvement; demonstrations; public excursions to the wild areas of Šumava NP; summer work camps for volunteers in the field (revitalization of water regime in peat bogs); Lynx Patrols—public involvement in protection of lynx against poaching; and monitoring of logging in the national park. Along with public work, there was lobbying, expert and legal work, research reports on nature conservation and wilderness in Šumava, complaints to the Czech Environmental Inspectorate (CIZP, the national environmental law enforcement body), and the European Commission, formal involvement in logging permit procedures, and lawsuits.

And, finally, on three occasions, peaceful blockades were organised by Friends of the Earth, other environmental groups and scientists. We launched them when there was a threat of systematic destruction of the wilderness areas and of the mission of the national park as well as of permanent damage of the key habitats in the national park by logging.

In spite of the strongly positive economic impact of the national park and wilderness areas, the public awareness campaign aimed at the local inhabitants was largely

unsuccessful. The decisions of the local mayors are strongly influenced by regional politicians who strive to push through the construction of a ski resort and reduce the non-intervention areas. Local communities are divided and some key members actively undermine nature conservation in the national park. Despite that (and because the actual villages are in fact distant from some key sites in the park), national public opinion continues to oppose logging and development in the national park. Because of that, short-term work has focused more on the park visitors. Thousands of brochures, leaflets and post cards for visitors were distributed via local guest houses and hotels. Information stalls in some of the most visited spots in the park, where volunteers explained the issue and the wider concept of wilderness protection to tourists, were organised every year.

Campaign Results

The debate – and, consequently, advocacy by Friends of the Earth, other environmental groups and scientists—has gone through three key stages.

While there was de facto non-intervention management in some parts of the national park, wilderness was not a major issue when the park was established in 1991. This is why the field managers' initial reaction to a bark beetle outbreak in mid-1990s was to focus on large-scale clearcuts in the higher and central parts of Šumava NP (see Figure 7). Friends of the Earth started to file complaints with The Czech Environmental Inspection (CIZP) in 1995–1998. The explicit case for wilderness—and for natural disturbances being part of it—was, however, rather surprising for both the national park administration and the Ministry of Environment officials.



Figure 7—Large scale clearcuts at the border ridge along the border between Sumava NP and Bayerischer Wald NP after logging of bark beetle affected trees and subsequent windfalls, Sumava NP, 2000, Photo: Jaroslav Soukup.

That is, partly, why in 1999 the national park management decided to cut down the bark beetle infested spruce trees even in the fragmented remains of old growth forests and in the first zones that were, in fact, wilderness at that time. Logging would have resulted in no montane spruce forests without intervention against the bark beetle in Šumava National Park. Therefore, Friends of the Earth, along with scientists and several local people, organized a peaceful blockade, which stopped logging in Trojmezna Old Growth Forest – the largest and most valuable remainder of an old growth montane spruce forest in the Czech Republic – during that summer. The blockade caused a heated nation-wide debate about the mission of the national park. The blockade also resulted in a shift in political discussions—in 2000 the representatives of non-government environmental organizations, scientists and the Minister of the Environment sat down to one table to negotiate. The outcome of the talks was the invitation of an expert IUCN delegation to Šumava NP.

According to a 2001 poll, public opinion was split: one third opposed wilderness, if that included bark beetle outbreak, 38% supported it and the rest remained undecided (CVVM 2001).

IUCN experts invited by the Ministry of Environment visited Šumava NP in 2002. One of the key recommendations was to consolidate and enlarge the core zone with non-intervention management to 30-40% of the NP area within 3-5 years, and no clearcuts in central parts of the national park (Solar and Galland 2003).

However, the national park director of that time refused to comply with the new minister's order to respect the IUCN recommendations and continued cutting down the bark beetle infested trees even in the core zones of the park. The peaceful blockade by Friends of the Earth stopped extensive cutting in waterlogged natural forests around the Vltava River headspring—which is one of the most attractive places for tourists in Šumava National Park. NP director was removed by his superiors and felling in the core zones was restricted in 2004 by the new Šumava NP director, and so it remained

for years. This was the moment when, after an initial confusion of the late 1990s and early 2000s, Šumava started an ambitious transformation into a common European national park, an IUCN Category II protected area.

The new NP strategy for wilderness protection, proposal of new zoning and new non-interference areas were drafted in 2005. A long discussion with local municipalities about new zoning did not lead to common agreement for it to be formally approved. However, it was the basis of national park administration work for years to come.

Enlargement of bark beetle non-interference regime areas to 30% of the NP was approved by the Ministry of the Environment after the Kyrill storm (see above) in 2007. Meanwhile, public opinion has moved after the years of debate and work by Friends of the Earth and scientists. A 2008 regional opinion poll commissioned by the Ministry of Environment showed that 54% of the people in the region support natural processes of the most valuable parts of Šumava NP, even if it includes bark beetle activity (STEM 2008).

Visitors' views are even more favourable. 68% of 4,118 visitors polled in a 2009 survey of tourists in the park said that the NP is important for their decision to visit the Šumava Mts. (Friends of Earth Czech Republic, 2009), and 63% of tourists who responded in the 2010 poll said that they expect to see nature without human interference in substantial parts of the national park (Friends of Earth Czech Republic, 2010). This is crucial for nature conservation since tourism is the backbone of the local economy: approximately 2 million tourists visit Šumava NP every year. Another poll in 2011 asked what proportion of the park, if any, should constitute the core zone which will be left without human interference (Friends of Earth Czech Republic, 2011). Seventeen percent suggested less than 30% of the NP; while 45% supported 30–40% and 36% wanted to see wilderness on more than 40% of the NP – see Figure 8. The key question whether visitors like or dislike to see so many dead trees was asked in a 2010 poll. Fifty-two percent of the 3,916 visitors who responded to the poll said that they did not mind to see dead trees; 33%

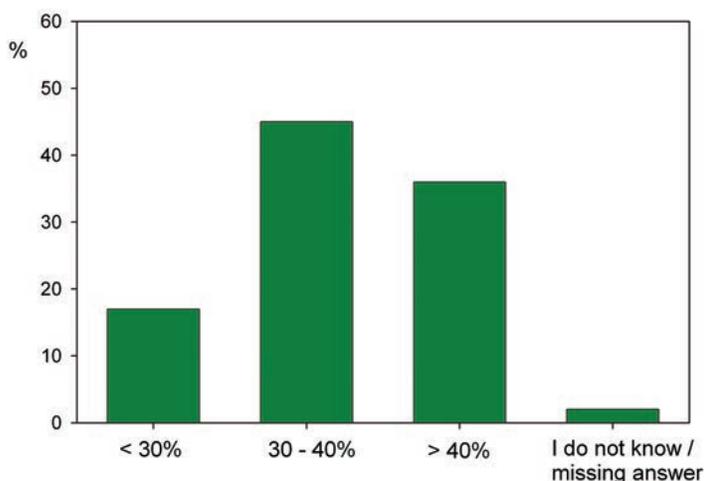


Figure 8—Result of the visitors poll 2011, answered by 2,932 respondents. Question: What part of Šumava NP should be left without human interference, with limited access to some sites (e.g. peat bogs, core breeding grounds of capercaillie), considering that the remaining parts of the NP will be managed in a close-to-nature forestry?

even said that they deliberately visited these sites in order to watch natural changes of the forest. Forty-seven percent disliked the view of the dead trees, but only 5% avoided the affected sites when hiking in the NP – see Figure 9. These results are very close to similar research in Bayerischer Wald NP (Suda and Pauli 1998). A similar question about the acceptance of clearcuts shows that 68% of NP visitors dislike the view of clearcuts (while 31% do not mind); 10% dislike them and avoid the affected sites (see Figure 10).

Šumava NP Wilderness in Danger

2010 brought a major shift in government policy. The new conservative minister of the environment replaced the national park director with a retired politician who was famous for his statement: “Nature is an enemy, and therefore it is necessary to fight it.” (Týden 2011)

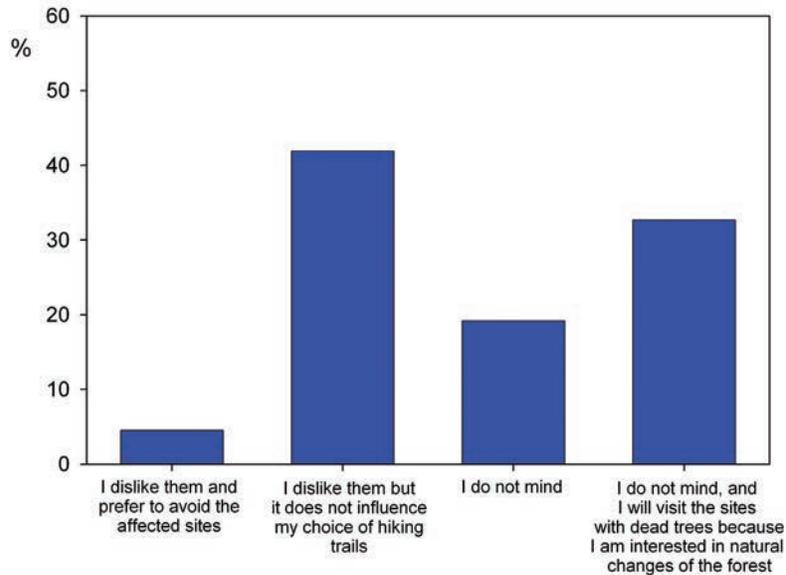


Figure 9—Result of the visitors poll 2010, answered by 3,916 respondents. Question: Do you dislike that you have to see many dead trees in non-intervention zones of the NP?

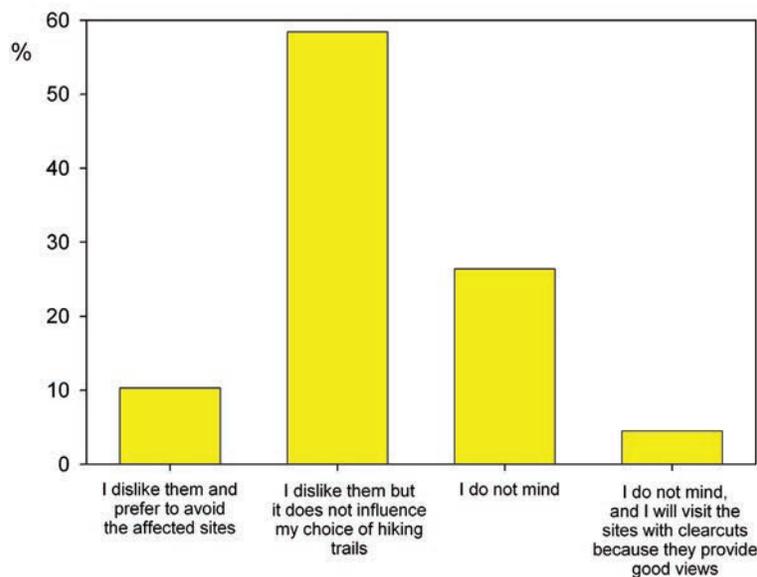


Figure 10—Result of the visitors poll 2010, answered by 3,916 respondents. Question: Do you dislike the view of clearcuts in the national park?

The first steps of the new director was to cancel the park's application for the European Council Diploma, which was prepared as a result of the previous positive management policy, and dissolving the Šumava National Park Scientific Council. The scientists created the Šumava NP Shadow Scientific Council (note the similarity with the independent Climate Change Council in Australia, created by former members of the dissolved government's CCC after an election in late 2013) and started to play a major role in the debate. The national park director also laid off a number of national park experts: zoologists, visitor managers, environmental education specialists, officials responsible for oversight of construction activity in the park, and others (Bláha, 2011).

Tree felling started in major parts of non-intervention zones and the use of pesticides continued in other parts of Šumava NP during the spring of 2011. The plan to solve the bark beetle outbreak by clearcuts and pesticides never underwent a formal Natura 2000 impact assessment, which is obligatory under the EU law.

Tree felling became massive in some of the previously non-intervention zones, and the situation culminated in an open conflict between the proponents of wilderness and the government when hundreds of active citizen, tourists and scientists attempted to block tree felling in the ancient spruce forest habitats around Bird Creek (Ptačí potok), a part of Modrava peat bog area - see Figures 11 and 12. They received support from environmental groups in the country and abroad, national human rights and anti-corruption advocates, celebrities and top scientists. However, the national park administration mobilised some people in the local communities to demonstrate against the conservationists, and special police units intervened upon the government's request – see Figure 13. The protests were intensified by demonstrations in front of the Ministry of the Environment in Prague and by national petitions – see Figure 14. The government stopped felling around Bird Creek because of this pressure, but only after it had created 32 hectares of clearcuts (out of 280 ha of Bird Creek area defended by the blockade).



Figure 11—Waterlogged and peat forest stands at Bird Creek (Ptačí potok) area. Photo: Markéta Jedličková/ Friends of the Earth Czech Republic



Figure 12—Nonviolent blockade of tree felling at Bird Creek (Ptačí potok) area, July 2011. Photo: Jindřich Prach



Figure 13—Special Police units intervened against conservationists, Šumava NP, Bird Creek (Ptačí potok) area, August 2011, Photo: Iva Zimová, <http://www.blurb.com/b/2510563-priroda-si-pomuze-sama>



Figure 14—Demonstration in front of The Ministry of Environment against tree cutting in non-intervention regime areas in Šumava NP, August 2011, Photo: Jan Losenický .

Several weeks later a regional court decided that police actions against the people who had blocked tree felling were illegal, that police had breached the protestors' constitutional freedoms and that they were obliged to deal with the protestors' complaints that the logging itself was illegal before intervening in favour of one side. This, along with the national ombudsman's ruling that tree felling in Natura 2000 sites without an impact assessment was illegal and with the CIŽP's decision to fine the park administration for breaches of law, was a major breakthrough in the debate – but not in government policy.

The Šumava debate came to a (yet unfinished) resolution in early 2013. After years of controversies, the government and some local Members of Parliament decided to deal with the dilemma by means of special new legislation, which was introduced to the parliament.

The proposed law would open some of the key wildlife sites to logging, enable development projects including a ski resort in the middle of key capercaillie and lynx habitat (see above) and implies that development projects will not have to respect national park conservation anymore.

Furthermore, the government proposed a new management plan which suggests downgrading the protection status of Šumava NP from IUCN category II to IUCN category IV while keeping the 'national park' label, because it is well aware of its marketing and political advantages.

The proposal raised another wave of widespread public opposition. Thousands of people wrote to the Members of Parliament: it is estimated that each Member of Parliament received more than 500 original, personal letters or emails calling for the protection of the Šumava wilderness. The parliamentary debate was interrupted by the (unrelated)

collapse of the governing coalition and an early election scheduled for late October 2013. However, it is clear that the legislative battle will reopen shortly after the election. Since most political parties, both left- and right-wing, are divided over the Šumava issue, a lively parliamentary debate and narrow margin votes are expected.

Discussion

The most effective feature of the public awareness campaign seems to be direct wilderness experience during public excursions. They can permanently influence the participants' opinions, very often to such a degree that they later become personally involved in wilderness protection. Negative emotions caused by a large number of dead trees are experienced by some of the public excursion participants when they look at them from a distance. However, their views change soon after they enter the forest with dead trees where a large variety of life, structures and shapes is obvious and their feelings become positive. The same has been shown by visitor polls in the adjacent Bayerischer Wald NP (Suda and Pauli 1998). However, public excursions have a limited impact due to the low number of participants although they share their personal experience with others.

The blockades were of significant influence – they were milestones in the debate about wilderness protection in Šumava NP. We believe that peaceful blockades were a distinctive feature of the campaign, justifiable in exceptional cases when other actions have failed and when there is a threat of permanent damage to natural values. The blockades accelerated debate, made all the parties including politicians take a stand, and caused politicians to return to discussions with experts and with the public.

The current threat to the national park has met a strong reaction from the international community – which perceives the danger that deterioration of wilderness status of Šumava NP may lead to similar developments in other protected areas across Europe and the EU in particular. Seventy-two heads of conservation bodies – national park directors, executives of WWF, Birdlife, European Environmental Bureau and others – sent a strongly worded letter to the Czech minister of the environment, expressing concern about the government's proposals: "Above all, there is a clear signal that even the best known National Parks are not protected."

The issue is of significance not only for the future of nature protection in the Czech Republic, but also beyond -- not least in relation to the review of EU nature conservation legislation which is expected to take place in the next couple of years.

Re-designating the park, which is also one of the key Natura 2000 sites in Central Europe, would be extremely dangerous as a major precedent because of the domino effect. A blatant breaching of Natura 2000 rules in a site of crucial importance, one which has been under protection of both national and EU legislation, would set a dangerous example for other governments.

It will be very important what stand on the case the European Union will take. Janez Potocnik, the EU Commissioner for the Environment, sent a letter to the Czech minister of the environment in 2012, asking him to "put a halt to the large scale logging in the Šumava NP". European Commission officials visited the park afterwards. However

we do not know what will be the result and final position of the European Commission, yet. The outcome of this process will also answer the question to what extent can Natura 2000 ensure wilderness protection in Europe. The cases of threats to the remainders of wilderness in Europe, such as Białowieża Forest, Šumava, and others show that a special EU wilderness directive (a piece of EU legislation) may be needed.

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Operationalization of the Wilderness Targets of the German National Strategy on Biological Diversity

Albert Reif

Abstract—The German government’s National Strategy on Biological Diversity (NSBD) aims at protecting its biodiversity in a broad sense. The NSBD calls for 5% of Germany’s forest land area to be permanently set aside for natural forest protection, i.e., natural processes taking place, and as a second target, for 2% of Germany’s land area to become “wilderness areas,” where the land is left to develop without human interventions.

Introduction

The German government’s National Strategy on Biological Diversity (NSBD) aims at protecting its biodiversity in a broad sense. Integrated approaches are combined with two complementary targets: The NSBD calls for 5% of Germany’s forest land area to be permanently set aside for natural forest protection, i.e., natural processes taking place, and as a second target, for 2% of Germany’s land area to become “wilderness areas,” where the land is left to develop without human interventions. Both targets provide the frame conditions for areas with permanent protection of completely natural processes, i.e. without physical human impacts, where undisturbed successions and dynamics take place. The area covered by these two concepts is overlapping by definition.

The NSBD should be implemented so that it can be completed by 2020. Due to this strategy, two “research and development projects” were launched by the Federal Agency for Nature Conservation, “Natural forest protection (5%)” and “Implementation of the 2% wilderness-goal”. Forest areas with natural protection (FAND) are by definition areas without direct human impacts, where undisturbed successions and dynamics take place (Meyer et al. 2007). This also implies permanent cessation of forestry and absence of other management measures. Wilderness areas (WA) have to be

“sufficiently” large, unfragmented, and have no exploitation of natural resources, or human interventions. Wilderness restoration areas (WRA) have been heavily modified by human activities and are at present under conversion to more natural conditions, and will become WA in the near future.

Common Characteristics

Common characteristics of the two concepts are

- protection and development of biodiversity in a broad and undetermined sense;
- protection of undisturbed natural processes will be guaranteed permanently by law, regulations, contract, testament;
- absence of all physical uses; recreation and research may be permitted.

For certain cases, an initial introduction of large grazers may occur, replacing the extinct “megaherbivores”.

Differences

Despite WA and FAND having many similarities some differences are pronounced (table 1). WA tend to be larger in size and cover all types of natural ecosystems, whereas FAND areas are confined to forest habitats and can also be very small (table 1).

Nature Conservation Criteria

The core criterion in terms of nature conservation for FAND as well as for WA/WRA is the dominance of natural processes in absence of physical use and interventions by humans as the long-term final objective of both categories (table 2). Besides the protection of natural processes, other criteria contribute to the value of single areas and/or the area system.

(1) Size, representing the completeness of processes, states, and species composition.

FAND have at least as minimum standard to be localized, which implies a minimum size of 0.3 hectare. With increasing size, the value of FAND for nature conservation increases.

Size criteria for wilderness areas in a densely populated country like Germany have to take into account the limited availability of large unfragmented areas but also have to be chosen to allow for ecosystem specific natural processes.

Dr. Albert Reif is Chair of Vegetation Science, Faculty of Environment and Natural Resources, Albert-Ludwigs-University, Tennenbacher Str. 4, D-79085 Freiburg, Germany. E-Mail: albert.reif@waldbau.uni-freiburg.de

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Therefore a minimum size for wilderness areas in Germany of approximately 1000 ha has been proposed for ecosystems like forests and (sub-)alpine areas and approximately 500 ha for azonal ecosystems like mires and alluvial areas.

(2) Habitat continuity

The value of FAND increases with increasing age of the locality bearing forest (Glaser and Hauke 2004) and with increasing average age of the trees of the stand. For wilderness restoration areas, habitat continuity will not be applied.

(3) Rareness and endangerment.

Strictly protected forest areas have a higher value if they harbour rare and/or endangered forest vegetation types (Rennwald 2000) of the potential natural vegetation (Suck and Bushard 2011), and are composed of a near-natural tree species composition. It is assumed, that rare forest types can act as “surrogates” for extreme site conditions also in future, e.g., after environmental (and vegetation) change. The criterion is applied for the whole reserve system on the national scale, and for seven terrestrial biogeographical regions within Germany.

For wilderness areas, rarity is included when aiming on protecting natural processes which largely or completely were eliminated from cultural landscapes, including in alluvial areas, avalanche screes, eroding slopes, or when permitting natural fires.

(4) Connectivity and absence of fragmentation

For large-sized WA, connectivity was not applied. In FAND reserve systems, small reserves lack completeness, but they provide connectivity for certain species and processes, e.g., migration of species.

(5) Representativeness

Representativeness is another important criterion for FAND: Reserve systems should contain all types of forest habitats / ecosystems in a balanced way (Pressey et al. 1993, Branquart et al. 2008).

Tools and Methods

The methods applied for the two land classifications are different. The FAND-project compiles all existing areas under strict protection (> 0,3 ha), using the information provided by the forest owners. The WA-project aims at selecting potential WA and WRA in Germany using GIS-shapes of unfragmented areas (Hänel 2007) and other thematic maps.

Both projects apply the nature conservation criteria mentioned above. Tools are GIS-shapes of maps of the potential natural vegetation; a digital terrain model, providing information on elevation and topography; geological map of Germany that provides information on the susceptibility of the bedrock to erosion, a map of existing strictly protected forest reserves and core areas of National Parks, and others. The compilation will involve the overlay of thematic maps, combining polygons with the specific criteria mentioned above.

Table 1—Differences in function and habitat types in relation to the concepts of “wilderness areas”/“wilderness restoration areas” and “Forest areas with natural development” in Germany

	Wilderness areas	Forest areas with natural forest development
Function	Protection of natural processes on ecosystem level including large natural disturbances, offering habitat to species which require large areas undisturbed by humans	Clear emphasis on protection of natural processes, , strict exclusion of physical utilization
Habitat type	To a large extent natural areas (WA) or sites modified by humans (WRA: former military areas, mining areas, embanked rivers), where succession towards natural states can take place or where natural processes can be induced. Habitat types: (prospective) forests, subalpine and alpine habitats, mires and swamps, alluvial areas, coastal areas.)	Areas with forest or the site potential to develop forest, where succession takes place or can be foreseen (e.g., areas which will be released from physical use by 2020)

Table 2—Criteria of nature conservation in relation to the targets of “wilderness areas”/“wilderness restoration areas” and “Areas with natural forest protection” in Germany.

	Wilderness areas	Areas with natural forest development
Size	>1000 ha for zonal vegetation types, and >500 ha for areas selected because of azonal vegetation (sensu NSBD), to protect processes and species depending from large-scaled disturbances, dynamics, and populations of human-fleeing animals.	≥0,3 ha (limit of localization).
Habitat continuity	(not applied for WRAs)	- Time period of bearing forest, stand age, threshold 200 years - Age of stand
Rareness and endangerment	Rare natural dynamic processes are protected	Rare/endangered forest vegetation types of the potential natural vegetation increase the value of FAND reserve systems
Fragmentation and connectivity	Absence of fragmentation within WA	Also small areas are included, they can act as stepstones for dispersal-limited species, e.g., of deadwood dwellers
Representativeness	Germany in total and its ecoregions	Germany in total and its ecoregions

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Access to Nature in Lithuania: Limits, Perceptions and Design Issues

Aida Macerinskiene

Abstract—One of the factors in local tourism could be nature tourism promotion for disabled people in protected areas. This social group is more sensitive to long-distance travel; therefore, it is likely that local tourism is especially attractive. The disabled population may possibly have more free time, which also makes local travel particularly attractive. The main focus while developing disabled people's opportunities in nature should be imposed on three parallel tracks: 1) a consistent segment-oriented policy, 2) assurance of its feasible implementation, and 3) promotion of the motives to travel. One of them by itself wouldn't be enough.

Introduction

Less than 3 million people currently live in Lithuania. For a variety of reasons, but mostly due to emigration, population number fell by 500 thousand over the last 10 years. However, despite these indicators, opportunity to live a better and healthier life in Lithuania has increased greatly. About 15 percent (2,465,815 acres) of Lithuania's territory is covered by land of exclusive natural attractiveness—protected areas. More than half of these consists of national and regional parks—1,477,363 acres. (Kamicaityte-Virbasiene et al. 2009). Lithuania's national and regional parks position themselves as territories suitable for tourism, but can all of society's social groups reach and enjoy them?

The local tourist flow is exceptionally important for the development of tourism in the country. However, for the time being, mass tourism in Lithuania is a phenomenon of the summer, with all tourists seemingly lined all the way to the Baltic Sea coast. Meanwhile, longer weekends, outdoor rest and recreation with family still have not become a tradition. To promote local tourism in Lithuania the intention was to carry out a study to assess how protected areas are used by disabled people. This social group is more sensitive to long-distance travel; it is likely that local tourism is therefore especially attractive. They possibly have more

free time, which also makes local traveling more attractive. This article analyzes travel into the wild among this social group; together with a new range of adaptation possibilities and upcoming challenges.

Throughout this research, the term disabled is used to include individuals “who have long-term physical, mental, cognitive, or sensory impairments that, in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others” (United Nations Convention on the Rights of Persons with Disabilities, 2008). Thus, the term disabled includes those with hearing, visual, communication, mobility, agility, pain, learning, memory, developmental, or psychological/psychiatric difficulties to the extent that it could hinder their participation within society.

Disabled people comprise about 8 percent of Lithuania's population. A particularly important issue is that disabled children (0.5 percent of the population) must be granted good conditions for visiting tourism sites (Mactavish et al. 2004). It should be added that as children are the future of each country, influencing their travel habits could lead to positive changes in overall perception of domestic tourism as well.

While Lithuania's population is decreasing in its numbers and this is reflected in the overall statistics considering disabled people, in some areas, however, this trend is reversed, for example: in Vilnius, Lithuania's capital city, the number of people with disabilities is increasing. This trend has led to a decision to investigate the needs of disabled people living in Vilnius and opportunities to enrich their existence, relating the upcoming results to the state strategic planning process and to the approach of specialists, working in the field of planning protected areas. The results are presented below.

Accessible Tourism Planning

Almost 20 years ago Martinez-Alier (1995), evaluating priceless nature's benefits given to tourism, wrote: “The environment becomes a luxury good...” At the moment, tourism based on environmental advantages is conferred in many different forms—green tourism, outdoor tourism, sustainable tourism, alternative tourism, niche tourism, responsible tourism, etc. (Buckley 1994, Buckley 2000, Ceballos-Lascurain 1998, Page et al. 2002). Apparently discussion about the positive impact of nature on the tourist has been largely absent, while most concern is about the impact which humans and created services are bringing upon nature itself.

Many researchers are analyzing the needs of disabled people, including their traveling necessities, the motives of their conduct, their “behavior” as a market segment, includ-

A. Macerinskiene is a tourism planning expert, assoc.prof. in Vilnius University, Faculty of Economics, Sauletekio str. 9,I bld. LT-10222 Vilnius, Lithuania, e-mail:aida.macerinskiene@ef.vu.lt

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ing for tourism marketing (Hug et al 2007; Kaganek and Kruczek 2011). Obviously, providing infrastructure and facilities alone are not sufficient. Tourism for the physically handicapped is an increasingly popular form of tourism activity in Bavaria, and the tourism base is well adjusted to the needs of the disabled spending their holiday in this region (Sawicki 2011). Various types of tourism are rapidly gaining popularity in Poland, also, with the interconnection between tourism and opportunities for the disabled an important subject among Polish scientists (Goralewicz-Drozdowska 2010, Sawicki 2011, Musiaka 2011).

While studying possible adaptation of natural resources to society's needs and promoting a new generation of responsible tourism consumers, it is time to remember the concept of accessible tourism (Sen et al. 2004). The accessible tourism planning approach is based on strategic territory and tourist product planning and design oriented to sustainable life, where all groups of society feel equal and comfortable. Accessible planning is the way of designing environmental spaces and elements so as to be usable by all people in all circumstances, avoiding the need of any special adaptation. One of the strategic goals of accessible planning is to promote equality and to ensure the equal participation of all members of society, including those with disabilities, in the public life, removing existing barriers and preventing any inappropriate changes.

The accessible planning concept presumes multiple planning approaches; it emphasizes equality more soundly than is expressed in the disabled people's freedom of movement concept. While the movement opportunities of people with disabilities can be strengthened applying specific engineering and architectural solutions, the accessible planning principle emphasizes preconceived primary solutions. In this context, planning is perceived as a congregated system of all factors involved—both planning and physical environment. The process involves the use of land, architectural and construction activities, product development and public hearings (Sen et al. 2004). Accessible planning is a principle which may become the starting point for all planning processes, which is especially important in nature. According to this principle the physical environment—buildings, natural areas, technical equipment, etc.—everything is designed and constructed in a way that all members of society have the opportunity to use it, regardless of mobility, vision, hearing and mental disabilities, or lower tolerance of environmental factors or allergies.

Assessment of needs of people with disabilities in the planning and development of public infrastructure often result in decisions that will be more functional for others, too. For example: cyclists and parents with children in strollers will appreciate infrastructure designed for wheelchairs. Specific measures for improved accessibility also upgrade the opportunities for people with mobility impairments. Anyone with limited hearing and vision, or even healthy, able-bodied people, will be satisfied with an easy to understand, specifically adapted environment (Israeli et al. 2002; Freeman et al. 2010). Clean air is an advantage for all of us, despite the fact that asthmatics and allergy sufferers are sometimes vulnerable.

Two main factors that determine the adequate adaptation of protected areas for the needs of disabled are being analyzed in this article: political decisions, implementation

and usage. To assess planning and implementation, the protected areas specialist's approach towards the universal planning and visitors with special needs was carefully analyzed. Consumer behavior analysis has been carried out on interviews of people with disabilities or their accompanying persons – those who are traveling or who intend to.

Methods

Methods used for the research – one interview with experts and two questionnaire surveys. Both interested segments, relevant to the protected areas and especially to the needs of the disabled people were interviewed: 1) tourism and recreation professionals, working in an area, that is national and regional parks; 2) visitors with special needs (people with affected motoric), with both physical and mental – information interpretation – disabilities (people with affected orientation).

The aim of the first survey was to assess the opinion of experts coming from the tourist information centers and regional parks on the infrastructure and meeting the needs of visitors. The aim of the second survey was to assess the needs of disabled people, their abilities and desires, finding out opportunities for developing the tourism infrastructure.

The first research was conducted by interviewing the target group associated with infrastructure planning in protected areas, consisting of professionals from tourist information centers and regional parks. Their daily activities directly related to tourists, they were proximate to the customers or those involved in visiting protected areas or other tourism objects. The inquiries method was a quantitative survey. The sample of 44 respondents (representative sampling; $(n = N / 1 + N(e)2; \pm 7\%)$, where N – number of specialists, n – number of respondents, e – margin level) for this study came from the number of specialists working in regional parks and related with tourism infrastructure. The timeframe for this survey was three months (August-October) in 2012.

Second survey used a quantitative survey method, directly distributing questionnaires among the respondents. However in the process a frequent respondent asked what the protected areas mean, who are those they are protected from, aren't they fenced? The sample of 121 respondents were interviewed during the query (representative sampling; $(n = N / 1 + N(e)2; \pm 7\%)$, where N – number of people with disabilities in Vilnius region, n – number of respondents, e – margin level). Timeframe for this survey was three months (August-October) in 2012.

Results

Infrastructure Assessed by Professionals From Nature Areas

While interviewing professionals representing protected areas, determining the advantages of those areas, and determining reasons for a visitor's choice to visit them were studied, along with problems appearing during or after their visit. It should be noted that the people working in the regional parks are best placed to see what kind of engineering infrastructure is best suited for incoming visitors or what is missing or in need of repair.

It is no surprise that nature and cultural heritage are very important reasons to visit protected areas (59% and 41% of respondents indicated that), as those areas are established in places where environmental features and facilities are the most numerous. However, various entertainments such as active recreation and cultural events accounted for only a small fraction (less than 20%) of tourist motives to visit a protected area. Sporting events are not a motive for visiting, because a big number of respondents have movement disability. However, lifestyle and traditions can be a great reason to visit thriving businesses and educational programs for the tourist in the protected areas, as an example – bread baking, candle making and so on. On the other hand, it is striking how a lack of information and activity, both from visitors and organizers, can undermine sports activities in nature or nurturing the local traditions.

It is essential to determine the level of infrastructure tailored to tourists while developing educational tourism in protected areas. The opinion of professionals, directly responsible for the development of such infrastructure, is one of the most important aspects evaluating infrastructure's capabilities in the protected areas.

According to the respondents, biking and walking trails are the most suitable for visitors, with 57 and 76 percent of respondents, respectively, evaluating these facilities as good and very good. Meanwhile, the least adapted infrastructure is considered to be:

Public WC, which 86% of respondents evaluated as bad and very bad, Catering services—77%,

Camping—78%, Public transport—80%. Other infrastructure installed in the protected areas—parking lots, beaches, bridges and so on—rated as average.

Tourism is a relatively new activity in Lithuania. It should be noted that the respondents had no doubts about the need for such infrastructure, as many as 84% agreed on that. More than half—64% of the respondents—considered the lack of infrastructure is due to lack of funds. But, the biggest issue is the lack of information on how to adapt the infrastructure so that it would be suitable for disabled people.

Expectations of Disabled People Already Travelling or Willing to Travel

Interviewing people with disabilities was crucial to understand where they intend to travel, the way they spend their weekends and what is their relationship to the protected areas and nature. Nature's impact on disabled people is a keystone in professional literature. Therefore it was important to understand the extent of opportunities, created by Nature itself and people, that disabled persons in Lithuania can use to her/his advantage.

Seventy percent of respondents answered affirmatively when asked how many of them participated in trips to national and regional parks over the past three years. Those with negative answers indicated the following main reasons affecting their behavior – lack of finances, missing information, no organization or invitation, absence of desire, no opportunity, complicated and not accommodating environment, due to deteriorated health, timing, work, family with small kids.

Which parks are favorite and most visited among the representatives of this social group? It is interesting to note the recognition of two parks as the most visited- Aukštaitija National Park and Trakai Historical National Park Reserve, more than 40% of respondents indicated visiting these parks. Not as often visited, but still popular are the Curonian Spit National Park, or Dzukija National Park, 25 and 15% respectively. The least visited is Zemaitija national Park with 3%.

However the crucial aspect of the study analyzing the protected areas is travel time and frequency. Most often respondents visited protected areas as short-term visitors, as 47% of them indicated that their trip lasted a day; 32% reported only half a day. Concerning is the frequency of visits, as half (46%) of visitors pointed out a visit once a year, while 35% visited twice.

The study showed that visits to national and regional parks were mostly organized by disabled people's organizations (39% of respondents), or family members (28%). The car was mentioned as the main way of traveling (40%), but those traveling by public transport make a large number – 30%. Twenty-five percent of respondents traveled by rented vehicle (mostly bus or minibus).

For people with disabilities, 42% named protected areas as a major leisure attraction. The respondents valued infrastructure, which is already installed in the protected areas, more negatively than positively. Beaches were rated the worst (87%), trails suited for disabled (76%), recreational equipment (79%). Other infrastructure, suited for disabled—camping grounds, public toilets, bridges were rated negatively by the majority of respondents. Public transportation is the best valued infrastructure, while only 28% of respondents rated it very well.

Services in the protected areas have been analyzed in addition to the infrastructure assessment—catering, accommodation, information, etc. Attention to the needs of the disabled often enhance the motivation to travel, meaning well-being, comfort and independence. Catering services are treated as the best, as 44% of the respondents assessed them as good or very good. Only 30% of disabled people rated other services – entertainment, tourism information, accommodation, transport services positively. Meanwhile the remainder (around 20%) rated them as very bad.

Discussion

Main survey results from park specialists:

1. According to specialists from the regional parks and tourism information centers tourists, visitors partly like to spend their leisure time in protected areas for nature and cultural objects. Strikingly noticeable, however, is that the various entertainments, active recreation, cultural events accounted for a small fraction (less than 20%) of tourists' motives to visit a protected area.
2. According to specialists, biking and walking trails are best suited for visitors, and the worst suited are public WC, catering services, camping and public transport. Other infrastructure installed in the protected areas—parking lots, beaches, bridges, etc.—rated as average.

3. Most of the experts indicated visitor and tourist information centers are suitable for the needs of disabled people and are adequately adjusted, while facilities such as campgrounds, recreational facilities, public toilets, beaches, trails, bridges and public transport were perceived as poor for the needs of people with disabilities.
4. Lack of information on how to accommodate the protected areas for the needs of disabled people was identified by the professionals as the main obstacle adapting infrastructure, as well as lack of funds. Among the specialists there were no real doubts in the need for such infrastructure.

Main survey, conducted with disabled people, results:

1. Survey, conducted with disabled people, has shown that this group of respondents likes to travel, as 80% of respondents have had a leisure trip over the past 3 years. The most favorite sites are Palanga (35% of the respondents indicated this place as the most frequently visited), Nida (8%); 14% were traveling abroad.

2. Survey of disabled people visiting a protected area has shown the following results:
 - Protected areas are mostly visited in summer (60%), but it should be noted that the spring (19%) and autumn (15%) attendance is also significant;
 - Respondents most commonly visit the protected areas as short-term visitors, with 47% of respondents in the survey indicating that their trip lasted one day, 32% reported only half a day;
 - Trips to the national and regional parks are usually organized by the organizations for disabled people, as 39% of respondents have indicated, or family members—28%.
 - Car was the most convenient way of transportation (40%), but quite a big part of travelers consists of those travelling by public transport—30% of the respondents, or by preordered vehicle—25%.
3. Positive attitudes were shown by disabled people and their escorts to the protected areas as reflected in the figures: only 5% questioned consider them unimportant, and even 42% named the protected areas as a major leisure attraction.

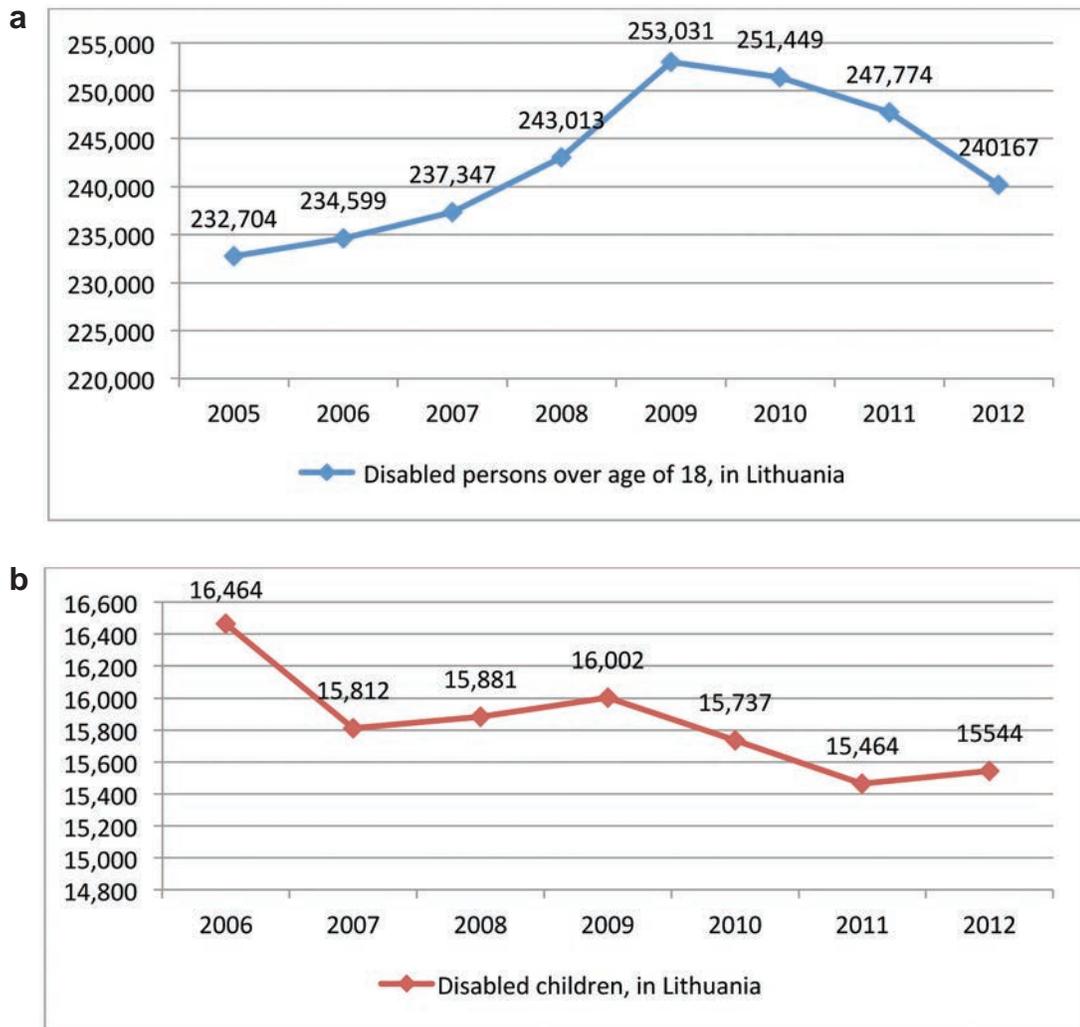


Figure 1—Number of dissable people (a—over age of 18, b—children younger than 18) in Lithuania. Source: www.stat.gov.lt

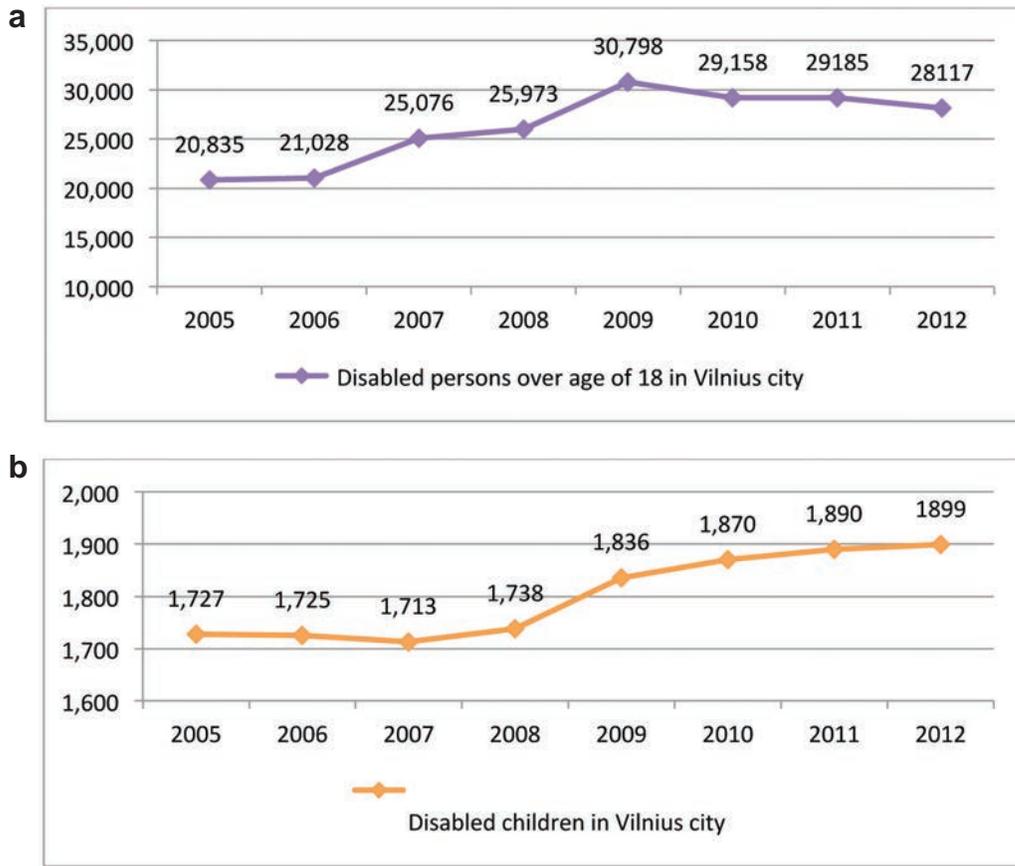


Figure 2—Number of dissable people (a—over age of 18, b—children younger then 18) in Vilnius. Source: www.stat.gov.lt

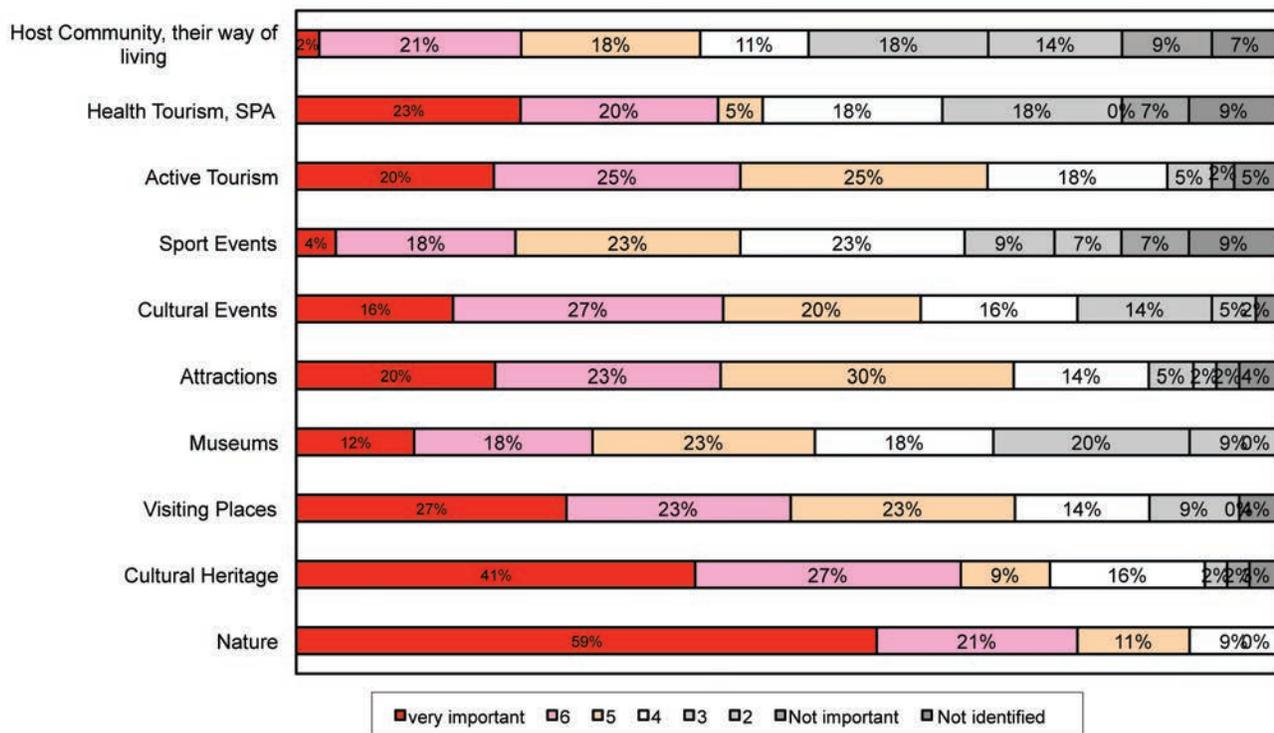


Figure 3—What are the main motives and interests of visitors/tourists coming to the protected areas? Rate in scale of 7 points, where 1 means “it does not matter at all” and 7 means “very important”, 99 – “I have no opinion”.

4. The respondents value infrastructure which is already installed in the protected areas more negatively than positively: beaches are rated worst (87%), then paths suitable for disabled people (76%), and recreational facilities (79%). Other infrastructure adapted for disabled, such as camping grounds, public toilets, bridges, by majority of the respondents are also rated negatively.
5. The evaluation of services provided to the disabled showed slightly better results: catering services are treated the best, as 44% of the respondents evaluated them as good or very good; other services – entertainment, tourism information, accommodation, transport services were rated positively only by 30% of those who responded.
6. The results showed that the visitors of the protected areas are very fond of traveling, but their options and habits are still strongly limited by the lack of the proper infrastructure and specially adapted services. Therefore the rest of the society must seek to implement all feasible measures that the protected areas be better adapted to the needs of the disabled people.

Proposals

1. Many investigators in different countries are using various techniques to determine and manage impacts on tourism and wild nature. The main focus when developing disabled people's opportunities in nature should be 1) a consistent, segment-oriented policy, 2) assurance of its feasible implementation, and 3) promotion of the motives to travel.
2. It can be determined, following analysis of the three studies that the largest gap and mismatch is between the policy makers and implementers. It is therefore necessary to link these chains for close cooperation in the future, ensuring this segment's opportunities to get acquainted with wild nature.
3. While neighboring countries have achieved a lot in opening up and adapting natural resources, some countries, such as Lithuania, suffer from the lack of attention on the issue – while holidaymakers have no doubts about nature's positive effects, their abilities to reach nature itself are very limited still. It is therefore necessary to encourage the development of the facilities, tailored to the needs of the tourists with special needs.

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Section 2—Australia and Antarctica: Geography of Place and Spirit in The Big Wild



The Bundian Way: Mapping with Stories

John Blay

Abstract—The Bundian Way is a shared history pathway that connects the highest part of the Australian continent and the south-eastern coast via an ancient Aboriginal route that brought together the people of the greater region. The Eden Local Aboriginal Land Council has long worked towards its use for educational/tourism purposes and recognition for heritage protection. In 2010 the Land Council began a survey of the route which resulted in New South Wales State Heritage listing on 18th January 2013. While the Bundian Way is defined as a physical route, its stories link a variety of Aboriginal landscapes through time and space. For example, some special places along the route are suited to formal Aboriginal Place recognition. These are all significant places with strong, inter-linking stories. Therefore, though the old song-stories that identified the route have partly been lost due to the impact of European settlement, even today the richest way to map the route is through story. Not with a physical map, but a mental one, one you can carry in mind. As it was in the beginning, before history arrived with the Europeans.

Introduction to an Ancient Pathway

I'm going to tell you some stories about the Bundian Way. That's appropriate because the Bundian Way is a story in itself, one that is long and unfinished, and made up of many strands. My aim here is to map its progress, through some fragments and shorter stories, in the hope that this will be helpful to those who might follow. Our mapping of the landscape has many layers. My part in it really started when I first met BJ Cruse, Chair of the Eden Local Aboriginal Land Council, more than 10 years ago. I was working on a South East Forests history project that covered vast tracts of national park and wilderness in the bottom corner of the Australian continent, to the east and south of its highest point at Mt Kosciuszko. Part of the project involved mapping the old Aboriginal routes of passage. BJ expressed his enthusiasm for a particular way that ran from the whale



Figure 1—New South Wales State Heritage listing was granted in January 2013 and a line has been identified to appear on maps as the Bundian Way.

John Blay is Chair of the Bundian Way Management Committee and the Bundian Way Project Officer for Eden Local Aboriginal Land Council, 17 Bay St, Eden, NSW Australia 2551. Email: sefproject@netspeed.com.au

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places of Twofold Bay to the high country of the Australian Alps where the old people used to gather to socialise, trade and have ceremonies in the summertime when the Bogongs were present. These moths were roasted to provide a food for the gathering that was good to eat and nutritious.

We soon became good friends and worked together in a spirit of brotherhood to find whether there was part of the network of ancient pathways that was still in a suitable state for recognition. He mostly attended to the Aboriginal cultural side of the ancient pathway while I looked to the shared history. His people, the Aboriginal people of the south east, are also known as Kooris. They have occupied the country since the Dreamtime. An Aboriginal presence on the continent stretches back beyond 50,000 years. The Kooris have modernised along with the rest of Australian society, but during the C19th they were wrenched from their traditional way of life by European settlers and then, during the 1880s and 90s, they were forcibly removed from their traditional lands onto missions and government reserves where travel was restricted and the old customs and languages were banned. But in spite of the heavy-handed efforts of government, the Kooris and their culture have survived. Our aim was that recognition of a route might provide a focus for the expression of Koori culture and Country. And also, as a public walking route, it would tell the story of European settlement along the route and the history of what happened to its Aboriginal people.

Targangal

My first walk in Kosciuszko National Park reveals the high country as a reflective place, intensely beautiful, dramatic with constantly changing degrees of light, its beauty nonetheless haunted by ever-present threat. Even on a blissfully sunny summer day, the blizzards can suddenly take command. Snow sweeps the landscape in front of winds that can bowl you head over heels.

The old Aboriginal people treated the high country snow-grassland with the gravest respect, visiting reverently when they ventured there after the Bogongs that massed in the westerly facing granite crags for a summer time aestivation. It is quite amazing to consider that as you pass the Bogong places of rocky North Ramshead at about 2000 m, the landscape and wild vistas would look much as they did a thousand years ago. Here you've moved beyond the ant-trails that direct so many visitors through townships from one tourist destination to the next, and the bustling of tourists recedes from consciousness. For the next one third of the Bundian Way, through Kosciuszko National Park, a distance of more than a hundred kilometres, you cross only two public roads.

Of all the places along the route, and I have now walked it many times, I find the Great Divide near Targangal (one old Aboriginal name for Mt Kosciuszko) the most enchanting. In spring and summertime, there are slowly melting patches of ice while the ground in between reveals a rainbow mat of



Figure 2—Through Kosciuszko National Park, a distance of more than a hundred kilometres, you cross only two public roads.

alpine wildflowers. It makes a seriously wonderful walk—perhaps wander would be the better word—of about a half day. Or a day, maybe two. A week there would be even better. And it's never quite the same from one moment to the next.

Naming the Bundian Way _____

After some initial explorations, as we have done so often, I sat down with BJ to figure out how to deal with findings that we considered quite remarkable. From all the evidence, we believed we had found pathways that were many thousands of years old, far older than the Pyramids or the Silk Road. These paths have many names: mountain passes, walking routes, dreaming tracks, roads, songlines, routes of passage, transhumance, traditional routes and so forth.

In the 1820s and 30s when the European pioneers arrived in the SE region of Australia they found the rugged, deeply dissected mountainous country of the coastal ranges a barrier to settlement. Produce of the Monaro, for example, was too difficult to get to market without roads. Travelling and sending freight by sea required access to the nearest harbour in Eden. The old Aboriginal clans of the region came to the rescue and showed their ancient pathways to the settlers. These became the first roads. And not only did the Aboriginal people show the settlers the best travelling routes, they also showed them the best places to establish their farms. 'Why it was the blacks, and nobody else who opened up the country...' said Bernard O'Rourke, one of the first to settle the region in 1843. 'They led him, and you, and everyone else here and there.' He also told how, in the days of earliest settlement, the blacks would tell of a potential station and the settlers, always keen to increase their landholdings, would follow. Soon enough the promised land came into sight, and there the land grabbers pitched their tents and regarded this as sufficient proof of their ownership (Young 2005).

It was a story repeated up and down the Australian coast. We considered the main routes of the region to decide which one might be the best preserved. Like the rest of Australia, the region had a complex network of pathways that linked everywhere to everywhere else. Our first task was to sort through options until one route emerged that had been changed the least in almost 200 years of settlement. Most of the routes had been changed utterly, highwayised, fenced off, built upon, intensively farmed. Walking them I found one that followed an old pass leading from the tablelands to the coast through the wild SE Forests. It was the one furthest south, closest to the wild country around the New South Wales-Victorian border, the one referred to by W.B. Clarke who described it as the Bundian Pass in reports during his geological explorations of the Monaro in 1851/2 gathered in his 1860 book, *Researches in the Southern Gold Fields of New South Wales*.

After much further consultation, and sorting through the names of other parts of the route, we settled upon the Bundian Way as a name as it best describes how the route goes by way of the ancient Bundian Pass.

The Bundian Way, a shared history pathway, formally starts in the high country of the Australian Alps on Targangal and runs another 330km to Bilgalera, on Twofold Bay (Tullamullerer). It brought together the Aboriginal people of the greater region, most notably for ceremonies associated with whaling in springtime at Twofold Bay and

moth hunting in the high country during summer. If I were to express its route in a simple story song, it would go: from Targangal pass just to the north of the Pilot, just to the north of Tingaringy, just to the north of the Delegate and then just to the south of the Coolangubra, follow the ridges around Balawan to the sea.

Many say it is one of the best walks in the world because it is the most varied, running as it does between the highest point of the continent and the coast, and especially because of its extraordinary story. Along its route no day's walk is quite like the next. Some are so different it's as if you have stepped onto a different planet. Having now followed it many times, my excitement levels rise just thinking about it. There's so much to it, so much to see and do. So much that is way beyond the ordinary.

BJ Cruse sees an important role for the Bundian Way. 'It is,' he says, 'all about connection.' And I realise that I most feel connected to that country through the Aboriginal vision, past and present interwoven, with my civilisation like a gloss on the surface. That's how I have now come to understand my country. It's the way that rings truest.

In some parts we find how the old pathway is still close to its original form. BJ says the route should be more widely acknowledged; protected from being bulldozed during fire emergencies, for example, or turned into roads. 'That's the sad truth,' he tells me. 'Today some people would recognise the Bundian Way by covering it with bitumen, whereas the old Kooris could recognise it in song. We've gotta protect it from people who don't understand.'

When I speak with the Elders about what should be done, and we consider the possibility of seeking heritage recognition, Uncle Ossie Cruse says, 'It's there. It's always been there. We know that.' He pauses, searching the far distance before turning to directly engage my eyes. 'What means the most to us is the kinship. It's what connects us Kooris. The way's a symbol.'

When I ask Ossie who owns the route, he responds that, 'We all do. Or nobody does, unlike the way Europeans own their land, we're custodians of it. We have a responsibility to look after our part for future generations... You see, we're all one family round here, we're all related. We're proud of what we've got. Sometimes we fight, but we all get on together again afterwards. That's the way things are.' (Blay 2013)

And so we set about the long and arduous task of gaining heritage protection for the Bundian Way: the cultural stories to be told by its Aboriginal people, shared history to be held in common.

In December 2012 it was entered on the NSW State Heritage Register, both for its Aboriginal and European and shared heritage values, and published in the NSW Government Gazette on Jan 18 2013 (viewed online on 15th June 2013 at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5060185>).

Ingegoodbee _____

Further eastwards, lush-green grassy flats along the Ingegoodbee River tableland are such that it feels as though you've come into a Shangri-La. Five star camping places abound. It's friendly, and marvellous. Dingoes howl from range to range by night. Emus strut by day. Soon the walk joins the route followed by surveyor Townsend in 1842,

during the first European survey of the region, when Aboriginal guides showed him this route through the ranges from Omeo. It is as far from settlement as it was in the mid-1800s, and yet it is the easiest way to walk from Omeo to the Monaro. Like many parts, this section of the ancient pathway is still trafficable and recognisable and quite easily followed. Thick scatters of stone tools litter the ground at the best stopping places. Our route leads to the Nine Mile Pinch, a vertiginous descent from the high plateau of the Ingegoodbee to the Snowy River.

As you leave the tall Mountain Gum forest, various animal pads converge. This is the ancient route, along the top of a long ridge that winds all the way downhill over some eight kilometres (nine miles, it was guessed by the old cattlemen, who gave it the name) in distance and an 800-metre fall to the Snowy River. As the vegetation changes, the track tilts more steeply downwards, and does so with a vengeance. There are the markers of Byadbo: blue leaves of the Snowy River Wattle, then Box and the White and Black Cypress. And breathtaking views as you overlook the steep, rainshadow country with its desert-like scenery. This vision is as scary as it is beautiful: it says, stick to the way or face deep trouble.

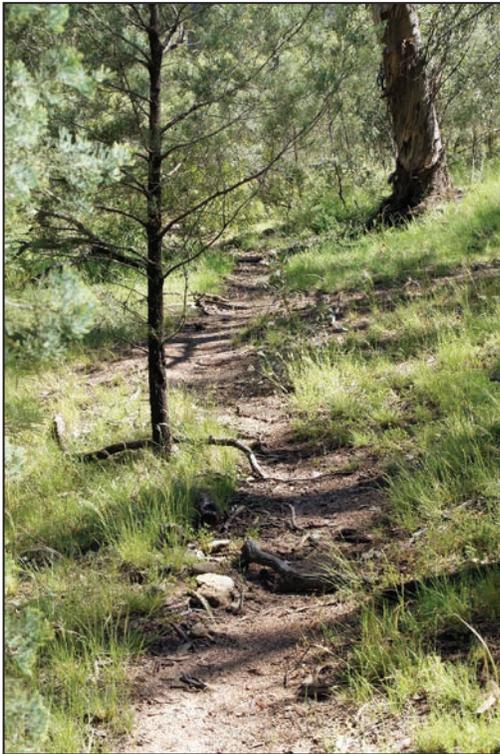


Figure 3—Aboriginal guides showed this route to surveyor Townsend in 1842, during the first European survey of the region. It is still the easiest way to walk through the rugged wilderness country.

Management

The management of the project, another vital part of the greater story, came about with a great deal of cooperation and assistance from Aboriginal community members and Elders. Uncle Ossie Cruse saw the potential benefits from the beginning and has been a leading light. I was elected as the Bundian Way Project Manager by the board of the Eden Local Aboriginal Land Council in 2006. The land council has worked vigorously to develop the project, which has its headquarters at Jigamy Farm, on the Princes Highway near Eden. This will become the gateway to the Bundian Way and serve as information and culture centre, and the management base for all operations. But the land council soon realised it could not achieve its ambitions for the project on its own. The administrative task was simply too great.

Conversations with other agencies of the region brought representatives together and a steering committee was established to assist in management of the project in September 2010. The aim was to involve all stakeholders and the strengths of this committee saw it evolve into a formal management advisory committee with a membership of community organisations, state and federal agencies of the region and local government. Other organisations attend meetings on a needs basis. All have made a solid, usually voluntary, contribution. In 2012, a Strategic Plan was finalised. It began:

Our mission:

To provide and develop a unique shared cultural, physical and spiritual journey. The Bundian Way maintains the integrity of Aboriginal cultural heritage. The pathway promotes and empowers shared cultural understanding as well as harmonious appreciations of cultural differences through genuine partnerships. The Bundian Way empowers people to come together to undertake a challenging physical and intellectual experience. (Bundian Way Management Committee 2012)

The Snowy River

The Snowy rises on the slopes of Kosciuszko and loops north and easterly thence through a gorge before it heads southerly to arrive at its junction with the Pinch River, or where, in Aboriginal terminology, the Moyangul meets Nurudj-Djurung. There are great camping spots here, always have been. For all its wildness this is such special country it does not surprise me when I find it must have, at times, bustled like a city. The signs of its Aboriginal occupation are everywhere.

More recently, this countryside was much loved by horse-men of old. Its rocky steepness seems threatening at first. But it stays warmer in winter than the Monaro or high country, and was hence much sought after by the cattlemen for winter grazing. In camp near the river, you feel comfortable, sheltered. Emus, like prehistoric beings, wander freely. The granite soils are reddish, crystalline, soft, and make the hills glow like ochre. Trees on the hillsides are mostly the native cypress-pine, which look like surreal blue-green Christmas trees, presenting scenes I've found nowhere else. And the Snowy here has been rejuvenated in recent years so that it can still crash and thunder after the snow melt and

fill its gorges with tumbling waters which echo through the peaks of the Byadbo Wilderness. It is a great place to ponder how the Bundian Way plugs into the deepest recesses of the Australian heart.

The Man from Snowy River, written by Banjo Patterson in 1890 when there was still direct memory of the first European settlement in the region, is modern Australia's best known poem. The bush ballad is still regularly recited in pubs and schools as much as it is around the campfire. Its legend resonates from a particular place, where a young horseman, a stripling, is challenged by the wildest of landscapes:

Through the stringybarks and saplings, on the rough
and broken ground,
Down the hillside at a racing pace he went;
And he never drew the bridle till he landed safe and sound,
At the bottom of that terrible descent.

His daring and courage carry him through by dint of skills and local knowledge. Its setting lies deep in Australia's mythical heartlands.

Today that landscape of the imagination is still an unpopulated and challenging place. One road runs through the vast wildness of the lower Snowy. It is a dirt track that descends from the tablelands into a veritable bowl, over a kilometre deep, carved by the river and populated by a most unusual flora and fauna. The country for as far as the eye can see is part of Kosciuszko National Park, a proclaimed Wilderness Area. But before the coming of the white men and their horses and livestock, the area hummed with a very different life.

In 2010 the Land Council began a survey of the Bundian Way to identify the route and its Aboriginal landscapes. After very considerable consultations and research on historical, natural and Indigenous values, the survey team with up to five Koori personnel walked the 330km length of the Bundian Way in legs of up to 8 days starting on 11th October 2010. It was an intense healing experience for all involved. Many parts, especially those in remote declared wilderness areas covering half the route, had to be visited again and again to clarify details and establish the old pathway route (Blay 2012).

We started on the Snowy because the high country in October was still under snow. We were immediately surprised at the regularity and quantity of evidence (including artefacts) along the route, and it became clear that the Bundian Way should be regarded as a single site. Artefacts appeared less frequently in places where roads had been engineered and least frequently near sealed roads. Nonetheless, artefacts were not the only indicators of the route. Other matters considered included historical writings and maps, as well as stories, oral history and surveyors' scarred trees and journals.

The signs are everywhere to see: artefacts, scarred trees, food plants and such. This is where various ancient pathways crossed over. It lies at the heart of the Bundian Way.

The ways the old horsemen used to go, we confirm, follow the much older Aboriginal routes. Many today claim links with The Man so that they can put themselves forward as latter-day persons from the Snowy River. It remains, after all, Australia's strongest and most persistent myth. It has inspired not one, but two movies. The ethos captured in the



Figure 4—The legends of the Snowy River still echo through the peaks of the Byadbo Wilderness.

poem is of someone prepared to break away from the mob to follow his own heart and instincts, of knowing the country better than anybody else, of being more at one with nature than the rest; it's the story of the little man triumphing against the odds. That runs against a history where it's usually the big man property owners who are recognised, whereas the main players were more often their employees and contractors.

In fact, Byadbo bears more than a passing resemblance to Banjo Patterson's scene:

...And down by Kosciusko, where the pine-clad ridges raise
Their torn and rugged battlements on high,
Where the air is clear as crystal, and the white stars fairly blaze
At midnight in the cold and frosty sky...

Aboriginal friends give me the precise genealogy of one horseman. That Man from the Snowy River must have been a Koori, they tell me. Who else could have done what he did? Who else would have known the country so well? Maybe we should rename him the man from the Nurudj-Djurung.

Byadbo

The Bundian Way quite sensibly follows the old routes. It doesn't gung-ho through the landscape the way a map or GPS might tell you, but moves quietly the way human feet like to go. It heads southwards along the Snowy for about eight kilometres before crossing the river near Sandy Creek to head directly into Byadbo. This is the way surveyor Townsend came in 1842, and trees he blazed with a scar every mile can still be found. Along the river there are impressively tall Yellow Box, White Cypress, Bundy and White Box in groves where the ground is covered with Australian bluebells, and elsewhere the cypresses grow huge. Nor does the way here follow the routes awkwardly made by modern machinery. What it amounts to, in brief, as I wade the Snowy to come into Byadbo, is one of the most extreme, most dangerous, most interesting and most thrillingly beautiful walks imaginable.

The route goes for over fifty kilometres without guarantee of water through parts wild and steep. Snakes are plentiful: Tigers, Browns, Blacks and Copperheads. Spiders such as Funnelwebs even manage to survive the desert conditions. Do you need to be mad to go there? No, I say. It's the most rewarding walk I've ever done. You just have to prepare yourself.

Crossing from the catchment of Sandy Creek to Sheepstation Creek you follow the ancient path beside an old-style fence made from the cypress logs without nails or wire. An old horseman told me it dates from the 1840s and the Ben Boyd era, when there was grass aplenty. The big spreading cypresses are certainly the oldest. Some have been dated to over two hundred years ago. (Pulsford 1991)

One day while surveying the route in Byadbo we spy a cat in a tree hollow that has to be a domestic cat gone wild as we are fifty kilometres from the nearest house. The old tree has a number of hollows above ground level. Some of us reach into the hollows as far as we can to try and grab it, without success.

A few hours later we come back along the same route and again spy a cat in the same tree. This time I prepare to photograph it, but just as I press the shutter, the cat appears to fall from the tree. Strange. We go over for a closer inspection and find the cat dead. It is a young one just about ready to

leave the nest. Then a little further away there is another dead cat. And another. As we stand round the tree, suddenly, a large, highly venomous Tiger Snake begins climbing the tree. Blind to our presence, manic, it plunges into one small hollow, comes out another, then dives into the next...

The crew suggest I put my arm in to see whether there are any more cats.

The Monaro

When I finally come out of the sharp slopes of Byadbo onto a plateau where the Monaro begins, I find the Merambego grasslands. It's a shock, for now at last other people figure. But it's so out of the way it's like being on the outer rim of civilisation in a Mad Max sort of place. What now? I wonder, as I look down along the dirt track that will lead me through grassy flats back towards the 21st century.

But it's not long before a very large flock of emus and mobs of kangaroos bring renewed enthusiasm. Merambego is where the many forests meet, on the far edge of the Monaro tablelands. During the all too frequent droughts of the region it can look desolate, but the native grasslands need only a little rain to transform the countryside. Then yam plants like Early Nancy, Vanilla Lily, Bulbine Lily and the orchids proliferate. Seed-bearing grasses paint the ground many hues of green. There are still a few Koalas, although Brushtail Possums are present in remarkable numbers. The sheer number of artefacts tells how fully this country was once occupied by the old Maneroo people.

From the Byadbo Gap it's not hard walking through the basin of hilly grasslands to McGuigans Gap, a high grassy ridge from which exceptional views take in the landscape all the way back to the high country. A little-used country road then winds through an open forest of pale gums beside the spring-fed Wollondibby Creek and the route begins to flatten.

Although the extensive old Corrowong grazing run has gradually been whittled down, it nonetheless remains a vast and impressive sight that takes in the most southerly of the Monaro region's treeless plains. The countryside is now less extreme in its topography and the grasslands and grassy woodlands show how the land was before the settlers came. Somehow, as I walk, I am haunted by visions of the oldest inhabitants. I imagine them with their numerous campsites tucked along the creek, in the sunniest places, not too far away from wood and game. I can even imagine their much-favoured 'rabbit rats', now extinct in the area, which perhaps were bandicoots or some other little hopping marsupial like the Rufous Bettong also known as the Kangaroo-rat.

And it can be such hard country. Its colours can run through green to golden to white. There's either too much rain or not enough. Graziers here have been at the mercy of rainfall and geology no less than the old Aboriginal people, however, the old traditions without land ownership and barbed wire allowed more flexible ways to inhabit the country. The Maneroo, as its Aboriginal people were known, were not stuck in the wrong place at the wrong time. My walk has become a meditation on nature and the land, it is as if I am becoming at one with it.

Progress towards Delegate is for the most part through grassy woodlands where the predominant tree is Ribbon Gum, majestic and spreading, often standing in groves where the white trunks contrast with a darker stocking. The way

focuses my attention on the nature of things as each new vista opens up. Old Travelling Stock Reserves mark some of the places where the old Aboriginal people used to camp, good places near water and firewood, that will hopefully be made available to walkers.

After Corrowong Creek, the next important stream is the Delegate River.

Delegate

Delegate is the hub of the Bundian Way. So little has changed in recent years it seems I have been transported back in time. This is the only town along the route with a hotel and shops and accommodation and a remarkable history. As a bonus, since late 2012, it hosts the Bundian Way Aboriginal Art Gallery.

In about 1827 Delegate Station became the first European settlement of the Monaro and its treeless plains. At that time the tablelands held very abundant resources. Springs were common and well maintained by the Maneroo. It is rolling land, covered with grasses that soften the roundnesses to a human appearance. Towards the edges and on some hills there are trees. Its food sources included kangaroos, wallabies, emus, wombats, echidnas, and all manner of small macropods like the potoroos, pademelons, kangaroo rats and bandicoots. Koalas sometimes wandered the grassy plains and in other places as many as four to a tree. The possums were plentiful also, in fact the Maneroo deliberately made fires to hollow out trees and make them more suitable for nesting by possums, of which there were numerous species that included Greater Gliders, Yellow Bellied Gliders, Brushtails, Mountain Brushtails, Ringtails and Sugar Gliders. Forests in the Coolangubra were found during the 1980s to have the highest level of arboreal mammals in the world. The fur of the Greater Gliders was much sought after for making cloaks. Fish were in plenty. Delegate River was famous for its blackfish. Yabbies inhabited the many ponds, waterholes and swampy areas along the creeks. There are still yabbies in the swamiest country. Bustards or wild turkeys were common. An emancipated convict, Joseph Lingard, reported in about 1840 how 'the river was covered with all kinds of water-fowl. I could take my gun in a morning and shoot as many as I liked (Lingard 1846).' The food plants included many forms of yam and tuber, leafy stems, fruit and seeds of innumerable species. But during droughts, trampling by settlers' stock began to compact the dried mud and this meant many potential foods—including the frogs and eels and lizards and snakes, not to mention the edible plants—found survival more difficult.

The settlers aimed at increasing the land's carrying capacity for their animals and crops, whereas the Aboriginal methods provided continuing sustenance from what was already there. Yam sticks loosened the soil in places. Fire was only one of the tools used, but it helped focus kangaroos into burnt areas to make hunting predictable. The various patches of woodland, White Sallee and peppermint for example, still have discrete clear areas from the old fires. The clearings a few kilometres apart are where, after the hunt in one place today, the kangaroos could be found at the next grassy patch tomorrow (Gammage 2011).

The track passes easterly through the grizzled peppermint forests of the Irondoon Range, and then down to the river

and the goldfields of Craigie. When the alluvial gold seemed to peter out, the field was left to the Chinese who had their own ways of finding the remaining metal, and it became Chinatown. Few signs of gold rushes remain, apart from pock-marked river flats. Craigie is a cluster of houses with a pine-plantation back-drop and a public hall. Platypus are commonly seen from the bridge across the Little Plains River.

The exhilarating walk from Craigie leads through low hills along a winding country road lined with old trees and grasslands. It passes old places with evocative names like the Pipeclay Ford on Jacksons Bog, Duiguds Bog, past the handsome grass and woodlands of the Mila Travelling Stock Reserve, to the Gulgin or Rock Flat and another old wayside resting place reserve.

The Bundian Pass

The Bundian Springs were part of a greater Aboriginal landscape across the Gulgin flats that included ceremonial and women's places. Many yam plants still grow there, those with edible tubers include twelve species of lilies and orchids, including a large population of the now regionally rare Yam Daisy (Nyamin or Murrnong), making it the most remarkable yam garden I have found on the Monaro. This is undoubtedly a classic example of the Aboriginal Landscape, one which contains not only a good sample of the original flora and fauna, but also a great number of food plants and artefacts. With Aboriginal people demonstrating its value as a campsite, it became a wayside resting place in 1872 for the use of travellers and bullock drivers. It was simply the best place to stop and camp the night at the top of the long uphill route that rose from the place mapped as Boondiand on the first primitive sketch of the region by surveyor Stewart Rylie.

After Delegate, you see regular glimpses of a wild mountain range on the eastern horizon. The dark peaks of the Coolangubra present a very clear obstacle to further progress in a direct easterly direction. Indeed, the difficulty of finding a way through the tall forests, precipitous slopes and scrubby gullies that plagued the early Monaro settlers in their quest for a road to the port of Eden immediately confronts you at Gulgin. But it is from here that the Bundian Way begins its descent from the tablelands to the coast via the Bundian Pass. Our route slides to the south, immediately below the threatening mountainous chain. This is country where you find the most majestic of tall eucalypt forests. The route fords the river to cross a gap in the hills to another Sheepstation Creek (entirely different and so much greener than the one in Byadbo) where there are swampy areas and grasslands. The route is there on the oldest maps and its location was described to me by Harold Farrell, an old dingo trapper from the region, noting, 'It crossed Sheepstation just below the Swamp, where the old bullockies from Nangutta put in a stone corduroy to make the crossing safer. From the swamp it went up the ridge beside the Surveyors Gully...' (Blay 2013)

This is the foot of the Bundian Pass, a major Aboriginal place once described as 'the most important Aboriginal artefact site on the far South Coast of NSW' (Glascott 1987), where, over a very long time, many people had rested following their descent from the tablelands. It was once a major thoroughfare for the region. In the era of the automobile it had been by-passed and almost been forgotten.



Figure 5—The great eucalypt forests of Australia's south east, proposed for world heritage in 1982, are exemplified along the Bundian Pass.

Towards Balawan

And then, striking out for the coast, the route follows a very old track through the grassy Stringybark forests of the old Nungatta run. It follows a long ridgetop, and still appears as the old pathways did: 'like a road,' because they were used and burned regularly. The forests show a variability, often with trees of remarkable girth and height. And there are many very special camping places. The fauna is

also special. In the evenings or early mornings many species of possum might be seen, not to mention potoroos and bandicoots. Koalas were here in plenty once upon a time and may yet reappear, any sightings are welcomed. Our route crosses Nungatta Creek, then along another ridgetop to the head of Pericoe Creek, and comes on to the Towamba River at the small township of Towamba. The walk to Bilgalera on Twofold Bay then continues through the tall forests around Balawan (Mount Imlay). A most worthwhile detour climbs 500m to the summit from which there are views so breathtaking they left me dumb-struck. It is as though you are looking directly down upon Bilgalera, the destination of the Bundian Way. Carpeting the forest floor is a massed understorey of a white and pink flowering endemic shrub, *Boronia imlayensis*. The colours, the trees and aspect amount to nothing less than a once in a lifetime experience.

Bilgalera

From Balawan it's a pleasant, mostly downhill walk through the forests to Bilgalera (Fisheries Beach) on Twofold Bay. This is an Aboriginal Place, where an education centre is proposed, and there are plenty of excellent camping spots behind the dunes and beside a peaceful lagoon. Then, the walking route proceeds around the bay to Eden. Vistas with mostly red and orange stone formations make a truly wonderful and very colourful walking experience.

Bilgalera is a place to be explored, not only for its Sea Country attractions like the Weedy Sea-dragons, but also its tall forests and littoral rainforest. It is a bountiful place to mark the eastern limit of the Bundian Way. Nonetheless, the most remarkable aspect of Bilgalera is its stories.

When the artist Oswald Brierly painted the scene at Bilgalera in bright watercolours he showed various trading and whaling vessels at anchor while crews busily loaded and unloaded supplies. A whale spouted across the bay not far



Figure 6—Landscapes of the eastern limits of the Bundian Way look back along its route to reveal many important cultural places, including Balawan, Kiah Inlet and the Whale Beach, now proposed for recognition as Aboriginal Places.

away from where a traditional Aboriginal family stood on the rock shelf from which plentiful shellfish were gathered. Behind the beach lay fresh water. On 14th August 1844, he drew a small sketch of natives dancing by firelight in his journal and recorded an event of some very great substance. The Protector of Aborigines for the region was his guest. G. A. Robinson also wrote at more length than usual about the remarkable activities at Bilgalera, with some telling details of the gathering:

This evening went on shore in South Twofold Bay and witnessed a very interesting corroboree [sic] by the Maneroo Natives, they were on a visit to their coast friends to introduce it, was composed and arranged by Al.mil.gong, an Omeo Black from Tongio-mungie. There were about 60 or 70 Blacks present including the Twofold Bay. Number of whales were on shore ... (Clark 2000).

This is a story that is central to the Bundian Way. During his walk from Omeo to the bay Al.Mil.Gong would have covered close enough to 400km, much of that distance along sections of the Bundian Way.

And there are many other stories that relate to traditional practices around the bay. Some feature the relationship between the old Aboriginal people and Killer Whales (Orcas), which assisted them in hunting whales, a practise that continued in partnership with European shore-based whalers. This was, apparently, the only instance in the world of a wild species cooperating with man to hunt another wild species, (Clode 2002).

Aboriginal Places

The Bundian Way today is not only a route to be walked. It is a story that is composed of many strands that weave together to form a necklace laid over the landscape. New South Wales allows the recognition of Aboriginal Places, kinds of mini-national parks, which are 'a way of recognising and legally protecting Aboriginal cultural heritage. Under

the NSW National Parks and Wildlife Act, any land may be declared an Aboriginal Place if the area "is or was of special significance to Aboriginal culture" (<http://www.environment.nsw.gov.au/conservation/AboriginalPlacesNSW.htm>). And we currently have in progress numerous nominations along the Bundian Way with an aim that these will be like pearls threaded in the necklace, places with the highest values that can be used for education and conservation but especially as places where a story brings indigenous cultures into focus. Our understanding of the country has many dimensions.

Stories, in my experience, are the most vital and appropriate way to reveal the magic of the Bundian Way. Fundamental is the story of Al.mil.gong's new corroboree in 1844. Another is W.B. Clarke's record of the Bundian Pass. They better give the sense of it than strip maps. How much more interesting to follow the stories?

Accounts from the cusp of settlement, when the traditional lifestyle began to change, enable us to see the stages of colonisation. And by the same token, as the shared history stories unfold over time, we see the resilience of the Aboriginal culture. Other stories are revealed in the ways that traditional management have influenced the appearance of the greater landscape we see today. It was here that scientists in 1992 proposed World Heritage recognition of its great, diverse eucalypt forests (Costin and Mosley 1992). The stories also animate landscape in the walker's mind, they show its circumstances through time, and form the impress that can guide and ensure its management. They are the key that links past and future, and promise much for the Aboriginal people of the region, especially in the sense of the desperate need for cultural healing and learning in Country. As they come together in the Bundian Way, they also bring recognition, jobs in tourism and natural resource management and new insights for culture-based storytelling. Perhaps most importantly, this can result in better understanding and reconciliation with the broader community (Blay 2013).



Figure 7—The yamfields at the Bundian Springs, an important part of the route's stories, were surveyed for their part in women's business and continue to be studied scientifically to ensure sustainable management.

In following the Bundian Way step by step the stories gradually reveal themselves. Its landscape has many aspects that are illustrated by the stories. They allow other stories to be told. They fix the route in the mind. Your way becomes an odyssey. And so you readily rediscover nature, and respect for it, not by following lines on a map but by becoming part of a greater engagement. But no matter what part of the route we follow, when I am walking it with Aboriginal people, we invariably find yet another special quality to our way, some new magic. Walking the distances involved becomes less of a chore than a light-hearted movement of the spirit. Indeed, we have discovered whilst walking the old route that somehow it sings to us. If by chance in the wild country we come off-track, we can tell. A short backtrack, and the lightness returns again. We are on track. The songs are in the air and the country makes sense. That is the Bundian Way.

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What's Working, What's Not: The Monitoring and Reporting System for Tasmania's National Parks and Reserves

Glenys Jones

Abstract—This paper describes the Australian State of Tasmania's management effectiveness Monitoring and Reporting System for national parks and reserves. This jurisdictional performance measurement system is designed to provide all interested parties with reliable factual information and measured evidence about reserve management achievements, progress and challenges. Key features of the system are that it is outcomes-focused, evidence-based, operationally practical, and transparent to the public. The system fosters an organizational culture of measuring and demonstrating the results achieved from investment of funds in reserve management. It encourages an adaptive management approach and supports the management agency to operate as effectively and efficiently as is practicable. Online reporting of quality information about management performance enhances public sector transparency and accountability, and facilitates informed public engagement in sound adaptive management of national parks and reserves. The approaches, methods and tools developed for Tasmania's Monitoring and Reporting System are potentially suitable for uptake and application elsewhere.

Introduction

Management effectiveness evaluation is recognized globally as a key strategic priority for protected areas (e.g. International Union for Conservation of Nature (IUCN) World Parks Congress Durban 2003; World Conservation Congress Barcelona 2008; United Nations Environment Programme (UNEP) Convention on Biological Diversity Programme of Works on Protected Areas COP7 Decision VII/28).

Glenys Jones is a specialist in management effectiveness evaluation for national parks and World Heritage Areas with the Tasmania Parks and Wildlife Service, PO Box 1751 Tasmania 7001 Australia; and an Associate of the University of Tasmania (School of Land and Food). Email: glenysjones@netspace.net.au. Note: The views expressed in this paper are those of the author and do not necessarily reflect the views of affiliated institutions.

In: Watson, Alan; Carver, Stephen; Krenova, Zdenka; McBride, Brooke, comps. 2015. Science and stewardship to protect and sustain wilderness values: Tenth World Wilderness Congress symposium; 2013, 4-10 October; Salamanca, Spain. Proceedings RMRS-P-74. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 208 p.

Management effectiveness evaluation is important for (i) guiding improvements in management through adaptive management processes; (ii) supporting reporting for accountability and transparency; (iii) informing the allocation and prioritization of resources; and (iv) fostering an informed and engaged constituency (Leverington et al 2008; Hockings 2008).

In Australia, performance audits of national parks management have identified the need for government agencies to establish robust monitoring and reporting systems so that managers and decision-makers can better understand how management is performing with respect to objectives and so make informed decisions to guide the delivery of planned outcomes (Auditor-General NSW 2004; Auditor-General Queensland 2010).

Growing community expectations for transparency and accountability in public sector performance are reflected through increasing calls and requirements for government departments to monitor and report on their performance. In particular, there is growing emphasis on reporting on the effectiveness of management in achieving objectives. For example, in Special Report No 72 on Public Sector Performance Information, the Auditor-General Tasmania 2008 states: 'In the business world, the success of an enterprise is largely judged on its profitability. In the public sector, profitability is generally less significant than the effective and efficient achievement of objectives and efficient use of resources. Accordingly, non-financial performance reporting is a vital element in keeping the community informed.' Public sector reporting of reliable factual information about management performance assists stakeholders and the broader community to understand what is being achieved from investment of public funds, and supports transparency and accountability.

The Challenge for Government Agencies

It is important for national parks management agencies to establish performance monitoring and reporting systems to better understand how management is progressing with respect to objectives and to provide transparency and accountability. Despite clear needs for performance measurement systems, government agencies have struggled to find practical and robust ways of meeting those needs. Too often, monitoring and reporting systems have failed to prove their worth to staff, stakeholders, funders and/or decision-makers. Indeed it is rare to find a performance monitoring and reporting system for protected areas that has endured over the long term.

Part of the problem may lie with the issue succinctly summed up by the nineteenth century teacher/philosopher William Pollard who wrote: "Information is a source of learning, but unless it is organized, processed and available to the right people in a format for decision making, it is a burden, not a benefit." (I'll refer to this issue as Pollard's polemic.) The challenge for governments is to develop performance measurement systems that are sound, practical and useful.

Background to this Initiative

With almost half of the State of Tasmania protected in public national parks and reserves, Tasmania's protected area system is amongst the best in the world. The government management agency for Tasmania's national parks and reserves – the Parks and Wildlife Service – recognizes that reserve managers, stakeholders and the broader community need reliable information about how management is performing.

In 2007, the Parks and Wildlife Service embarked on an ambitious initiative to develop a state-wide jurisdictional management effectiveness Monitoring and Reporting System for Tasmania's entire national parks and reserves estate. This initiative built on over a decade's experience in developing the evidence-based evaluation and adaptive management system for the Tasmanian Wilderness World Heritage Area (Jones 2009; Jones 2005; Parks and Wildlife Service 2004). Table 1 presents a timeline of the background history and key milestones in Tasmania's development of evaluation and the Monitoring and Reporting System.

Objective

The overall objective of this initiative was: "To develop a practical performance monitoring and reporting system that generates measured evidence of management progress, achievements and challenges across Tasmania's national parks and reserves."

Key Considerations

As project manager for developing the Monitoring and Reporting System, I wanted to ensure that we built on the strengths of the evidence-based adaptive management process we had established for the Tasmanian Wilderness World Heritage Area. In particular, the adaptive management cycle (Figure 1) had proved its worth in: (i) providing an integrated approach to achieving long-term desired outcomes; (ii) communicating and making clear the role of management effectiveness monitoring, evaluation and reporting in the adaptive management process; and (iii) supporting continuous organizational learning and improvement. The adaptive management cycle figure has been widely cited and adopted by others (e.g. CSIRO Marine and Atmospheric Research at <http://www.cmar.csiro.au/research/mse/>).

I also wanted to ensure that Tasmania's evaluation system would avoid perceived weaknesses and risks associated with some prevailing models of management effectiveness evaluation and State of Parks Reporting programs. The above considerations gave rise to the following set of guiding principles for Tasmania's Monitoring and Reporting System.

The resulting system should be: outcomes-focused, evidence-based, transparent to the public, relevant to the ongoing needs of the management agency and key audiences for performance information about management of Tasmania's national parks and reserves, operationally practical and scalable, and resilient to institutional changes.

For example, the system should:

- let staff of the management agency and others with responsibilities for parks management know how management was performing with respect to the agency's formal responsibilities for reserve management – in particular the legislated management objectives in Schedule 1 of Tasmania's National Parks and Reserves Management Act 2002 – and also take account of other enduring mandates including State Party responsibilities under international conservation agreements such as the World Heritage Convention;
- provide information and measured evidence about management progress, achievements and challenges that would be relevant and meaningful to staff, stakeholders and the broader community;
- establish a system that was resilient to institutional changes – such as changes in key staff, Ministers or government; departmental re-structures; budgetary changes, etc.);
- provide feedback about the effectiveness of specific major initiatives (such as large budget projects) as well as state-wide performance indicators;
- forge an organizational culture of measuring evidence to evaluate results;
- deliver performance reports that would gain high levels of credibility with key audiences, including natural resource scientists and experts in natural and cultural heritage.

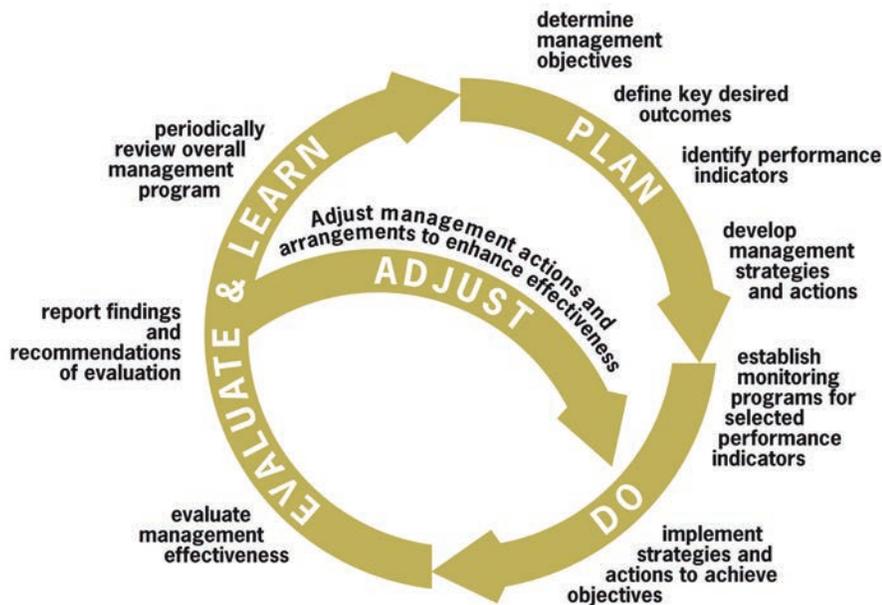
In addition, the following factors were identified as being critical to the success of the project in gaining the requisite level of staff and agency support to achieve agency commitment to building and implementing the system. The Monitoring and Reporting System would need to:

- be seen by the management agency as being relevant and useful – for example, relevant to ongoing strategic directions as well as relevant to on-ground operational programs, and useful for supporting a variety of agency reporting requirements.
- engage staff at all levels (Hockings et al 2009).
- look and feel intuitive to staff and other users – for example, it was recognised that the system would need to have a simple 'front end' that was user-friendly and could be quickly understood and grasped by a wide range of audiences.
- ensure that staff across the agency were provided with the necessary professional guidance, assistance, tools, and ongoing training and support they needed to systematically apply and implement the system to an appropriately high standard that would deliver performance reports which reflected well on the agency and government (e.g. by building community trust and regard for the agency's authenticity and integrity).
- be able to be integrated into the organisation's ongoing management systems, plans, projects and processes (including budgetary processes).

Table 1—Timeline of milestones leading to the Monitoring and Reporting System

Date	Milestones in Tasmania's development of management effectiveness evaluation
1992	First statutory management plan for the Tasmanian Wilderness World Heritage Area (Parks and Wildlife Service, 1992) <ul style="list-style-type: none"> ➤ Plan prescribed that a management effectiveness evaluation system be developed for the Tasmanian Wilderness World Heritage Area.
1999	Second edition of the management plan for the Tasmanian Wilderness World Heritage Area (Parks and Wildlife Service, 1999) <ul style="list-style-type: none"> ➤ An evaluation framework was integrated into the plan with clear statements of 'Key Desired Outcomes' articulated against the objectives. ➤ Plan prescribed that a <i>State of the Tasmanian Wilderness World Heritage Area Report</i> be developed to evaluate management effectiveness for the Area.
2004	<i>State of the Tasmanian Wilderness World Heritage Area Report No. 1</i> (Parks and Wildlife Service, 2004) <ul style="list-style-type: none"> ➤ Publication of the report marked the first comprehensive evaluation of management effectiveness for the World Heritage Area ➤ Report was recognised through the Australasian Evaluation Society Award for best publication in evaluation
2006	Parks and Wildlife Service commits to building a management effectiveness monitoring and reporting system for Tasmania's entire national parks and reserves estate (<i>Parks and Wildlife Service Strategic Plan 2006-2008</i>)
2007	Project Plan for development of the state-wide Monitoring and Reporting System approved
2010	PWS draft report on the proposed Monitoring and Reporting System released for agency and advisory committee comment, and external peer review. <ul style="list-style-type: none"> ➤ Feedback from key stakeholders and external peer reviewers was positive. ➤ Parks and Wildlife Service approved development of a pilot demonstration of the Monitoring and Reporting System.
2011	Pilot demonstration of Stage 1 of the system built and operating successfully on the department's Intranet.
2012	Department commits to building and implementing the Monitoring and Reporting System as an agency priority (<i>DPIPWE Corporate Plan 2011-2014</i>)
2013	Parks and Wildlife Service's final report on the Monitoring and Reporting System published (Parks and Wildlife Service, 2013a)
2014	Monitoring and Reporting System is progressively being built and implemented as resources permit. When fully operational, the Monitoring and Reporting System will be accessible to the public on the Parks and Wildlife Service website (www.parks.tas.gov.au)

The adaptive management cycle



Source: Jones (2005, 2009)

Figure 1—The adaptive management cycle.

Process of Development

Development of the Monitoring and Reporting System was informed by the management agency's formal responsibilities for reserve management and by key stakeholders' identified needs for performance information. These dual foundations were aimed at ensuring that the resulting system would be – and would remain – relevant to staff and stakeholders, and therefore resilient to institutional change.

In brief, the process of development involved thoughtful consideration and concept development; targeted literature searches; identification of key audiences for performance information; extensive staff and stakeholder consultation processes (including 17 Needs Analysis Workshops) to identify staff and stakeholder needs for performance information; synthesis of the project inputs; development of a draft framework for the Monitoring and Reporting System; presentation and discussion of the proposed framework and system with others; refinement and improvement of the system; development of reporting templates to support the system; practical 'road-testing' of key components of the system including preparation of examples of the various types of reports; development of detailed operational guidelines for implementation of the system; preparation of a draft report outlining the proposed system; review of the draft report by agency, management advisory committees, and external peer reviewers; minor adjustments to the system to take account of feedback and suggestions received; development of a pilot demonstration of Stage 1 of the Monitoring and Reporting System on the department's intranet as proof of concept; briefings and demonstrations of the pilot system and reports

to gain agency support for building and implementing the system; preparation of the proposed final report outlining the system; agency commitment in the Department's Corporate Plan to build and implement the system; agency approval for publication of the final report outlining the Monitoring and Reporting System for Tasmania's National Parks and Reserves; graphic design and publication of the final report (Parks and Wildlife Service 2013a).

Workshops and Consultation Processes

Workshops and consultation processes for the initiative focused on the following four key audiences for information about management performance for Tasmania's national parks and reserves: (i) reserve managers, (ii) specialists and experts in reserve values and issues, (iii) community stakeholders, and (iv) government/major funding partners.

The following focus questions were addressed during workshops and consultation processes:

1. What are the key things that would tell you that Tasmania's national parks and reserves were being well managed?
2. Where would you realistically expect to see improvements or changes if reserve management was going well?
3. Where would you realistically expect to see things getting worse or changing if reserve management was not going well?

The responses to the first question assisted in identifying key topics of interest to staff and stakeholders for assessing the performance of management for Tasmania's national parks and reserves. The responses to the second and third questions assisted in identifying 'indicators of change,' i.e. indicators that were expected to change under improving and worsening performance scenarios. These indicators suggested high priorities for monitoring programs to detect changes or trends in management performance. Examples of workshop outputs are provided in Figure 2.

The software application Mindjet MindManager was used to record participants' inputs to the Needs Analysis Workshops. The software enabled participants' responses

to the key focus questions to be captured immediately in electronic form and projected 'live' through a data projector onto a screen so that all participants could see what was being recorded during the workshop. This enabled everyone to participate in real-time editing and refining of the workshop findings through interactive group discussion.

The use of open-ended questions, an efficient interactive workshop process, and real-time recording of the workshop inputs fostered genuine engagement and constructive contribution by participants, and generally gave rise to interesting and thoughtful conversations about measuring park management performance. Even when stakeholders sometimes had divergent views about whether something was 'good'

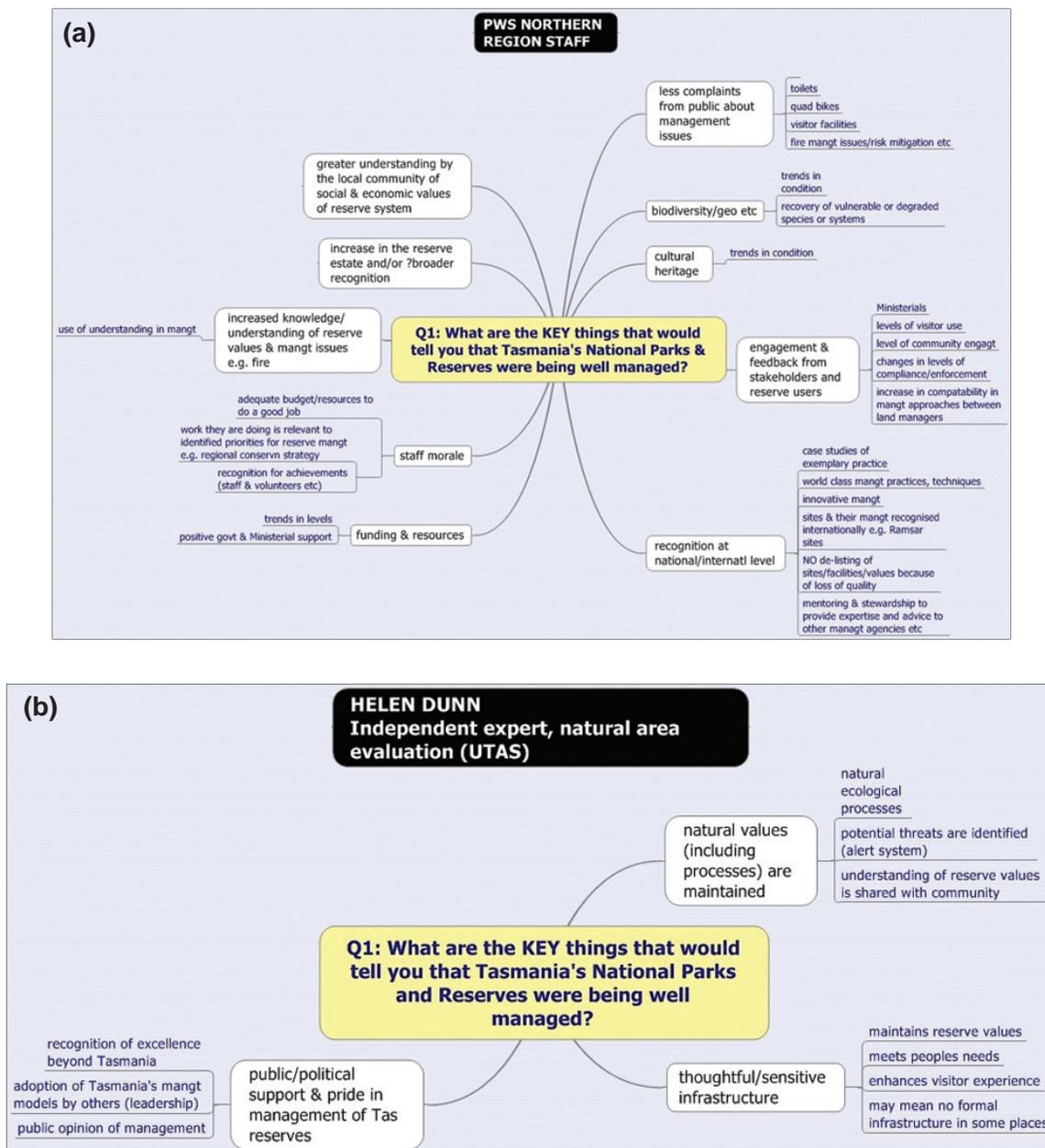


Figure 2—Examples of workshop outputs: (a) Parks and Wildlife Service staff (Northern Region); (b) Independent expert in natural area evaluation (University of Tasmania). (Source: Parks and Wildlife Service, 2013a)

or 'bad' (e.g. tourism developments in national parks), they could often agree that measuring a performance indicator such as 'the level and nature of tourism development' would give everyone the information they needed to assess how management was performing regardless of their personal views about the matter.

The workshop findings revealed that some types of performance information are of interest to all stakeholders, while some types are of unique or special interest to one or two stakeholder groups. Figure 3 shows stakeholders' overlapping needs for performance information. Development of Tasmania's Monitoring and Reporting System attempted to address the identified needs for performance information of all key stakeholder groups.

The Framework of the Monitoring and Reporting System

The detailed inputs to workshops and consultation processes were grouped and synthesized into discrete topics with a common theme. The findings revealed that in order to understand how management of Tasmania's national parks and reserves is performing, the management agency and stakeholders need factual information about the following six major arenas:

1. **Management context and arrangements** (e.g. information about the reserve estate, legislation and policy mandates, governance arrangements, funding for management, etc.)

2. Condition of reserves and reserve values (e.g. information about the condition of ecosystems and natural diversity, environmental quality, wilderness quality, Aboriginal and historical cultural heritage, etc.)
3. Management of threats, risks and impacts (e.g. information about the management of illegal activities, fire, weeds, diseases, feral animals, erosion, damaging/unsustainable activities, new and emerging issues, etc.)
4. Management of tourism, recreation and other uses (e.g. information about visitor numbers and activities, visitor satisfaction, infrastructure, public health and safety, sensitivity and sustainability of human use, etc.)
5. Community engagement and support (e.g. information about public awareness and support; community feedback; media profile; communication and education; community involvement; public and political advocacy and support, etc.)
6. Management systems, processes and tools (e.g. information about management plans, policies and processes for reserve management; information management; research and monitoring; collaboration and linkages with others; organisational workforce and staff morale, etc.).

These six performance arenas and associated component key performance areas (KPA) establish the framework for the Monitoring and Reporting System for Tasmania's National Parks and Reserves (see Table 2).

Stakeholders' needs for performance information



Figure 3—Stakeholders' overlapping needs for performance information. (Source: Parks and Wildlife Service, 2013a)

Table 2—Framework of the Monitoring and Reporting System

Arenas	Key Performance Areas (KPs)
<p>1. Management context and arrangements</p>	<p>1.1 Tasmania's national parks and reserves estate 1.2 Value and contribution of Tasmania's national parks and reserves 1.3 Legislation and policy framework for management 1.4 Governance arrangements and organisational structure 1.5 Strategic priorities and long-term outlook 1.6 Funding and allocation of resources 1.7 Achievements, progress and challenges 1.8 Standard of reserve management practice</p>
<p>2. Condition of reserves and reserve values</p>	<p>2.1 Significance and integrity of Tasmania's national parks and reserves and reserve values 2.2 Key strategies for conservation and rehabilitation 2.3 Identification and understanding of the natural and cultural heritage 2.4 Ecosystems and natural diversity 2.5 Environmental quality 2.6 Wilderness areas and wilderness quality 2.7 Aboriginal cultural heritage 2.8 Historical cultural heritage</p>
<p>3. Management of threats, risks and impacts</p>	<p>3.1 Nature and significance of key threats, risks and impacts 3.2 Key strategies for protection 3.3 Law enforcement and compliance 3.4 Fire management 3.5 Weeds 3.6 Feral and introduced animals 3.7 Diseases 3.8 Erosion and sea-level rise 3.9 Climate change adaptation 3.10 Damaging and/or unsustainable activities and practices 3.11 Other threats, risks and impacts including new and emerging issues</p>

(con.)

Table 2—Framework of the Monitoring and Reporting System (Continued).

Arenas	Key Performance Areas (KPA)
4. Management of tourism, recreation and other uses	4.1 Level and nature of tourism, recreation and other uses 4.2 Key strategies for tourism, recreation and other uses 4.3 Visitor numbers and activities 4.4 Visitor satisfaction, feedback and perceptions of change 4.5 Public health and safety 4.6 Infrastructure and built assets 4.7 Natural resource utilisation and other uses 4.8 Sensitivity and sustainability of human use
5. Community engagement and support	5.1 Public awareness and support for Tasmania's national parks and reserves 5.2 Key strategies for community engagement and support 5.3 Public acceptance and cooperation with reserve management 5.4 Community feedback 5.5 Media profile 5.6 Communication, education and presentation of the natural and cultural heritage 5.7 Community involvement and contribution 5.8 Public and political advocacy and support for the managing agency
6. Management systems, processes and tools	6.1 Statutory management plans, non-statutory plans and other key strategies 6.2 Implementation of organisational strategic and business plans 6.3 Effectiveness of reserve management plans, major projects and strategies 6.4 Policies, processes and standards for reserve management 6.5 Information management and decision-making, including for controversial issues 6.6 Research and monitoring 6.7 Adaptive management and continuous improvement 6.8 Collaboration and linkages with others 6.9 Workforce and staff profile 6.10 Staff morale and organisational culture

Source: Parks and Wildlife Service, 2013a

Types of Performance Reports

Tasmania's Monitoring and Reporting System is designed to deliver four types of online performance reports:

- **Status and Trends Reports** provide a brief state-wide overview of how reserve management is performing for each Key Performance Area (KPA) of ongoing interest for tracking management effectiveness. Each report presents best available information and supporting evidence (where this exists). Status and Trends Reports are ongoing and regularly updated. Examples of Status and Trends Reports are provided in Parks and Wildlife Service 2013a.
- **Reference Information** provides up-to-date information that supports users' understanding of management performance but is not itself measured, e.g. legislation and policy framework for management, governance arrangements and organisational structure.
- **Periodic Evaluation Reports** are occasional reports on the evaluated effectiveness of specific reserve management plans in achieving the planned outcomes. These reports examine the extent to which the statements of Key Desired Outcomes (KDOs) identified in the management plan have been achieved. An example of a Periodic Evaluation Report is the State of the Tasmanian Wilderness World Heritage Area Report (Parks and Wildlife Service 2004) which provides a comprehensive evaluation of management effectiveness under the statutory management plan for the Area. Periodic Evaluation Reports for most reserves in Tasmania will be much simpler and briefer than this example.

- **Evaluated Case Study Reports** provide an in-depth evaluation of the monitored effectiveness of significant projects in achieving the project objectives, and may also be used for reporting on the monitored condition of selected reserve values and/or issues. Case studies for evaluation should normally be identified during the planning phase of a project to ensure the monitoring and evaluation components are appropriately designed and integrated into project implementation. Examples of Evaluated Case Study Reports include the Macquarie Island Pest Eradication Project (Parks and Wildlife Service 2013b) and the Needwonnee Aboriginal Walk, Melaleuca (Parks and Wildlife Service 2013c).

The different types of reports serve different purposes and enable performance to be examined at a range of scales ranging from project effectiveness to state-wide performance. The relationships between the levels and types of reports generated by the Monitoring and Reporting System are shown in Figure 4.

The framework of the Monitoring and Reporting system provides a simple front-end entry point for users to the on-line reporting system. Users can quickly and easily navigate down through the hierarchical structure to the topics they are interested in and access the level of information that is of interest to them. For example, those seeking a deeper level of understanding can 'drill down' through links in the reports to more detailed information and supporting evidence including measured data.

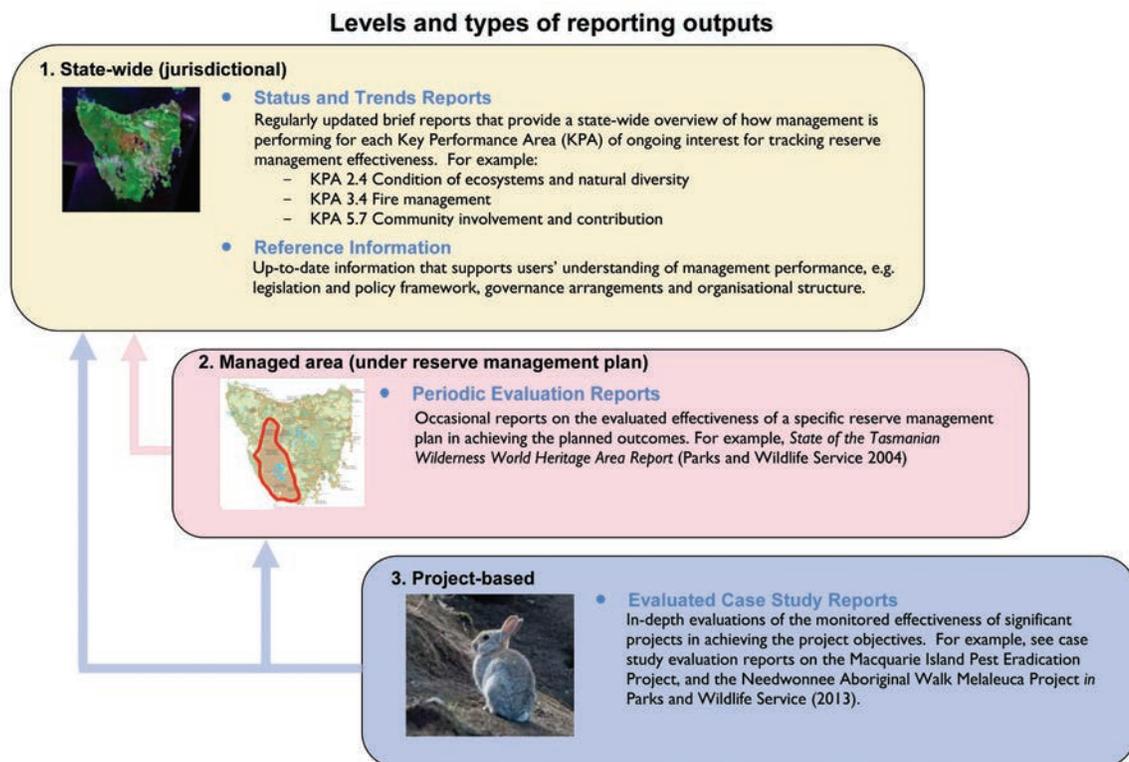


Figure 4—Levels and types of reports generated by the Monitoring and Reporting System. (Source: Parks and Wildlife Service, 2013a)

Implementation

At the time of writing (June 2014), the first stage of Tasmania's Monitoring and Reporting System has been built and is operating successfully on the agency's intranet. The system is progressively being built and when fully operational will be accessible to the public on the Parks and Wildlife Service website (www.parks.tas.gov.au). As resources permit, priority monitoring and evaluation activities are being implemented and new reports are regularly being added to the system. Each new or updated report helps to build the system and to grow the organizational culture of measuring evidence to demonstrate results.

Benefits

Tasmania's Monitoring and Reporting System encourages an adaptive management approach which supports the management agency to operate as effectively and efficiently as is practicable. Factual feedback about performance helps guide informed decision-making to optimize the achievement of the intended results.

The system progressively builds a structured repository of factual information and measured evidence about reserve management effectiveness. This resource not only supports the management agency to better understand how management is performing but also enables the agency to reliably communicate news of management achievements, progress and challenges with staff, stakeholders and the broader community. By providing accurate information about reserve management matters of interest to the community, the Monitoring and Reporting System supports all interested parties to become informed and to participate meaningfully in relevant processes for management planning and decision-making for national parks and reserves.

The Monitoring and Reporting System provides an informed basis for:

- Understanding areas of strengths and weaknesses in reserve management;
- Recognising and showcasing management achievements and giving due recognition to the people behind those achievements;
- Identifying opportunities for improvement;
- Informing and guiding management directions and priorities to better achieve the desired results;
- Making wise decisions—including well-targeted allocations of staff and funding resources—to optimize the returns on investment in management of Tasmania's national parks and reserves;
- Guiding strategic investment of resources in monitoring programs to evaluate the effectiveness of management for Tasmania's national parks and reserves;
- Building community understanding and informed involvement in reserve management;
- Increasing staff and stakeholder understanding and engagement in adaptive management processes — in particular the system is encouraging staff to think in new ways about how they approach their work, with a growing emphasis on identifying desired outcomes and developing monitoring programs to measure the results achieved;

- Supporting the agency to coordinate, streamline and meet multiple agency performance reporting requirements reliably and efficiently;
- Organising, linking and aligning various aspects of the agency's work (e.g. Management plans, business planning and reporting) through a common unifying framework that reflects legislative responsibilities and the expectations of stakeholders and the community;
- Accelerating organisational learning and improvement;
- Supporting collaborative and partnership approaches to reserve management (e.g. For cross-tenure strategies);
- Enhancing the delivery of long-term desired outcomes for Tasmania's national parks and reserves;
- Building community trust, confidence and pride in management of Tasmania's national parks and reserves.

Discussion

Key Drivers for Tasmania's Management Effectiveness Evaluation System

Key drivers for development of a management effectiveness evaluation system for Tasmania's national parks and reserves included:

- Management advisory committees advocated for an evaluative approach to management and provided firm ongoing encouragement and support for management effectiveness monitoring, evaluation and reporting initiatives.
- Management planners within the Parks and Wildlife Service recognised that unless we had factual feedback about what was working and what wasn't, management was essentially 'flying blind' and having to rely on educated guesses and intuition to shape management strategies, directions and priorities rather than being guided by factual evidence about how management was actually performing in achieving its objectives and goals.
- Formal agreements in some cases required the management agency to report on the results achieved from investment of funds in management programs, e.g. federal/state government agreements on joint funding arrangements for management of Tasmania's World Heritage Areas.
- Increasing calls at all levels for improved transparency and quality performance reporting by the public sector.
- Senior executive officers for Tasmania's national parks and reserves committed (through agency strategic and corporate plans) to develop, build and implement an evidence-based jurisdictional performance monitoring and reporting system for Tasmania's national parks and reserves.

Additional drivers that could potentially accelerate adoption of evidence-based evaluation and adaptive management approaches include:

- Strong commitment 'from those at the top' to evidence-based adaptive management approaches (e.g. Whole-of-Government, Government and/or agency commitment).
- Strategic commitment and resources for developing and maintaining an evidence-based performance monitoring and reporting system for national parks and reserves (e.g. for a jurisdictional 'State of Parks Monitoring and Reporting System').

- Investment and ongoing allocation of reliable adequate resources for measuring evidence to evaluate results ('METER programs')
- Increasing use of funding arrangements and partnerships that include requirements for measuring and reporting evidence of the results achieved from investment of funds.
- Increasing expectations for Departmental annual reports to provide links from summary statements of the agency's achievements, progress, and challenges to more detailed online information and measured evidence of management effectiveness.
- Legislation which not only includes clear statements of the objectives for reserve management but also includes requirements for regular public reporting of measured evidence of management effectiveness against those objectives.

The Project Journey

There is sometimes a misconception that developing a simple system is a simple matter. In fact, developing a robust simple system is often highly challenging and commonly involves high levels of complexity during the middle phases of development. As American physician/author Oliver Wendell Holmes observed: "I would not give a fig for the simplicity on this side of complexity, but I would give my life for the simplicity on the other side of complexity." Figure 5 depicts the project journey for development of Tasmania's Monitoring and Reporting System.

Acceptance by Staff

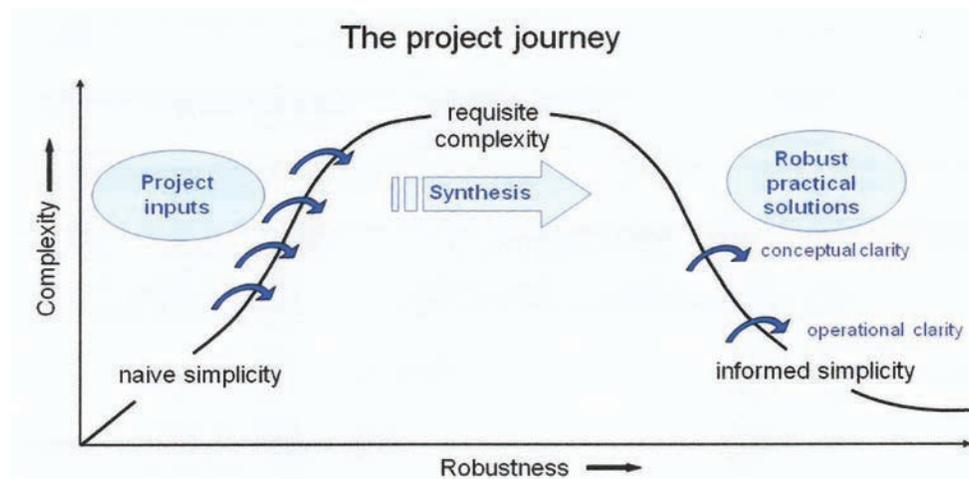
Staff familiarity with evaluation was low at the commencement of this initiative and attitudes toward evaluation were wary and uncertain at all levels of the agency. Understanding and acceptance of evaluation has progressively

grown over time as staff and managers have become more familiar with—and less fearful of—evaluation as used in an adaptive management context.

During development of the Monitoring and Reporting System, genuine consultation processes took account of staff and stakeholder inputs. This helped to build trust and provided some level of comfort that the developing system would be relevant to staff and stakeholder needs. These processes also helped to raise staff and stakeholders' understanding of evaluation, its purposes and benefits. Practical 'road testing' of the proposed reporting templates for the system also involved working closely and collaboratively with staff of key programs to ensure the templates were operationally practical and accepted.

Another important aspect of gaining staff support was to begin building the system by working with staff who were 'willing and able' to participate in evaluation. These were typically staff who were quick to recognize the benefits of demonstrating the results achieved from investment of resources in their programs. These staff were often highly motivated and achieving good results. This meant that the first evaluation reports produced tended to demonstrate high performing projects and programs. The recognition of good results by these evaluations provided positive feedback to the staff involved and helped allay others' fears about evaluation. It also gave encouragement for the agency to continue building and broadening the evaluation program. There was also growing agency realisation that evaluation reports could provide a valuable product for showcasing and communicating the agency's outstanding achievements.

Through taking a slow and collaborative approach, the Monitoring and Reporting System is now generally well-accepted by staff and managers. The focus is always on building an organisational culture of measuring evidence of management effectiveness to inform continuous learning and improvement. Should a management program not deliver the anticipated results, the focus turns to considering opportunities, options and proposed actions for improving



Modified from Cresswell (2009) and Lefroy et al (2009) after an original concept by Ward (2005).

Figure 5—The project journey. Developing robust yet practical solutions to challenging problems often requires high levels of complexity during the developmental phase of the project; however the ultimate goal is to remove unnecessary complexity and deliver a simple system that is robust, practical and useful. (Source: Parks and Wildlife Service, 2013a)

performance. Occasional set-backs and unanticipated results must be viewed as just a normal part of being a learning organization. By focusing on what the evidence is telling us, and reporting the findings of evaluations in a way that is factually accurate and supportive of adaptive management responses, Tasmania's Monitoring and Reporting System has (to date) avoided delivering any unwelcome surprises for staff or decision-makers.

Resources

Tasmania's Monitoring and Reporting System has been designed to be readily scalable so that implementation can proceed under a range of budgetary environments. With low levels of staffing and funding resources, it is possible to make slow and steady progress in building a management effectiveness monitoring and reporting system that is supported by limited measured evidence. Nonetheless the effectiveness of some management programs can be monitored and documented using relatively simple techniques such as a camera to take 'before' and 'after' photos.

With moderate levels of resources and appropriate professional staff capacity, there can be faster development and roll-out of a more comprehensive monitoring and reporting system that is supported by more and better quality evidence of management effectiveness, including more examples of evaluated case study projects.

With higher levels of Government and agency commitment and priority for evidence-based evaluation and adaptive management, it is possible to build a robust management effectiveness monitoring and reporting system that is supported by scientifically credible evidence including measured results of long-term ecological monitoring programs. Adequate, secure ongoing resources and professional capacity are necessary to support a robust evidence-based jurisdictional State of Parks Monitoring and Reporting System.

Even under very constrained resourcing environments, much can be achieved by capable, committed staff supported by key managers and stakeholders. For example, development of Tasmania's Monitoring and Reporting System has been achieved with minimal financial resources and only one assigned position to lead the project and coordinate inputs from staff and specialists across the agency. Additional staffing resources would be desirable.

Monitoring Activities

In general, reporting activities are relatively cheap to implement but monitoring activities are expensive. It is therefore essential to give careful consideration to prioritising monitoring activities. It makes sense to monitor and evaluate the effectiveness of significant initiatives and major budget projects. For instance, the Tasmania Parks and Wildlife Service evaluated the effectiveness of a major (\$25 million) project of immense conservation significance which aimed to eradicate feral rabbits, rats and mice from Macquarie Island World Heritage Area (Parks and Wildlife Service 2013b). We also evaluated the effectiveness of an innovative project working with indigenous people to develop an Aboriginal interpretive walk (Parks and Wildlife Service 2013c).

Priority is also given to monitoring activities that will assist the management agency to make informed decisions

for the management of critical on-ground issues (such as fire management), and to guide the achievement of important strategic planning goals. For example, effectiveness monitoring and evaluation is progressively being integrated into all new reserve management plans to evaluate the effectiveness of management under the plan. For example, see Coningham Nature Recreation Management Statement (Parks and Wildlife Service 2009).

Photo monitoring activities (such as fixed point photo-monitoring sequences and aerial photographic imagery) have proved to be a particularly economical and powerful way of demonstrating visible changes in the condition of selected sites and landscapes over time. For example, Figure 6 shows the changes over time in the condition of vegetation on Macquarie Island World Heritage Area caused by feral rabbits and the subsequent commencement of recovery in vegetation condition following successful management measures to eradicate feral rabbits and rodents from Macquarie Island (Parks and Wildlife Service, 2013b).

Scientifically credible long-term ecological monitoring programs are especially important for evidence-based adaptive management of national parks and reserves (Lindenmeyer and Gibbons 2012). These programs are generally heavily reliant on governments to provide the necessary long-term strategic commitment and security of resources for professional staffing capacity to undertake monitoring and research activities (including data analysis and information management).

Organizational Culture

Adaptive management can thrive in an organizational culture that values continuous learning and improvement. From the outset, governments and agencies that are considering adopting an evaluative approach to management must understand and accept the reality that not every management program will be a glowing success story. It takes a certain level of organizational maturity to recognize that learning from both successes and failures is an integral part of being an authentic learning organization.

If an organization is committed to continuous learning and improvement, it will not feel threatened by evaluation. In the event of a less-than-satisfactory result, the organization will not seek to hide or disguise the results, but will calmly and rationally analyze the factors that have contributed to the result and make the necessary adjustments or decisions to improve ongoing performance. In the process, it will learn something that helps it to perform better in future. This is the essence of sound adaptive management. Those organizations that are unable or unwilling to admit to shortcomings or failures are not yet ready to willingly embark on the journey that is evidence-based adaptive management.

Conclusions and Key Messages

Tasmania's Monitoring and Reporting System for National Parks and Reserves provides a practical model of evidence-based jurisdictional performance monitoring and reporting that is well suited to government. The system addresses the management agency's formal responsibilities for reserve management and delivers reliable factual information that is relevant and meaningful to staff, stakeholders and the



Figure 6—Photo-monitoring of vegetation condition on Macquarie Island World Heritage Area. Photo (a) shows healthy tussock grasslands in 1990 prior to impacts; photo (b) shows widespread dead and dying vegetation in 2006 as a result of overgrazing by feral rabbits; photo (c) shows the vegetation starting to recover in 2010 following successful management measures to remove rabbits and rodents from Macquarie Island. (Source: Parks and Wildlife Service, 2013a; photos: PWS/Jenny Scott (UTas).

broader community. By providing all interested parties with detailed accurate information and measured evidence about management achievements, progress and challenges, the Monitoring and Reporting System supports informed, effective and transparent management of national parks and reserves.

The following suggestions are offered with a view to supporting broader uptake and practical application of evidence-based evaluation and adaptive management for conservation management and public policy.

Strategic Commitment

- Make a bold strategic commitment to evidence-based adaptive management. For example:
 - ◊ Adopt the adaptive management cycle at all levels (Figure 1).
 - ◊ Invest in developing a strategic performance monitoring and reporting system to support informed, effective and transparent management of national parks and reserves.

Organizational Culture

- Understand that developing a robust management effectiveness monitoring and reporting system takes time, careful planning, and long-term strategic commitment.

Expectations for Measuring Results

- Establish expectations and requirements for measuring and demonstrating the results achieved from investment of resources in management of national parks and reserves (e.g. via funding arrangements and/or legislation).

Professional Capacity in Performance Measurement

- Build in-house professional capacity in performance monitoring, evaluation and reporting. For example:
 - ◊ Employ at least one science and/or statistics trained professional to lead, coordinate and provide quality assurance for a robust monitoring and reporting system.
 - ◊ Provide editorial support to staff as appropriate to ensure that all performance reports are of an appropriately high and consistent standard suitable for government publication.

Resources

- Allocate an ongoing percentage (e.g. 5-10%) of resources to measuring evidence to evaluate results ('METER programs').
- Establish a steady ongoing program of monitoring, evaluation and reporting to support continuous online

reporting on performance as well as the production of major periodic evaluation reports. This helps to avoid major fluctuations in staffing and resourcing requirements which can be difficult for government agencies to manage reliably through normal budget processes and cycles.

Development and Implementation

- Remember 'Pollard's polemic' and ensure that no matter how complex a system or its datasets may be, it is essential to have a 'simple front end' that can be quickly grasped and understood by a broad range of audiences (including decision-makers and funders).
- Develop a strategic framework for management effectiveness monitoring and reporting that is aligned to relatively stable enduring mandates (such as legislation and/or long-term funding arrangements) and stakeholders' identified needs for performance information. These dual foundations will enhance the resilience of the system to institutional changes.
- Integrate effectiveness monitoring and evaluation into management plans, strategies and major projects at the planning stage.
- Start simply and build from one success to the next. For example, work with the willing and able to establish early examples of evaluation reports that demonstrate how the evaluation system works in practice.
- Remember you can't monitor everything! Prioritise monitoring activities to address the most important matters and questions.
- Where possible, use photos and images to tell the story of management, including what was done, what was achieved, and to give acknowledgement to the people behind the program.
- A user-friendly website and hierarchically structured reporting helps everyone to find the information they are looking for quickly and easily.

Acknowledgments

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Wilderness Management within an Australian Interstate Context

Franz Peters

Abstract—Conservation, reserve management within an interstate context is not unique in or to Australia. Nevertheless, the policy and procedures derived from various, state legislation often creates ambiguity for interstate, land management agencies. This compels such agencies to adopt specific approaches and strategies to landscape management. This paper provides a context for wilderness management in south-east Australia and outlines how the NSW National Parks and Wildlife Service and Parks Victoria have assembled the Genoa River Interstate Liaison Committee, a committee of people focusing on a “nil tenure”, approach to cross border conservation within the Genoa River Catchment. The Genoa River catchment contains 101,000 ha (249,576 acres) of public and private lands including the 25,500 ha (63,011 acres) Genoa Wilderness protected within conjoining, interstate national parks. As a unique bioregion in Australia, where geology, vegetation communities and their faunal assemblages undergo dramatic changes from the coast to the escarpment, the subject Committee’s management focus includes: wilderness, biodiversity and fire, introduced vertebrate pests and weeds, and recreational visitation.

Introduction

There are thousands of hectares of land in the south east corner of Australia comprising south eastern New South Wales (NSW) and the Far East Gippsland region of Victoria which remain relatively unvisited, of both private and public domain, containing a diverse range of forest ecosystems. Other than the coastal zones which were afforded access by sea, significant parts of this region were the last frontiers for explorers and early settlers. To this day the region is only serviced by two main highways, subsidiary roads and trails,

Franz Peters is the Manager for the Bombala Area, Far South Coast Region of the NSW National Parks and Wildlife Service, Office of Environment and Heritage, 153 Maybe Street Bombala, New South Wales, 2632. AUSTRALIA. franz.peters@environment.nsw.gov.au.

In: Watson, Alan; Carver, Stephen; Krenova, Zdenka; McBride, Brooke, comps. 2015. Science and stewardship to protect and sustain wilderness values: Tenth World Wilderness Congress symposium; 2013, 4-10 October; Salamanca, Spain. Proceedings RMRS-P-74. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 208 p.

as the main railway lines end either in NSW at Nowra south of Sydney, and for Victoria at Bairnsdale located in East Gippsland, east of Melbourne, some hundreds of kilometres from the subject region.

In common with the Australian continent and immediate islands, this region is part of the continuum of Aboriginal culture and kinship with land and sea. It is characterised by a landscape of narrow coastal plains rising into steep hinterland and escarpment forests furnishing catchments which flow into relatively intact estuaries.

More than 30 percent of the region is now protected in either national park or nature reserve under the management of national park authorities, or protected as flora protection reserves managed by forestry agencies (Australian Department of Sustainability, Environment, Water Populations and Communities 2013). The primary impacts upon the region’s catchment values and the Aboriginal cultural values remain those associated with the early clearing of land for agriculture, logging and forest roading and in some cases fire management practices.

Within this extensive area of south east Australia there are two areas of interstate managed wilderness: the Nadgee-Howe Wilderness situated on the coast and the Genoa Wilderness situated in the middle reaches of the Genoa River north-west along the NSW/Victorian state border (Figure 1). The Nadgee-Howe Wilderness Area of 25,900 ha (64,000 acres) is situated within the NSW managed Nadgee Nature Reserve and Victorian managed Croajingolong National Park and is considered to be the best representation of pre-European coastal vegetation in south eastern Australia (Parks Victoria website 2013). Croajingolong National Park is a dedicated United Nations Educational, Scientific and Cultural Organization (UNESCO) World Biosphere Reserve.

By contrast, the Genoa Wilderness (25,500 ha – 63,011 acres), gazetted in the early 1990s also forms one of the largest areas of high quality wilderness in south-eastern Australia. This cross border wilderness is situated in the southern sections of the South East Forests National Park in NSW adjoining the northern extent of Coopracambra National Park managed by Parks Victoria (Figure 2). In 1999, the need for a collaborative approach to managing the Genoa Wilderness led staff from Parks Victoria and the NSW National Parks and Wildlife Service (NPWS) to establish the Genoa River Interstate Liaison Committee (GRILCO). Before describing the work of GRILCO it is prudent to provide a background for Wilderness management in south-east Australia and describe the Genoa Wilderness.

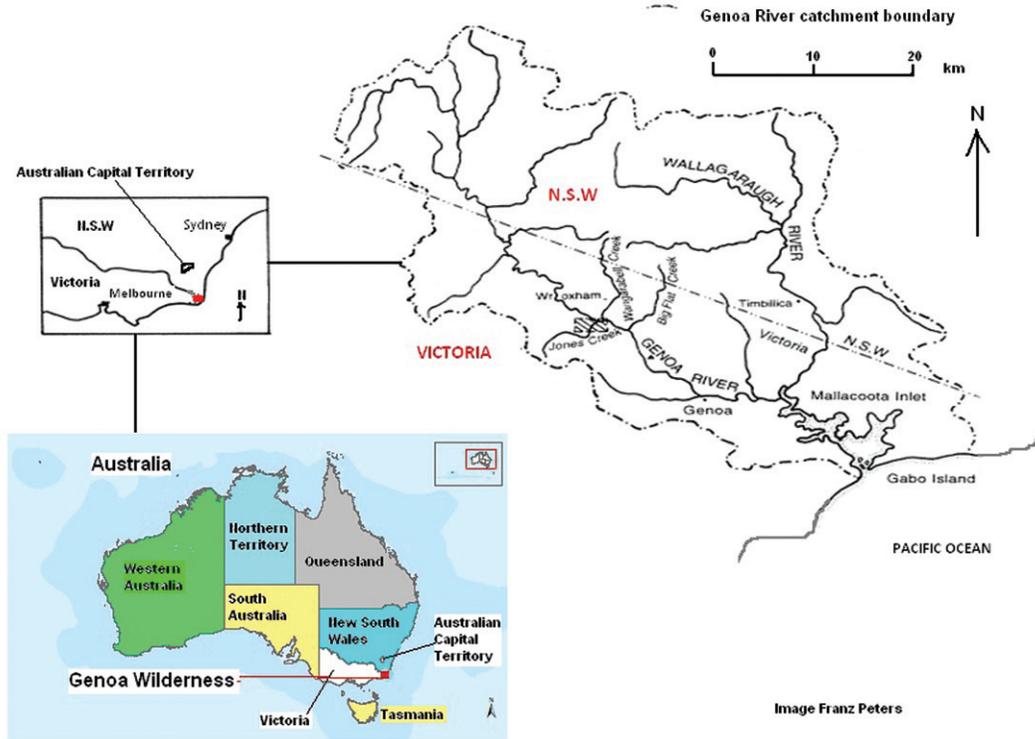


Figure 1—Map of the Genoa River Catchment including the Wallagarrugh River as it is located within south east Australia. Map by Franz Peters.

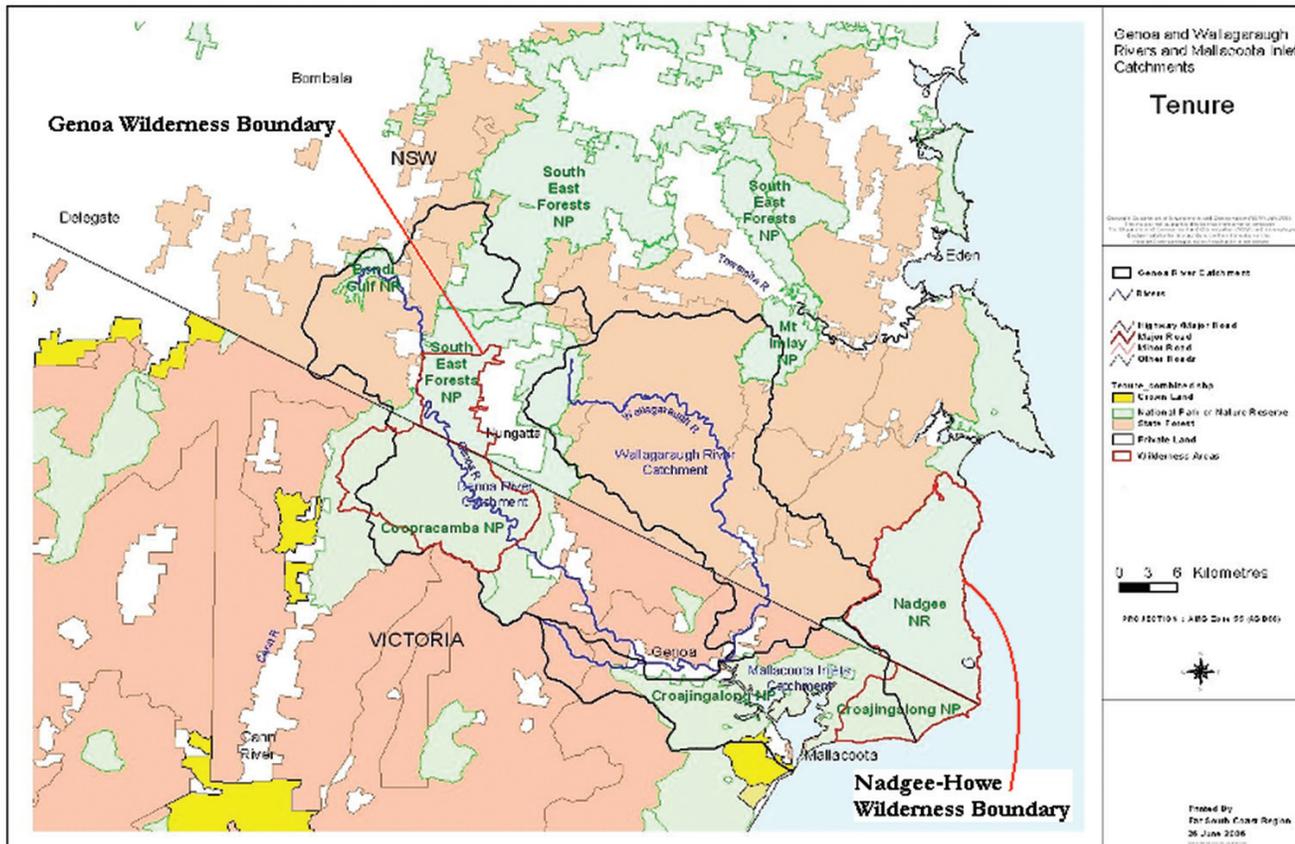


Figure 2—Genoa and Wallagarrugh Rivers and Mallacoota Inlet Catchments including south east Australian wilderness boundaries. Map by Max Beukers.

Wilderness in South East Australia

A Précis

State governments in Australia legislate for the protection of wilderness and generally include objectives regarding the restoration of land to its condition before European colonisation. In Victoria the National Parks Act 1975 provides for areas of land to be declared Wilderness Parks, yet also allows for the formation of Wilderness Zones which are areas within declared national parks similar to those in NSW. Victorian legislation also provides for the establishment of Reference Areas within Wilderness Zones for higher protection established under the Reference Areas Act 1978. Reference Areas provide a reference for comparative studies with other sections of land where various activities and types of human interaction happen, showing the effects of human alteration and utilisation of the land. Reference Areas are fundamentally managed by an Advisory Committee (State of Victoria 2013).

In NSW the Wilderness Act 1987 affords declared wilderness the most secure level of protection, requiring it to be managed in a way that will maintain its wilderness values and pristine condition by limiting activities likely to damage flora, fauna and cultural heritage. Nearly all declared wilderness is within national parks and nature reserves and it is actively managed for fire, pests and weeds, consistent with management practices applied elsewhere throughout the reserve system. NSW was among the first Australian states to legislate for wilderness protection (Office of Environment and Heritage 2011).

The Colong Foundation for Wilderness, Australia's longest-serving community advocate for wilderness, based in NSW, has a Wilderness Vision: To have all wilderness in NSW protected and managed by 2020. The foundation's program proposal 1.4 Cross Border Wilderness Management states that the NSW NPWS Wilderness Unit should prepare and regularly review memoranda with parks agencies in adjoining states and territories (Colong Wilderness 2013). The current cross border management of the Genoa Wilderness referred to in this paper provides a model for these arrangements.

Wilderness—The Mixed Debate

In Australia wilderness is considered part of the national identity. The 'bush' and the 'outback' landscapes so typified by wilderness, continue to hold a central place in Australian culture (Office of Environment and Heritage 2011). While considered part of the national identity the concept of wilderness and the ideals related to declaring and protecting land as wilderness continues to provoke concern in cohorts of the general populous and this issue is neither contemporary nor unique to Australia.

In his paper "The Trouble with Wilderness; or getting back to the wrong nature" Cronon (1995) asks the question - Why does the protection of wilderness so often seem to pit urban recreationists against rural people who actually earn their living from the land (excepting those who sell goods and services to the tourists themselves)? In Australia the notion of having land preserved for wilderness protection perplexes many farmers and traditionalists. The perception

exists that once declared, wilderness is land unmanaged, wasted or moreover posing a threat to society from natural events such as wildfire.

Within this preservation conundrum, there is a growing desire in Australia to augment the use of wilderness and in some cases exploit it to enhance local and regional economies, yet ensure that the values of wild places are being passed onto future generations whilst providing the benefits associated with increased national and international tourism. The Australian National Landscapes program discussed later in this paper, seeks to promote such benefits. Politicians and bureaucrats in Australia are also being persuaded by arguments to 'unlock' wilderness areas for recreational pursuits not normally aligned with self-reliant activity. Pursuits such as horse riding and mountain biking are being suggested. In NSW, a selection of wilderness areas have become the recent focus for a pilot program which may sanction horse riding in the subject areas based on the precedence of historic use of mountain passes and bridle trails.

Do We Need More Wilderness?

Using estimates of the total wilderness area in Australia, Watson et al (2009) determined that between 2000 and 2006 of the 2.93 million km² of wilderness (38 percent of land area, mostly in northern and western Australia), only 14 percent was protected in 2000. This value increased marginally to 19 percent by 2006 as the size of the Reserve System itself increased by 37 percent (i.e., from 652,597 km² to 895,326 km²). Watson and his colleagues further suggest that Australia's growth in reserve area has not captured the necessary wilderness; instead, gains were made in areas largely modified by humans.

The recent debate in Australia includes a focus on the management of our dwindling species rather than placing emphasis on reserving land. In his essay, Flannery (2012) discusses the Australian government's focus on ecosystem management rather than species management, a reduction in the scientific capacity of conservation agencies and suggests there is an overall reduction in government funding to support biodiversity conservation.

As such these complexities create the challenge for cross border conservation agencies to work together to develop effective, interstate management strategies and agreements.

The Genoa Wilderness

Aboriginal People

Aboriginal people were living in Australia for over 40,000 years prior to the first Europeans. The Genoa River, Genoa Wilderness and associated corridors provided important pathways for people travelling north-west onto the Monaro plains and up to the Mountains for the summer Bogong Moth ceremonies and returning to the coast (Flood 1980).

More recently the Bundian Way, one of the ancient Aboriginal pathways connecting the Snowy Mountains to the sea at Twofold Bay near Eden, has been listed on the NSW Heritage Commission register (NSW Office of Environment and Heritage 2013). The Bundian Way, located a few kilometres north of the Genoa Wilderness, celebrates

the connections and kinship Aboriginal people have with traditional routes and seasonal gatherings on an annual or seasonal basis. This shared pathway is also significant for early explorers who were aided by Aboriginal guides in exploration and the search for pasture (Blay et al 2011). The Bundian Way passes through national parks, state forest, private and Crown lands and is planned to become a focus for Aboriginal tourism and employment.

Large valleys such as the Genoa were important migration and trading routes between Aboriginal groups, enabling the exchange of raw materials, knowledge and information and food supplies. Significant artefact sites and camp sites are found in this region indicating extensive utilisation of the region's natural resources. (Franz Peters, personal observations of recorded archaeological sites from working in south-eastern Australia since 1987).

Devonian Discoveries

The Genoa River Gorge is a site of international and national significance for its palaeontological, geological and geomorphological features. In 1971 Norman Wakefield, an Australian naturalist and palaeontologist, discovered three distinct tetrapod trackways from 370 million years ago (Warren and Wakefield 1972). The Genoa site is renowned for preserving the first record of Devonian tetrapods from Australia and Gondwanaland track ways.

Holland (2010) further described a record of the Devonian fish fauna from the Genoa including the placoderm taxa *Bothriolepis*, *Remigolepis* and *Groenlandaspis* and within this article describes how additional fossil, tetrapod remains were found in the vicinity including jaw bones, teeth and scales, scattered within the red Devonian beds along a 6 km stretch of the river.

Heritage Rivers with Restricted Flora

A 27 km corridor of the Genoa River is listed under the Victorian Heritage Rivers Act 1992. This corridor from the NSW/Victoria border upstream from Wangarabell in Victoria has been designated a Heritage River corridor under the Act because of a range of values, including the geomorphic significance of the gorge, which displays deeply entrenched meanders in various scales of channel and valley development.

Certain species of riparian vegetation are unique to this part of Australia. Forester's Bottle brush *Callistemon forresterae* is a member of the family Myrtaceae and known from a single population of up to 3,000 plants occurring along the banks of the Genoa River and is listed as Vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (Sutter 2010).

Another small shrub, *Correa lawrenceana* var. *genoensis*, is known from only five populations: one in New South Wales growing in Redstone Creek and four in Victoria growing along the Genoa River and all located within the Genoa Wilderness. The taxon is listed as Endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (Carter et al 2010).

Unique Faunal Assemblages and the Struggle to Protect Them

Australia is one of the six most biodiverse nations on the planet and is home to more biodiversity than any other developed nation on Earth (Conservation International 1998); however, with 27 mammals having become extinct in the last 200 years, Australia has the worst mammal extinction record in the world (Australian Wildlife Conservancy 2012). Across Australia, the predation by the European Red fox *Vulpes vulpes* and feral cats *Felis catus*, on small marsupials such as potoroos and bandicoots is of increasing concern (Johnson et al 2007). Most of these 'critical weight range' (CWR) marsupials are highly susceptible to predation because their evolution did not require behaviours to adapt to such predators. Ashby and others (1990) were of the view that these small marsupials, at least in NSW, are extinction prone. This is concerning because the existence of CWR marsupials is understood to be highly beneficial to the health of forest ecosystems resultant of the biological interrelationships these fungivores establish by translocating the spores of symbiotic fungi throughout the forest ecosystem (Claridge 2002). These interrelationships are common in forests throughout the world, yet very few countries compare to Australia where foxes and feral cats are having such an impact on native fungivores.

In an effort to counteract the impacts of predation, broad-scale landscape, poison baiting programs have been introduced in south-east Australia, coupled with monitoring techniques using remote cameras and this is clearly indicating that local populations of many CWR species are stable if not increasing. In East Gippsland Victoria, the re-appearance of potoroos and bandicoots has been attributed to the ongoing 'Southern Ark' fox control program that has been in operation since 1999. As the largest fox baiting project in south-east Australia, 'Southern Ark' is a collaborative, cross-tenure project with strong stakeholder support among the relevant public land managers, research organisations and community (Murray et al 2006).

In NSW under the Fox Threat Abatement Plan (FOX TAP), fox control is undertaken under a Site Plan for all threatened species priority sites in consultation with other land management agencies and other relevant groups as required (NSW DECCW 2010). The eastern edge of the Genoa Wilderness is located within a FOX TAP site plan area. Site Plans propose the extent, frequency and methods of fox control required at each site and describe the specific objectives and methods of monitoring, including actions at nil-treatment sites where required.

The Genoa River catchment is also important for protecting many endangered and threatened fish species and the unique monotreme the Platypus (*Ornithorhynchus anatinus*). The Platypus is legally protected within its range in the eastern states of Australia, albeit restricted to streams, suitable freshwater bodies and certain shallow water storage lakes and ponds. Fish species like the Australian Grayling (*Prototroctes maraena*), Cox's Gudgeon (*Gobiomorphus coxii*) and Eastern Freshwater Shrimp (*Australatya striolata*), are listed as threatened under the Victorian Flora and Fauna Guarantee Act 1988 and endemic to south eastern Australia.

The Australian Grayling is considered threatened along the Australian eastern seaboard due to declines in abundance throughout most of its range which includes Tasmania, and has been listed as Vulnerable under the Australian Government Environment Protection and Biodiversity Conservation Act 1999.

Recreational Visitation

In recognising the need for providing high level recreational opportunities, the NSW and Victorian park services have prepared management plans that:

- Specifically describe the need to protect and enhance the essentially unmodified natural condition of the parks and wilderness subject to that protection
- Minimise interference to natural processes and
- Provide opportunities for solitude, inspiration and appropriate self-reliant recreation.

More recently the Genoa River catchment, the Genoa Wilderness and the Mallacoota Inlet have been included in the Australia's Coastal Wilderness (ACW) National Landscape program. This program is essentially a partnership managed by Tourism Australia and Parks Australia and aims to promote Australia's world class high quality visitor experiences; increase the value of tourism to regional economies; enhance the role of protected areas in those economies and build support for protecting our natural and cultural assets (Tourism Australia and Parks Australia 2012).

There are 16 National Landscapes identified around the Australian continent and these are considered the most inspirational environments offering world class natural and cultural experiences. The marketing of the various Landscapes provides opportunities to personally engage with Aboriginal culture and heritage and appeals to visitors who want to learn about the world they live in and connect with local culture.

Each Landscape is guided by a local steering committee comprising regional tourism bodies and local councils, indigenous tour operators and groups, regional development organisations and relevant government conservation agencies. Parks Victoria and NSW NPWS have representatives on the ACW Steering Committee and both agencies play a major role in promotion and marketing and proving expertise to destination positioning and associated product development.

The Genoa River Interstate Liaison Committee—GRILCO

GRILCO's Vision—Better Management Outcomes Through Integrated Cooperative Planning and Actions

The Genoa River Interstate Liaison Committee (GRILCO) was convened in 1999 as a meeting between the author and a ranger from Parks Victoria. Their primary concern was initially to prepare a plan to control introduced weeds, particularly crack willow (*Salix fragilis*), within the upper reaches of the Genoa River catchment. GRILCO's early meetings also discussed other temporal management issues which included the management of other introduced weeds, wild dog and feral pig control and recreation management.

Crack willow, a native from Europe and western Asia, is now a Weed of National Significance (WONS). Early in 2006 using a funding program specifically aimed at targeting WONS, GRILCO secured funding of \$582,000 which included a \$215,000 grant from the Commonwealth Government under its "Defeating the Weed Menace" (DWM) program. The GRILCO DWM project which ran until 2010 aimed at controlling 10,500 ha (25,946 acres) of blackberries and 6,200 ha (15,320 acres) of cracked willows within the Genoa River, Wallagaraugh River and Mallacoota Inlet catchments using innovative and conventional control techniques. For the life of the project, GRILCO formed a partnership with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), to set up key release sites for CSIRO to develop new strains of blackberry rust fungus which lifted the status of the project to a National level. GRILCO also lobbied the owners of a private inholding in NSW surrounded by South East Forests National Park. The inholding – Nungatta Station, contained the "motherlode" of blackberry infestations which were seeding downstream into the Genoa Wilderness. The owners of Nungatta Station worked closely with GRILCO in developing a landscape plan for priority blackberry control works and Nungatta Station was then awarded the prestigious Australian Institute of Landscape Architects National Landscape Architecture Land Management Award in 2010 for design and implementation of the overall approach to weed control and sustainable farm management.

Education and community awareness programs, including field days, development of best practice guidelines and media campaigns were prepared to ensure that all landholders could participate and become aware of their responsibilities in achieving long term blackberry and willow control outcomes. GRILCO's success has been captured in the WONS National Blackberry Control Manual Part 5 – an example of blackberry management in practice (NSW Department of Primary Industries 2009).

Protecting Wilderness from Introduced Weed Invasions

The notion of implementing weed control work in the upper reaches of the catchment was fundamental to the early goals of GRILCO. For the national park authorities it was easily argued that introduced weeds growing in an escarpment catchment impacted on the riparian ecology downstream, on the values of the Genoa Wilderness and eventually on the values of the of the Mallacoota Inlet and Croajingolong National Park.

Radiata Pine, *Pinus radiata* growing in plantations in the upper reaches of the Genoa River catchment continue to pose a threat to the regions natural forest values. Within the southern sections of the South East Forests National Park, Radiata pine cones can be carried many kilometres by the Yellow-tailed Black Cockatoo *Calyptorhynchus funereus* (Franz Peters, personal observation, 2009). Although a large proportion of the Yellow-tailed Black Cockatoo's diet is made up of wood-boring grubs, these cockatoos flock in large numbers within pine plantations and when disturbed will fly off with cones clenched in claws dropping pine seeds outside the plantations and across the landscape. The NSW NPWS has been undertaking a systematic Pine wildling control program within the Genoa River catchment for 7 years with success.

Blue periwinkle *Vinca major* is also an introduced weed that commenced its journey in the upper catchment escaping from historically established gardens located around isolated houses which now lie abandoned, yet still located within Radiata pine plantations. These source infestations have now been treated, however, the physiology of this weed allows Periwinkle to easily spread downstream, posing one of the major concerns for the Genoa Wilderness because once established, it quickly spreads across the forest floor smothering and repressing the growth of all native ground flora. GRILCO recently agreed to make this weed the priority for action within the Genoa Wilderness.

Recreational Use and Feedback

Recreation management is fundamental to GRILCO's purpose because the Genoa River Gorge is a popular trek for back country, self-reliant walkers. Walkers can offer wilderness managers information not readily accessed on a day to day basis so, to make the most of this situation GRILCO created a data sheet to help capture all manner of Park management information from walkers and this is also used to plan and direct works.

In recent years the number of visitors to the Genoa Wilderness is believed to be steady. Parks Victoria Ranger Greg Cameron, who has been based in Cann River since the late 70's, suggests that while the human population increases corresponding to a potential increase in local and overseas visitation in Australia, a similar increase in the cohort of wilderness users would follow; however, interstate data collated for some 7 years indicates that there has been no significant recorded increase of visitation into the Genoa Wilderness (Cameron, personal communication).

Fire Management

The management of fire across borders has been enhanced by increased cooperation, yet in recent years has been the focus of change. Members of GRILCO sit on the Eastern Border Fire Operation Committee (EBFOC). The EBFOC has developed guidelines and agreement for the management and suppression of wildfires in the border region and also aims to increase and improve cooperation between agencies, particularly on the topic of prescribed burning.

With an emphasis on increased interventional fire management there are concerns among many conservation land managers and community members that ecosystems are being over burnt to the detriment of the flora and fauna assemblages to which they belong. The final report on the 2009 Victorian Bushfires Royal Commission (VBRC 2010) – the Black Saturday bushfires in Victoria has set a precedent for fire management agencies. The trend in eastern Australia is to increase the area of land treated by prescribed fire and to create a resilient community; a community that is vigilant and aware rather than reactive and defamatory. The VBRC handed down 67 Recommendations, which included a statement that the amount of prescribed burning occurring in Victoria was inadequate. The Commission further proposed that Victoria make a commitment to fund a long-term program of prescribed burning, with an annual rolling target

of a minimum of 5 per cent of public land each year, and that the State be held accountable for meeting this target.

The sentiments outlined in the VBRC have been taken on board by other states, particularly NSW where agencies have increased targets for controlled burning to mirror those set for Victoria. For instance in NSW the NPWS is instigating a doubling of the land treated by prescribed fire. In 2012-13 1,300 fire fighters treated 206,000 ha (509,067 acres) in more than 300 separate prescribed burns across the State – cited as a record achievement and more than doubling the previous best effort in 2009-10 when over 90,000 ha (222,394 acres) were treated in fuel reduction burning operations (Office of Environment and Heritage 2013).

In light of these revised policy requirements, agency staff responsible for managing the Genoa Wilderness maintain a consultative approach regarding prescribed burning practices, cognizant of research which suggests that the region's former repetitive, low intensity fire regimes were possibly detrimental to local forest fauna (Catling 1991). While some discuss this as the dilemma facing fire managers, citing the good and bad effects of fire coupled with the conflicts between aims and concerns (Kremer 2004; Miller 2008), more recently Gammage (2011) has argued that land managers in Australia should revert to the Aboriginal methods suggesting that once Aboriginal people were no longer able to tend their country with fire, it became overgrown and vulnerable to the hugely damaging bushfires we now experience. The concept purported by Gammage has support in our region due to the largely forested landscape within which we live; however, although traditional burning practises are occurring in other parts of Australia, there is still some work to be done in establishing similar practices in the south east.

While revising the Fire Management Strategy for the South East Forests National Park, NPWS parks staff used the geographic information system 'ArcGIS' to develop a model proposing Land Management Zone (LMZ) burns for the NSW sections of the Genoa Wilderness and other parts of the Park. The model overlaid two themes: 'time since fire' over a map of vegetation of high bushfire potential to produce a mosaic of areas within LMZs to be treated up to the year 2020 (NSW Office of Environment and Heritage 2010). The rationale for using 'time since fire' means that ecosystems are treated within their fire thresholds. The NSW NPWS uses biodiversity thresholds based on plant species functional types and life history to identify the domain of acceptable fire intervals within broad vegetation types (Kenny et al. 2004). The NSW model ties in with the planned Victorian Landscape Management Zone approach for the Genoa Wilderness.

Reintroducing Endangered Fauna

While photo monitoring indicates a reasonably stable population of CWR species, GRILCO is discussing the potential translocation of the endangered Brush-tailed rock wallaby *Petrogale penicillata* back into the Genoa Wilderness.

This small wallaby, now Endangered in NSW and Critically Endangered in Victoria, was once distributed along the Great Dividing Range in eastern Australia, inhabiting rocky escarpment outcrops and cliffs (NSW Department of Environment and Climate Change 2008). However, like

many other small marsupials this species succumbed to the changes in land management regimes and in particular the introduction of the European fox and feral herbivores such as the rabbit and feral goat. Lunney and others (1997) also maintain that this species was subjected to considerable hunting pressure for the commercial fur trade. Natural populations of this animal are now restricted to very small numbers located in what is termed Evolutionary Significant Units (ESUs) (Figure 3). The responsibility for the recovery planning process and provision of specialised technical support for the conservation of the Brush-tailed Rock-wallaby in each of the three ESUs: the Southern, Central and Northern groups, rests with the National Recovery Team. (Menkhorst et al 2010).

The landscape of the Genoa River and Gorge provides potentially suitable habitat for the Brush-tailed Rock-wallaby and it is envisaged that fox control programs under the FOX-TAP site plans co-opting the work with the Southern Ark project will succeed to reintroduce these unique marsupials under a long term plan. GRILCO has an action to prepare a feasibility study and will ensure a successful reintroduction program includes working closely with neighbouring, private landholders.

Discussion—Challenges for the Future

While the membership for GRILCO currently includes all agencies and landholders who manage land within the Genoa River catchment, the challenge is to match agency policy expectations, adjust plans to meet diminishing government budgets while continuing to uphold effective management.

State governments and the broader community want to see agencies managing and working effectively. For instance, the NSW 2021 State Plan; Goal 32 Involve the community in

decision making on government policy, services and projects (NSW Government State Plan 2013) provides an impetus for this whole community approach to occur.

The inclusive approach taken by GRILCO enables the establishment of agreed rules of engagement for meetings and has set a precedence for the establishment of terms of reference to aid the Committee to devise annual work plans and define priorities. In 2013, GRILCO met to prepare a Draft Strategic Plan which will detail the committee's mission and broad objectives with associated actions for the period 2013 to 2018. Strategic Plans are becoming more important for large committees in order to secure funding, particularly from the Australian Commonwealth Government. Independent funding bodies and philanthropists are also more likely to fund projects that have a clearly planned and measurable approach.

The success of GRILCO is intrinsically linked to facilitating and engaging all public agencies and private land-holders to work together under the goals set out in the respective State Government Plans, to manage the Genoa River catchment with an agreed shared principle; think globally - act locally.

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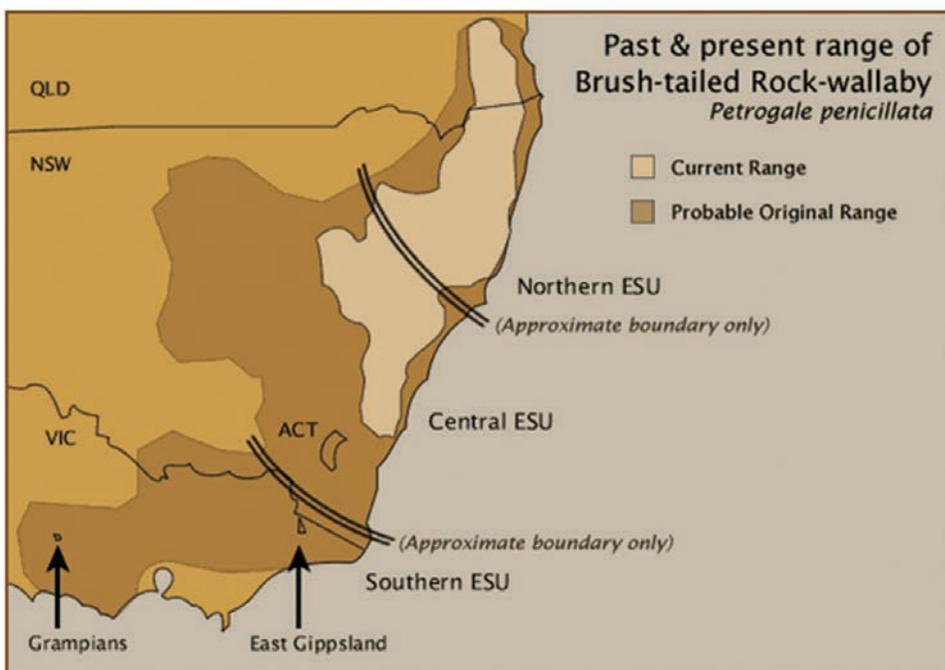


Figure 3—Past and present range of the Brush-tailed Rock-wallaby. Map from the NSW Department of Environment and Climate Change 2008 – NSW Recovery plan for the Brush-tailed Rock-wallaby – *Petrogale penicillata*.

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Wilderness Quality Mapping—The Australian Experience

Nicholas Sawyer

Abstract—By 1995 wilderness quality maps developed under the Australian Government’s National Wilderness Inventory (NWI) program had been published for most of Australia, but few traces of the NWI now remain and the word “wilderness” has become almost unmentionable in government and professional land management circles. Yet its popular appeal is demonstrated by its continuing frequent use in tourism industry advertising for natural areas.

This study explores this remarkable rise and fall. It establishes that there appears to have been a decision by Australian Government in the late 1990s to avoid any further official reference to wilderness because the concept of wilderness represented an ongoing constraint on development and was not acceptable to sections of the Aboriginal community. The widespread acceptance of biodiversity as a scientifically justifiable rationale for conservation provided an opportunity to discard this troublesome concept. The NWI, as the means of quantifying this concept, was necessarily discarded too.

The study concludes that the demise of the wilderness¹ concept was not justified. The benefits of wilderness areas may have been overstated in the past but they remain irreplaceable for inspiration and recreation, and valuable for conservation, and wilderness quality mapping remains essential for identifying and monitoring them.

¹ In this paper the word “wilderness”, unless otherwise specified, means a large area remote from and undisturbed by the influences of modern technological society.

Nicholas Sawyer M.Env.St. worked at a professional level in conservation, natural area management and environmental management for almost twenty years. He lives in Hobart, Tasmania, Australia. Email: nicksawyer@netspace.net.au

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Introduction

This paper is informed by my own experience and discussions with colleagues in state and Australian Government² agencies and the broader environmental community.

To understand the remarkable rise and fall of the wilderness concept it is necessary to provide some historical context. My experience relates primarily to Tasmania, the small island state to the south of mainland Australia. The south-west quarter of the island remained essentially undeveloped until the 1950s when a massive hydro-electric power generation project was proposed. This involved the flooding of Lake Pedder, located near the geographic centre of “the south-west”. The campaign to save Lake Pedder failed but it is generally acknowledged as the birth of the politically active conservation movement in Australia and it led directly to the successful campaign a decade later to save the Franklin River from hydro-electric development. The main focus of this campaign was the destruction of wilderness which was reflected in the name of the main environmental non-government organisation (NGO) opposing the dam, the Tasmanian Wilderness Society. This controversy led to public awareness and political attention undreamed of before or since.

There was substantial official acceptance of the term “wilderness” at this time. Since 1982 most of “the south-west” has been protected as national parks and inscribed on UNESCO’s World Heritage list as Tasmanian Wilderness World Heritage Area (TWWHA). It is valued for its wilderness qualities despite wilderness not being a criterion for World Heritage listing. To quote from page 54 of the management plan (Parks and Wildlife Service, 1999): “The concept of wilderness has been the issue around which many of the conservation debates in Tasmania have focused. Recognition of the values embodied in wilderness is one of the major reasons why the WHA was originally proclaimed and this is reflected in the naming of the area as the Tasmanian Wilderness World Heritage Area”.

Wilderness Mapping was one of the ten key focus areas of the management plan and consideration of the impact of new proposals on wilderness quality remains part of the Tasmanian PWS assessment process (Parks and Wildlife Service et al., 2003).

² Australia is a federation of six states and two territories, each with a separate state or territory government. The national government is often referred to as the Commonwealth or Federal Government. In this paper I have used the term Australian Government throughout.

In 2011, the Environment Protection Authority undertook the assessment of a proposed mine in the Tarkine region of north-west Tasmania, which includes several areas of significant wilderness quality. A request for assessment of the mine’s impact on wilderness quality according to NWI criteria led me to realise that very little information relating to the NWI was still available.

This focused my attention on an important phenomenon which has happened so gradually since the mid-1990s that I (and many others with an interest in conservation) hardly noticed. Biodiversity has become the primary rationale for conservation. Wilderness still features heavily in tourism industry advertising where it is usually synonymous with “spectacular natural views” but apart from material associated with the TWWHA and some other legacy documents, the word “wilderness” and the associated NWI have almost vanished from official use in Australia, and environmental NGOs which had previously embraced the concept now use it in a less rigorous sense, if at all.

The aim of this paper is to document these changes, examine possible explanations and consider whether the demise of the wilderness concept was justified.

NWI History and Concept

In Australia, the concept of the identification and definition of wilderness first appeared in papers published in the late 1970s. The evolution of these definitions is described in detail in Robertson et al., 1992.

In 1985 the wilderness quality continuum concept was proposed (Lesslie and Taylor, 1985). This was the concept of wilderness as part of a continuum of remote and natural conditions that vary in degree from pristine to urban (Lesslie and Maslen, 1995). It included the very useful concept of a range of wilderness quality from low to high. This avoided the vexed question of needing to define a boundary between what was, or was not, wilderness, and was well suited to mapping using computerised Geographic Information Systems (GIS) which were maturing into useful tools around the same time.

The benefits of the continuum approach were appreciated by the Australian Heritage Commission (an agency of the Australian Government’s environment portfolio) and it was adopted for the government funded National Wilderness Inventory (NWI) program which commenced in 1986. The

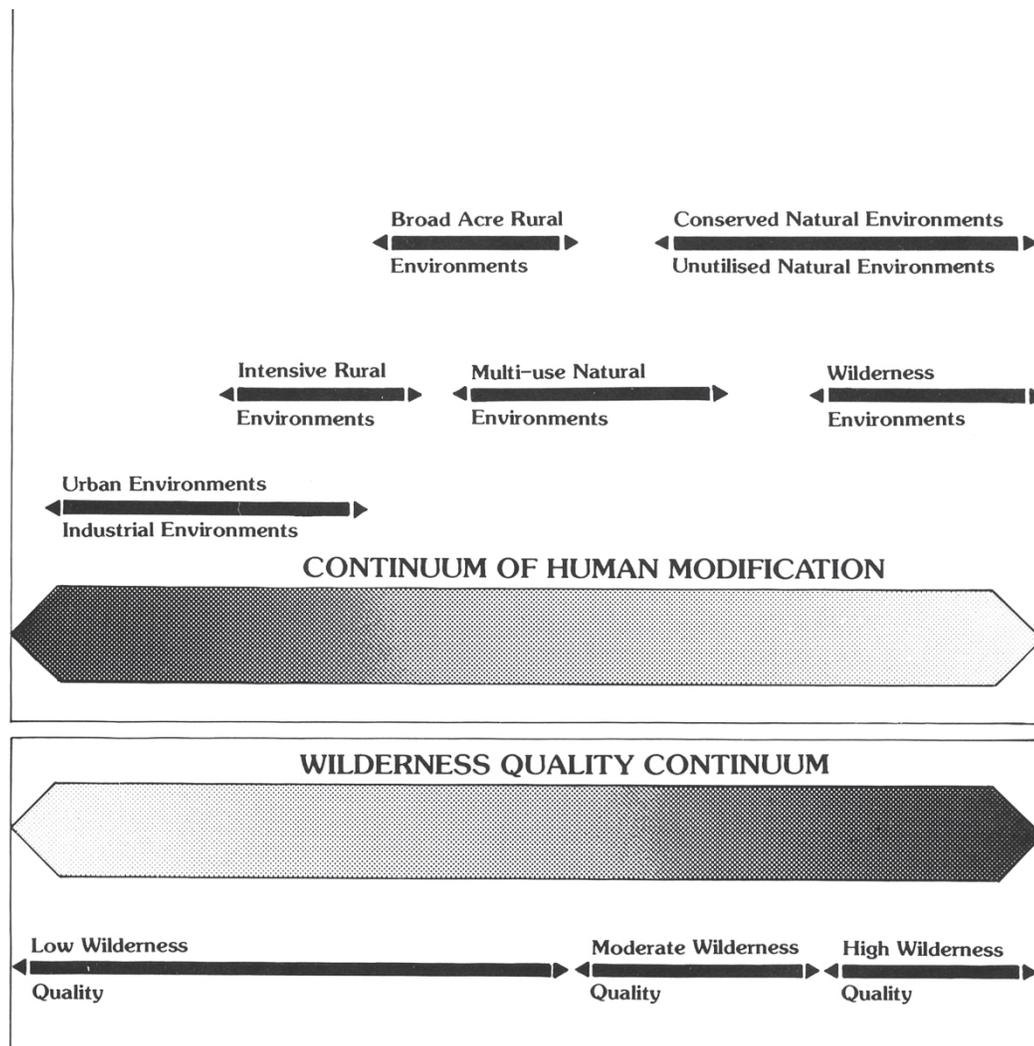


Figure 1—Wilderness continuum.

NWI mapping of Victoria was completed in 1986 and of Tasmania in 1987. The rest of the country was mapped by 1994 (Lesslie and Maslen, 1995), except for the south-west of WA which was never completed.

NWI Criteria

The NWI Handbook (page 4) defines wilderness quality as “the extent to which a location [is] remote from and undisturbed by the influences of modern technological society”. This also demonstrates that wilderness quality is a phenomenon perceived by human visitors; it is a cultural construct (as concluded by Mackey et al, 1998, page 2).

The NWI provides neither an absolute definition of wilderness nor a legal definition although it can serve as the basis for either. The NWI makes no suggestion on where the boundary between “wilderness” and “not wilderness” should be set, or even if such a boundary is appropriate, but it has been used for this purpose. For example, the “JANIS Criteria” (as they were commonly known) defined a “High Quality Wilderness” as an area larger than 8,000 hectares with a NWI rating of 12 or larger throughout (Joint ANZECC/MCFFA National Forest Policy Statement Implementation Sub-committee, 1997). This definition was used in the Regional Forest Agreements between several of the states and the Australian Government which were amongst the major uses of the NWI.

The NWI is a practical definition of wilderness quality based on four additive parameters, each given a score from 0 – 5, so the maximum possible wilderness quality is 20 (Lesslie and Maslen, 1995). The four parameters are:

- Remoteness from Settlement;
- Remoteness from Access;
- Apparent Naturalness³ (remoteness from permanent structures); and
- Biophysical Naturalness.

That is, the parameters comprise biophysical naturalness which is treated differently in “non-arid” and “arid” areas (NWI Handbook, pages 28-35) plus three remoteness criteria with different weightings according to the nature of the intrusion (NWI Handbook, pages 24-26).

Reception of NWI Mapping

The NWI mapping was applauded by the IUCN but received a variable reception within Australia. It was generally well received where areas with significant wilderness quality were heavily vegetated and often rugged (Tasmania, most of south-eastern Australia and some parts of the tropics such as Cape York and the Kimberly).

The most controversial aspect of the NWI Map of mainland Australia was the high wilderness quality assigned to huge extents of desert and semi-desert areas. Many environmental professionals considered that such areas were not wilderness because they were accessible by four-wheel-drive vehicle

³This was referred to as “aesthetic naturalness” in the earliest manifestations of NWI mapping but the definition was essentially the same.

(the NWI definition of “access” did not include cross-country access by four-wheel drive vehicle). Hence one outcome of mapping the entire country was to focus attention on the usefulness (or otherwise) of identifying areas which had high wilderness quality but were of essentially no interest for wilderness recreation.

In 1998 attempts were made to address these criticisms:

- a distinction was proposed between “wilderness quality” and “wilderness area” (Mackey et al., 1998). A “wilderness area” was defined to be not just an area of appropriate size and wilderness quality but one where “wilderness quality was recognised and valued by society”; and
- the Commonwealth Wilderness program released Wilderness Delineation Guidelines (Australian Heritage Commission, 1998) in which the NWI wilderness quality was one of the factors to be considered in the delineation of wilderness, rather than the only factor, as implied previously.

Use of the NWI prior to 2002

The Victorian Land Conservation Council’s 1991 Wilderness Special Investigation (Land Conservation Council, 1991) drew heavily on NWI criteria in its recommendations on the identification, reservation and use of wilderness areas and other areas of high wilderness quality. This led to the reservation of many of the remaining areas of significant wilderness quality in Victoria.

The NWI also contributed to the reservation of substantial areas as a result of its use in the Regional Forest Agreements in south-east Queensland, Tasmania, New South Wales (NSW) and Victoria, and its role in informing wilderness assessments conducted under the South Australian and NSW Wilderness Acts.

In 1998 a world wilderness quality map was produced using NWI principles (United Nations Environment Program World Conservation Monitoring Centre, 1998).

The NWI was also used in the 2001 study of the natural heritage significance of the Cape York Peninsula (Mackey et al., 2001) but this study noted (pages 116-7) that the wilderness indices could not adequately account for certain impacts including stock grazing impacts around water sources and the distribution of invasive organisms such as feral animals and certain weeds. This pointed the way to the future. For studies such as this, the requirement was for a more sophisticated treatment of biophysical parameters rather than a modelling of wilderness per se.

Use of the NWI Since 2002

In the last decade, official use of the NWI mapping (or other wilderness mapping) has been conspicuous by its almost complete absence, as noted in the introduction to this paper. However, the data set that corresponds to the NWI’s biophysical naturalness layer has continued to be developed and is now far more sophisticated. The Vegetation Assets, States, and Transitions (VAST) framework now classifies vegetation by degree of human modification from pre-European settlement conditions in seven intactness classes using the criteria of floristic composition, vegetation structure and

regenerative capacity (Watson et al., 2009). This has been used to generate a map of wilderness in Australia but the criteria differ from those used in the NWI so the results are not directly comparable.

The only computerised wilderness mapping by a government agency that has occurred appears to be the 2005 remapping of the TWWHA and adjacent areas by the Tasmanian PWS using revised criteria. This may be the only use of NWI techniques to monitor changes in wilderness quality over time, surely one of its most important uses.

Proposed developments in the Tarkine region of Tasmania led to requests since 2005 by both the Tasmanian (see introduction) and Australian Governments to evaluate impacts on wilderness quality of individual development proposals in this area. Anecdotal evidence suggests that this had to be done manually since the Australian Government’s computerised system was no longer available!

In 2012 UNESCO’s World Heritage Committee recommended, in relation to the TWWHA, the provision of “comprehensive data on the impacts of adjacent forestry operations on the property’s integrity ...” (World Heritage Committee of UNESCO, 2012). This has yet to be undertaken but would provide a further opportunity to demonstrate the relevance of the NWI.

Political Context

The rise and fall of the wilderness concept and the associated NWI cannot be explained without reference to the broader political context. The national election of March 1983 was won by the Australian Labor Party (ALP) under Prime Minister Bob Hawke. In March 1983 the campaign to save the Franklin River was at its height and was a major issue in the election campaign. One of the Hawke government’s first actions after taking office was to initiate the process which led to the halting of dam construction several months later.

The ALP continued a moderately pro-conservation agenda until March 1996 when the conservative government of Prime Minister John Howard took office and remained in power for the next decade. The next few years also saw the intellectual tide turn against wilderness. For example, Dr Peter Bridgewater (then Chief Science Adviser, Environment Australia⁴) stated: “Wilderness areas have been established on the basis of values which have no basis in science, however much they may produce warm fuzzy feelings in people. I will not deal with wilderness any further, as it is not a relevant classification in a consideration of science based protection regimes” (Bridgewater, 1998).

⁴The Australian Government’s environment agency.

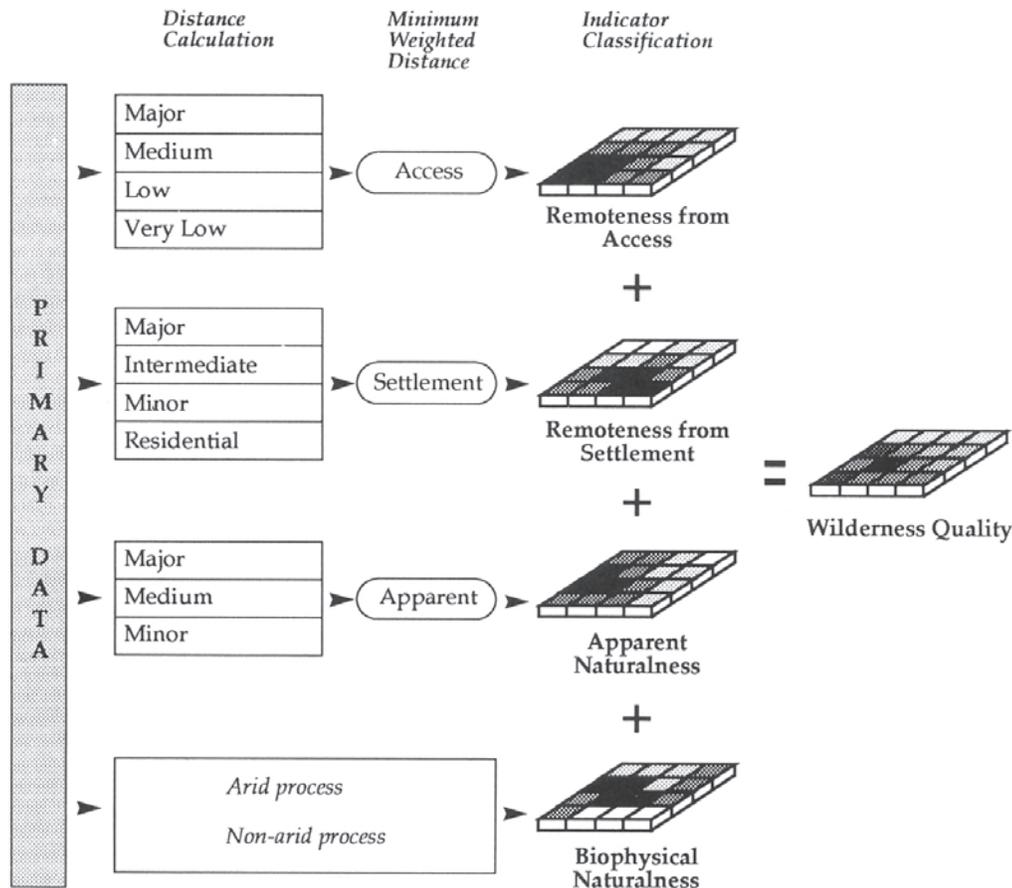


Figure 2—NWI methodology.

Several actions followed during the tenure of the Howard government:

- The Australian Government's Wilderness and Wild Rivers program (including the NWI) was terminated in June 1999. During the following years most of the material produced by this program has been removed from the department's website. There is anecdotal evidence of verbal directives from senior staff to cease use of the word "wilderness".
- Several separate pieces of Australian Government environmental legislation were replaced with the Environment Protection and Biodiversity Conservation (EPBC) Act, 1999. This did not mention wilderness except to acknowledge the IUCN Protected Areas Categories System. In contrast, one of the acts replaced, the National Parks and Wildlife Conservation Act, 1975 included provision for the declaration of wilderness zones.
- In 2004 the Australian National Heritage List, together with the Commonwealth Heritage List, replaced the former Register of the National Estate. Wilderness was prominent in the criteria for the Register of the National Estate but absent from the criteria for the replacement lists.

One consideration that appears to have been overlooked is Australia's responsibility as signatory to the Convention on Biological Diversity (United Nations, 1992). Annex I of this convention obliges signatories to identify and monitor wilderness, so the abandonment of the NWI appears to be a breach the Australian Government's responsibilities in this regard.

The above actions suggest that a decision was made during the early years of the Howard government to avoid any further reference to "wilderness" or the NWI within the Australian Government. It would be useful to understand the rationale underlying this apparent decision. In the absence of formal documentation only speculation is possible. The next section of this paper examines eight credible hypotheses.

Why Have Both the Term "Wilderness" and The NWI Mapping Almost Vanished?

Hypothesis 1 – The NWI Was Compromised By Technical Constraints

The NWI mapping was undertaken in the early days of computer based GIS and much of the primary data required digitisation (NWI Handbook, page 4) but the computer technology does not appear to have been a major limitation, apart from the impossibility of incorporating viewfield analysis (refer Hypothesis 2).

Hypothesis 2 – The NWI Was Compromised By Design Constraints

1. Definition of parameters

As noted previously under Reception of NWI mapping, a relatively small change in the definition of "access" would make a substantial change to the resultant wilderness quality map.

2. Choice of parameters

As noted previously, the NWI criteria can be summarised as biophysical naturalness plus remoteness from access and

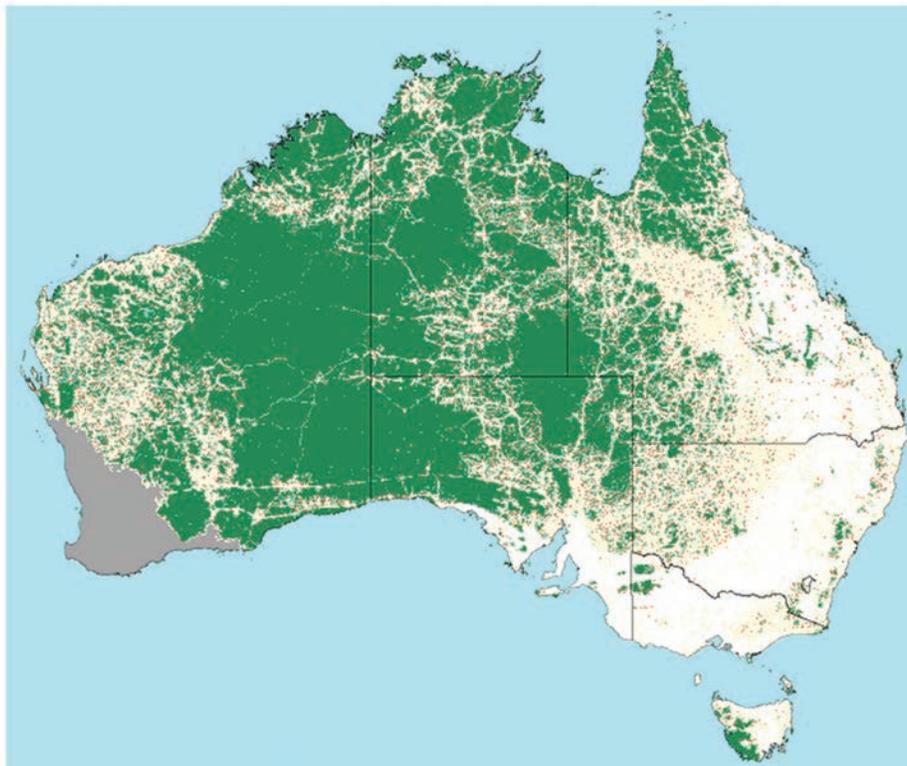


Figure 3—Wilderness quality- Australia.

remoteness from structures. Two criticisms can be made of the NWI criteria without undermining this basic premise:

- Distance is not necessarily the best measure of remoteness. In some areas of Tasmania dense vegetation can make off-track walking very difficult – 500 metres in an hour can be fast progress! Hence travel time is a more relevant parameter to describe remoteness than distance.
- The NWI methodology quantifies remoteness as the distance from the various categories of human modification, but human modification within the user's viewfield is considered to have a greater influence on the user's perception of wilderness than an identical modification at an identical distance, but out of sight – the NWI remoteness criteria could usefully be modified according to whether or not there is line-of-sight from the user to the human modification.

In 2005 the Tasmanian PWS undertook wilderness mapping of the TWWHA using a modified NWI methodology which included time-based remoteness. The incorporation of viewfields was rejected as too complicated (Hawes, 2005) although more recent mapping by Scottish Natural Heritage (Scottish Natural Heritage, 2013) has demonstrated that this is feasible. This confirms the soundness of the NWI concept and demonstrates that these constraints could have been overcome if its development had not been curtailed.

Hypothesis 3 – The NWI Was Too Successful

Use of the NWI led to the reservation of substantial areas (Refer to Use of the NWI prior to 2002). Without the NWI, many of these areas would probably not have been reserved when they were, if ever. This cannot have endeared it to anyone who philosophically favoured minimising constraints on development, such as conservative politicians.

Hypothesis 4 – Biodiversity Conservation Has Greater Scientific Justification Than Wilderness Preservation

Use of the term “wilderness” in the context of conservation in Australia predates the concept of biodiversity which did not become well established until the early 1990s (Mackey, Lesslie et al., 1998). The scientific community soon embraced the conservation of biodiversity as a major rationale for conservation (for example, it is one of the main objects of the EPBC Act, 1999) and the limitations of wilderness for conserving biodiversity were immediately apparent (for example, many threatened species cannot be preserved in wilderness areas because they do not exist there). To most environmental professionals the distinction was clear, the conservation of biodiversity was a scientifically justifiable rationale for conservation, the preservation of wilderness was one of many mechanisms for conserving biodiversity, and any other benefits of wilderness preservation were overlooked in the rush to embrace biodiversity.

Hypothesis 5 – Biodiversity Conservation Places Less Constraints On Development Than Wilderness Preservation

The concept that destruction of some individuals of a threatened species can be “offset” by the protection of others elsewhere has been formalised by most Australian governments. For example, the criterion used in Tasmanian Government guidelines (Department of Primary Industries, 2013) is that an offset must “maintain or improve conservation outcomes”. The effect is that the unavoidable destruction of a listed threatened species rarely halts a development. In

my experience the most usual result is a relatively minor increased cost to the developer.

If a similar principle was applied to the impact of a development on wilderness quality, offsetting such an impact would require the protection of an equivalent (or greater) extent of wilderness elsewhere. Even if feasible, this is likely to be extremely expensive, so legislated protection of wilderness quality could impose major constraints on development.

Since governments are generally keen to minimise impediments to new developments this is another motivation for them to emphasise the conservation of biodiversity at the expense of the preservation of wilderness.

Hypothesis 6 – Wilderness is not acceptable to the aboriginal community

In 1992 the High Court's Mabo judgement for the first time acknowledged native title to land (Reynolds, 2013). It overturned the concept (*terra nullius*) that nobody owned the continent of Australia at the time of the initial British settlement in 1788. This led to substantial areas being “handed back” to Aboriginal traditional owners and much of this had high wilderness quality according to the NWI. Some Aboriginal owners are now hostile to the wilderness designation because they see it as something which may restrict their economic exploitation of their land.

In addition, the Aboriginal community had been affronted by early definitions of wilderness which failed to acknowledge millennia of Aboriginal occupation and management of the land, and the term has become associated with *terra nullius*. In summary, despite attempts to negotiate a common meaning of the term (Australian Heritage Commission, 1998), wilderness is unpopular in the Aboriginal community for multiple reasons.

The Mabo judgement also raised the standing of the Aboriginal community; as owners of a significant part of the country their support was courted by politicians. Governments of all persuasions have seen the avoidance of any endorsement of the concept of wilderness as a means of gaining the support of the Aboriginal community and many non-aboriginal Australians who support Aboriginal rights.

Hypothesis 7 – Practical Reasons For Wilderness Preservation Have Been Discredited

The most commonly quoted practical reasons for preserving wilderness are:

Scientific (Wilderness Protects Biodiversity)

It has been claimed that wilderness is the best way to protect biodiversity and ecological integrity (Washington, 2012). It is true that wilderness does protect biodiversity and ecological integrity, and large reserves do have advantages over smaller ones (Mackey, Lesslie et al., 1998) but wilderness areas are (by definition) large, and the protection of large areas, while an ideal way to protect biodiversity and ecological integrity, is rarely essential. Wilderness areas should be seen as one end of a continuum of conservation measures.

In addition, the preservation of wilderness quality is often unnecessary to protect biodiversity and ecological integrity. Many artefacts of modern technological society which adversely affect wilderness quality have little or no effect on biodiversity or ecological integrity. For example, a road into the centre of a large natural area will greatly reduce

the wilderness quality perceived by a human visitor but if the road's impact on the biota is confined to loss of habitat within the construction footprint, with no other adverse impacts, it may have negligible impact on biodiversity or ecological integrity.

Economic (Wilderness Attracts Tourists)

There is no doubt that wilderness has been, and remains, a significant factor in attracting tourists to Tasmania and the argument that wilderness will attract tourists has often been used as a rationale for preserving wilderness (Milne, media release, 18 July 2013). However, commercial development to cater for mass tourism reduces wilderness quality and the vast majority of tourists are satisfied with easy access to a few low wilderness quality locations with spectacular views. They neither want nor need large areas of high wilderness quality – only a minority of bushwalkers (themselves a minority of all visitors) require extensive areas of high wilderness quality. The wilderness image is a key aspect of tourism industry marketing but this only requires the preservation of enough “real” wilderness to maintain the image, it is not a strong argument for preserving high quality wilderness or reserving additional wilderness areas.

Recreational (Wilderness is Essential for Certain Forms of Recreation)

Wilderness areas provide recreational opportunities which are unavailable in any other setting and are greatly appreciated by most users. The TWWHAMP notes (page 129) that the TWWHA “is widely recognised as a focus for remote area recreation. The extensive tracts of high quality wilderness in the region set it apart from most other natural areas ... The region provides people with the chance to experience solitude, challenge, independence, tranquillity and closeness to nature”. Wilderness recreation is easily criticised as elitist because of the small numbers involved but the use of remote area walking tracks within the TWWHA has shown a steady increase between the early 1970s and mid-1990s. Since then the rate of increase appears to have plateaued (Parks and Wildlife Service, 2006, Parks and Wildlife Service, 2013) but the data show an ongoing demand with at least 10,000 individuals per year spending several days in moderate to high quality wilderness.

Hypothesis 8 – Intangible Reasons For Wilderness Preservation Have Been Discredited

The significance of the intangible values of wilderness is hard to quantify but they are acknowledged. For example: “a significant cultural value of the Tasmanian wilderness is a place for reflection, a source of inspiration and as a symbol of untouched nature” (TWWHAMP, page 25).

For some people these values derive from the intrinsic value of wilderness, its right to exist for its own sake (Devall and Sessions, 1985). However, wilderness calendars and books of wilderness photography sell in substantial numbers and wilderness images and the word itself are widely used in tourism industry advertising for natural areas. This confirms the broad appeal of wilderness as somewhere which is attractive and worthy of a visit.

For some Australian academics (primarily from Schools of Art and Philosophy) the Biblical concept of wilderness as a desolate wasteland takes precedence over the “large, essentially natural area” definition. This underlies the post-modernist criticism of wilderness. Postmodernism has become the dominant ideology within much of academia and is so critical of wilderness that adherents are unlikely to use the word, let alone support wilderness preservation (Washington, 2012). Washington argues that there are many associations attached to wilderness, and it is some of these that are being criticised, rather than the large natural areas themselves, but there will be little academic support for wilderness until postmodernism ceases to be the dominant ideology.

Conclusion

By the late 1990s widespread recognition of the concept of wilderness (mostly manifested through the NWI) had led to reservation of substantial areas throughout much of Australia. Conservative governments philosophically favour minimising impediments to the development of natural resources so they had reason to see the concept of wilderness as an ongoing constraint on development as well as being unacceptable to sections of the Aboriginal community. The widespread acceptance by this time of biodiversity as a scientifically justifiable rationale for conservation provided an opportunity to discard the troublesome concept of wilderness.

The NWI, as the means of quantifying the wilderness concept, has necessarily been discarded too. It had some deficiencies but these could have been rectified with further development and were not the main cause of its demise.

The wilderness concept has received little support from academia and the environmental NGOs which were once its most enthusiastic proponents have not responded by tweaking and defending it, as might have been expected, but by dropping it or using it only in the popular (ill-defined) sense.

But the above arguments do not justify the near-total demise of the wilderness concept. I would have more sympathy for Dr Bridgewater's critique (“Wilderness areas have been established on the basis of values which have no basis in science...”) if he had specified “ecology” rather than broader “science”, because the main justification for wilderness can be found in the social sciences (his “warm fuzzy feelings”). In the appropriate context the wilderness concept remains a valuable tool for the management of natural areas as demonstrated by its successful and continuing use in the management of the TWWHA.

The alleged benefits of wilderness may have been overstated in the past and contributed to its demise. If the concept of wilderness is to regain credibility, the following (building on the conclusions of Mackey et al, 1998) need to be accepted:

- The word “wilderness” has multiple meanings. In any particular situation it is essential to be clear which meaning is intended. For example, in a land management context “wilderness” does not mean a Biblical wasteland but it can mean:
 - ◊ an area defined by physical parameters (for example, defined by the NWI);
 - ◊ an area designated by law (for example, zoning); or
 - ◊ almost anywhere with some wild character (the ill-defined popular meaning).

- Wilderness is a cultural and recreational construct (which may appear to trivialise it), but it provides recreational experiences which are highly valued and cannot be replicated in any other setting, and its inspirational value is of great and fundamental importance to very many people (which is why the term remains in popular use).
- The preservation of wilderness should be seen as one end of a continuum of measures to conserve biodiversity and ecological integrity. It is an important and effective strategy for conservation and provides additional social benefits, but the conservation of biodiversity and ecological integrity can often be achieved without the exclusion of the artefacts of modern technological society from a large area, so it is rarely a strong argument for preservation of wilderness.
- The wilderness image attracts tourists but unrestricted visitation (especially commercial tourism development) reduces wilderness quality, and the vast majority of tourists neither want nor need large areas of high wilderness quality. Attracting tourists only requires the preservation of enough wilderness to maintain the image, it is rarely a strong argument for preservation of high quality wilderness.
- It is essential to reach a consensus on the applicability of wilderness designation to areas accessible by terrestrial motorised vehicles.
- It is essential to reach an understanding with the Aboriginal community that wilderness designation acknowledges their traditional land management practices and relates to maintaining parts of their land as it was prior to European takeover of their country; nothing more.

And, once wilderness regains its rightful standing in Australia, some form of wilderness quality mapping will be needed to identify and (especially) monitor it.

Glossary

EPBC Act: [Australian Government] *Environment Protection and Biodiversity Conservation Act, 1999* (the main piece of Australian Government conservation legislation)

GIS: Geographic Information System

IUCN: International Union for the Conservation of Nature

NGO: Non-Government [conservation] Organisation

NWI: National Wilderness Inventory

PWS: [Tasmanian] Parks and Wildlife Service

RFA: Regional Forest Agreement (agreement between the Australian and state governments to define the ultimate extent of forestry operations)

TWWHA: Tasmanian Wilderness World Heritage Area

TWWHAMP: Tasmanian Wilderness World Heritage Area Management Plan, 1999

UNESCO: United Nations Organization for Education, Science and Culture

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Direct and Mediated Experiences of Wilderness Spirituality: Implications for Wilderness Managers and Advocates

Peter Ashley, Roger Kaye, and Tina Tin

Abstract—As a result of its elevated level of consciousness, the human species has been engaged in the quest for an ultimate meaning of life and what lies beyond life and death for millennia. Many of these spiritual or religious perspectives have been closely linked to each society's relationship with wild nature. This paper explores the topic of wilderness spirituality from the perspectives of: 1) direct experience, i.e., spiritual experiences and emotions that arise while one is in wilderness, utilizing some of the results from a Tasmanian Wilderness World Heritage Area spiritual values study, and 2) mediated experience, i.e., experiences of spiritual emotions and inspiration that arise while one is outside wilderness but is reflecting, reading or looking at art about wilderness. Direct and mediated experiences of wilderness spirituality can be used as complementary approaches to energise the connections people have with nature and their individual forms of spirituality. Specifically, wilderness areas can be managed in order to enhance opportunities for direct experience. Direct and mediated experiences of wilderness spirituality can be used to promote the values of wilderness and to replenish the souls of wilderness managers and advocates.

Introduction: Wilderness and the Human Mind

The elevated level of consciousness of the human species has facilitated the quest for an ultimate meaning of life and what lies beyond life and death for millennia. Many of these spiritual or religious perspectives have been closely linked to each society's relationship with wild nature. Particular wilderness landscape elements, including wildlife, high places, aesthetics, and pristineness, can create deep emotional and spiritual experiences (McDonald and others 1989), and for those who behold them, can represent the genius loci or special atmosphere or spirit of a place.

Peter Ashley is a University Associate, Geography and Environmental Studies, University of Tasmania, Hobart, Australia. E-mail: plashley@utas.edu.au. Roger Kaye is a wilderness specialist and pilot at the Arctic National Wildlife Refuge, 101 12th Avenue, Room 236, Fairbanks, AK 99701, USA. E-mail: roger_kaye@fws.gov. Tina Tin is an independent environmental consultant based in Chambéry, France. E-mail: tinatintk@gmail.com.

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In recent years, we have been thinking and writing about the concepts of wilderness and spirituality and their implications and importance for wilderness managers and advocates (e.g., Kaye 2006a; Ashley 2009, 2012; Tin 2012). This paper represents our collective sensibilities on the topic and contributes to a broader "geography of spirit". As a feeling or perception, spiritual responses to nature can be hard to talk about, elude precise definition, cannot be touched or photographed, and, in an empirical-centric world, are difficult to measure. Real spiritual experience lies beyond symbols and intellectual concepts. However, in order to communicate, we have to use words and concepts and it is necessary to establish at least some basic understanding before the communication can proceed. Therefore, we begin with a few broad working definitions.

Conceptual Underpinnings: Wilderness Spirituality

Traditionally in Western culture spirituality and religiosity have been strongly associated but this is changing as more people seek spiritual nourishment outside of formal religions. Indeed, spirituality can be an entirely secular phenomena (Kaye 2002), with wilderness spirituality having roots in our historical, evolutionary, biological, and psychological past (Kaye 2006a). By spirituality, we mean human's relationship with what moves him most deeply, with what he holds dear. This often is something that is larger than him/herself that transcends his/her isolated sense of self and is often considered as meaningful in some ultimate way (informed by discussions in Ashley (2009: 34-36) and Taylor (2008: vii-x)).

Wilderness spirituality refers to the ability of wilderness to evoke a spiritual response in some people, and thus, creation of an intangible relationship with the natural (wild) environment including landscapes and seascapes and their features. How the relationship is understood and articulated is coloured by each person's previous experiences and belief systems (see Heintzman 2011). For someone who believes in the existence of a transcendent God that created the universe, wilderness protection could represent the noble task of preserving God's work that has been unspoiled by humans (Nagle 2005). For societies that have lived for a long time in close relationship with nature, mountains, forests and lakes can represent sacred places where deities live (Ramakrishnan 2003). "Rational" scientific minds could understand spirituality as a psychological need of the human mind for further evolution, accessible through the physical demands of wilderness experience and the solitude provided by wilderness. These same attributes of wilderness experience can also be propitious for feeling one's connection to

life and the universe, often described in eastern philosophies and nature religions (Kaye 2006a).

Many visitors value wilderness spiritually, the wilderness experience offering opportunities for positive human transformations and concomitant health benefits (Ewert and others 2011), Cumes (1998) labelling the transcendent and healing/restorative effects of wilderness as ‘the wilderness effect’.

A Map for Our Contribution to the “Geography of Spirit”

In this paper we contribute to the “geography of spirit” with discussions from two perspectives:

1. Spiritual experiences and emotions that arise while one is in wilderness [we give this the label of “Direct experience of wilderness spirituality”];
2. Experiences of spiritual emotions, inspiration and connection that arise while one is outside wilderness but is reflecting, reading or looking at art about wilderness [we give this the label of “Mediated experience of wilderness spirituality”].

The first discussion is facilitated by taking a closer look at the study of Ashley (2009) that explored what wilderness spirituality meant to visitors to the Tasmanian Wilderness World Heritage Area (TWWHA). The second discussion explores how different art forms, specifically, photographs, paintings, and writings, serve as venues to communicate spiritual emotions from the artist to the audience outside wilderness. There have been fewer studies that have focussed on people who do not visit wilderness and whether they value wilderness spiritually. Results from these studies show that spiritual values, though not one of the values that receive the most overwhelming support, is an undeniable value that the non-visiting public attributes to wilderness (see for example, Bengston and others 2010; Cordell and others 1998; 2003). We then provide some suggestions as to how our exploration of wilderness spirituality can be useful to the work of wilderness managers and advocates, and close with some reflections on our contribution.

Spirit in Wilderness: Direct Experience of Spirituality in the Tasmanian Wilderness

In the first large-scale wilderness spiritual values study in Australia (n = 513; response rate 40%), if not elsewhere at the time (2006), a mixed quantitative-qualitative, self-reporting, mail-back questionnaire survey was developed by Ashley (2009) to determine if the TWWHA was valued from a spiritual perspective. The survey instrument was administered to three cohorts – a random sample of the general public in Tasmania (n = 234; 46% of all responses), a stratified sample of Tasmanian Parks and Wildlife Service staff involved with management of the TWWHA (n = 73; 14%), and a random sample of Tasmanian members of the Australian environmental and conservation group, The Wilderness Society (n = 206; 40%). Generally, the

survey revealed wilderness spirituality to be different from spirituality in general, and unequivocally demonstrated for the first time the existence and importance of the spiritual value of the Tasmanian wilderness. Some key results from the Ashley research follow.

Quantitative Results

In two of 36 Likert-scaled statements included in the study (strongly disagree, disagree, neither disagree or agree, agree, strongly agree), just over three quarters of TWWHA visitors (76%; n = 446) and nearly half of the non-visitors (49%; n = 67) either agreed or strongly agreed that the TWWHA has spiritual value, and 80% of visitors either agreed or strongly agreed that the TWWHA is a place that provides spiritual inspiration.

To more holistically examine how respondents valued the TWWHA spiritually, an inventory of 12 of the 36 scaled items provided a spiritual values index or sub-scale (Table 1). Principal components analysis with direct oblimin rotation for the sample (n = 513) established that the 12 items interdependent. Only one factor was extracted, confirming the value respondents placed on the TWWHA from a spiritual perspective was a unidimensional construct. A single factor was unexpected due to the relative breadth of the variables, although the TWWHA was a constant. The 12 items were moderately to strongly associated with factor loadings from 0.603 to 0.845. Bartlett’s Test of Sphericity for the items was significant (< 0.001), indicating that there are significant correlations between the variables. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.948, and Cronbach’s Alpha was 0.931, the latter suggesting that all items are reliable and the scale is internally consistent.

The spiritual values index (Table 1 variables) for each cohort and for the sample showed a high level of valuing the spirituality of the TWWHA. Out of a maximum index value of five, Wilderness Society members had the highest index (3.97; s = 0.81, n = 206), followed by TWWHA managers (3.69; s = 0.99, n = 73) and the general public (3.47; s = 0.87, n = 234), the inter-cohort index differences being significant. The sample norm was 3.70 (s = 0.89, n = 513).

Qualitative Results

To more fully explore what wilderness spirituality represented to respondents, an open-ended question provided them the opportunity to express their own meanings. This they did with relish, 290 respondents (57% of the sample) generously providing some 12,700 words affirming the spiritual value of wilderness. Following content analysis and theme development, the defining characteristics of wilderness spirituality could be identified (Table 2).

The qualitative question was most revealing in determining the essential characteristics of wilderness spirituality, albeit relatively broadly (Table 2). Substantially extending what we already know about this intangible value, it is now considered more grounded in practical terms, and thus, a more accessible concept.

Table 1—The 12 item sub-scale measuring the degree to which survey respondents (n = 513) valued the Tasmanian Wilderness World Heritage Area (TWWHA) spiritually.

Forests in the TWWHA provide opportunities for spiritual experiences
I believe that the TWWHA has spiritual value
The very wildness of the TWWHA generates a spiritual energy
Mountains in the TWWHA provide opportunities for spiritual experiences
The TWWHA provides spiritual inspiration
Every kind of water – waterfalls, mist, pools, deep water, white water, whirlpools, still water, oceans – contributes strongly to the spiritual landscape of the TWWHA
TWWHA spirituality involves a sense of unity, relationship, and connection with all of existence
The deprivation, exhaustion, challenge, and even the danger we find in the TWWHA can bring spiritual joy
The TWWHA is special because it is a sacred place
The TWWHA can cause a shift in my personal identity, from “I” to something greater than myself
For me, the spiritual value of the TWWHA can be found in an opportunity to escape from hectic, daily life
Spiritual benefits of the TWWHA may exist even for those people who have not visited this wilderness area

Table 2—Defining characteristics of wilderness spirituality, from most to least common (n = 290).

-
- Feelings of inner peace and tranquility contributing to personal contentment
 - Physical, mental and emotional refreshment thereby life enhancing
 - Connection and relationship with nature and increased understanding taking one beyond or outside the self
 - Feelings of awe and wonder about nature and life
 - Feelings of happiness and inspiration
 - A respect for and valuing of nature contributing to a change in personal values
 - A feeling of humility and self-forgetting resulting in ego detachment
 - A religious meaning and explanation may be present
 - A heightened sense of awareness and elevated consciousness beyond the everyday and corporeal world conducive to possible transcendent experiences
 - Motivation to protect and sustain wilderness areas inducing a sense of personal responsibility for their custodianship and stewardship
-

Source: Ashley 2012, p. 7.

Discussion

The results of the benchmark TWWHA study show that beyond its role as a recreation opportunity, tourist destination, or object of scientific curiosity, the Tasmanian wilderness is also an area providing settings in which people can have profound and life-changing experiences.

Quantitative and qualitative approaches provide complementary information that can be of use to the wilderness manager. The quantitative approach provides a newly developed scale that can be potentially useful for monitoring how visitors value the spiritual values of the Tasmanian wilderness over time, and for assessing how people spiritually value other wilderness areas. The qualitative approach provides more in-depth information from multiple dimensions that managers can use to better understand the characteristics of wilderness spirituality and the key conditions that are necessary to facilitate such experiences.

Communicating Spirit in Wilderness: Mediated Experience of Wilderness Spirituality

Art, e.g., images, words, music and movement, can elicit deep emotional responses from humans. Focussing on the same tools of images and words as used in Ashley (2009), we examine specifically how the media of painting, photography and writing have been used as venues to express the artist's passion for the divine as experienced in the natural world.

Mesmerizing Images

Classical Chinese landscape (san-shui) paintings from the 7th to 13th centuries were influenced by the Taoist sense of mystical communion with the natural world. Paintings depicted not only a physical landscape but also its atmosphere and spiritual topography (Clarke 2000). From the 14th century onwards, Japanese landscape paintings (sansuiga) were influenced by Zen Buddhism and glorified nature as a source of meditative insight (Hoover 1978). Russian artist Nicholas Roerich painted scenes of the Himalayas, Mongolia and Central Asia at the end of the 19th/beginning of the 20th century. Teasdale (1999: 188,191) put forward that Roerich's paintings were "intentionally meant to communicate a sense of the divine presence through the human encounter with ultimate beauty in the cosmos... Viewing his works, one enters this reality. It leads one beyond the image to what does not change, to the divine itself. Roerich is always trying to bring us to this realm that transcends this impermanent existence. His art is an attempt to invoke this reality for us, to stir it within the depths of our inner life".

Taylor (2010: 166-7) put forward that Ansel Adams' striking black-and-white landscape photographs of California's Sierra Nevada was "the archetypal exemplar of photographic nature religion" as Adams "sought to evoke a perception of the sacred in nature". Dunaway (2005, 2006) showed how Eliot Porter, Subhankar Banerjee and other American landscape photographers used their cameras to visualise their faith in nature, portraying wilderness as a hallowed place.

In the Ashley (2009) study reported above, respondents were shown colour photographs of the TWWHA as surrogates for the actual experience of being in the Tasmanian wilderness. Analysed quantitatively, the data suggest that the variables beautiful, natural, remote, quiet, and peaceful most reflected the spiritual content of the images. Images that most consistently evoked a spiritual response by respondents commonly contained ephemeral components such as clouds, waters reflections, waves and mist and a special quality of light such as mountain glow and light filtered through trees.

Power of Words

While requiring more active imagination and participation from the reader, writings on wilderness are no less powerful a medium for communicating the spiritual connection to the land and evoking spiritual emotions in the reader. America has a long tradition of nature writing (Mitchell 2003; Lyon 2001). In many of their writings, writers expressed the spiritual truths that they have discovered in wilderness. John Muir referred to the forests and fields below Mt Shasta as "God's country" (Wolfe 2003:180). Sigurd Olson infused his writings with his wilderness theology (Backes 1997). Gary Snyder steeped his poetry in his Taoist and Zen Buddhist sensibilities (Tan 2009). Although the language varied depending on the writers' religious backgrounds many of their writings shared the commonalities of awe, reverence and humility in the face of the immensity of wilderness.

Cole (2005) and Schroeder (2007) discussed the idea that wilderness can be symbols of distinct meanings to different people. Through interviews with wilderness visitors and research of wilderness literature Kaye (2000) concluded that the Arctic National Wildlife Refuge has become a "condensation symbol" which summarises a range of symbolic meanings, each of which has different relevance to each individual. One of the symbolic meanings evoked by the Arctic Refuge is that of a sacred place and this sacredness could be in religious or secular terms depending on the propensity of the person involved. Sanders (2008: 608-10) compared wilderness to the Biblical Sabbath. Just as the Sabbath is a time set aside for "the cultivation of spirit", wilderness is a place set aside "to call us back to ourselves" and to remind us that "we are answerable to a reality deeper and older and more sacred than our own will". In a contemplation on an environmental ethic suitable for Antarctica, Rolston (2002: 134) concluded by proposing its designation as the "Antarctic Sanctuary", a place set aside to realise deeper perspectives, a "wonderland place sacrosanct", where humans act radically differently from how we act on the other six continents.

Implications for Wilderness Managers and Advocates

What do our discussions mean for the work of wilderness managers and advocates? In the following sections we provide some suggestions on how direct and mediated experiences of wilderness spirituality can be used and facilitated by wilderness managers and advocates.

For Wilderness Managers Managing Wilderness Areas for Visitors

Wilderness spirituality research contributes to what Watson (2004: 7) described as a new era of public land stewardship concerning “stewarding the relationship between the public and public lands”. If some members of the public visit wilderness for its spiritual values, how might this relationship between spirituality and wilderness be stewarded? Here are some suggestions:

- Visitor centres provide information on spiritual values of wilderness or at least its acknowledgment. The experience of being in the visitor centre can be designed to evoke atmospheres infused with spiritual overtones (as Mitchell (2007) noted in Yosemite National Park).
- Interpretation/interpretive signage sympathetic to spiritual values can be created.
- Provision is made for particular landscape characteristics to be seen or experienced to foster spiritual opportunities via, for example, track routing.
- Training of wilderness managers and administrators can include spiritual values appreciation and awareness.
- Guides and tour operators can be informed of the spiritual values of wilderness areas.
- Spiritual values are included as one of the social indicators used in future determinations of wilderness quality and as part of future wilderness designation criteria.
- Safeguard opportunities for silence and solitude, as they can be key conditions that facilitate wilderness spiritual experiences.
- In communication materials, use loosely defined religious language and do not prescribe a certain dogmatic lens through which wilderness spirituality should be experienced. This encourages visitors to imbue their own individual spiritual meaning into their experience and embrace it as their own (Mitchell 2007).

In 2008, the IUCN produced a set of guidelines for the management of sacred natural sites in protected areas (Wild and McLeod 2008). While this document refers to sites that have had a long history of human-nature interactions, e.g. sacred forests in Kenya and sacred mountains in Nepal, some of the guidelines can be applicable to the management of wilderness areas:

- Recognise that sacred natural sites exist in all of the IUCN protected area categories and governance types.
- Recognise that sacred natural sites have great significance for the spiritual well-being of many people and that cultural and spiritual inspiration are part of the ecosystem services that nature provides.
- Recognise that sacred natural sites integrate social, cultural, environmental and economic values into holistic management models that are part of the tangible and intangible heritage of humankind.
- Develop supportive communication, education and public awareness programmes.
- Accommodate and integrate different ways of knowing, expression and appreciation in the development of policies and educational materials.
- Understand and manage visitor pressures and develop appropriate policies, rules, codes of conduct, facilities and practices for visitor access to sacred sites.

For Wilderness Managers and Advocates Promoting the Values of Wilderness

Some of the points raised above are also relevant for wilderness managers and advocates seeking support for designated wilderness areas or for the legal designation of new areas. Extolling the virtues of direct experience of wilderness experience and using art about wilderness, managers and advocates can develop communication, education and public awareness programmes of the spiritual values of wilderness. In these communications, managers and advocates can highlight that:

- Wilderness spirituality has great significance for the spiritual well-being of many people (e.g. Table 2).
- Spiritual inspiration is part of the cultural ecosystem services that nature provides.
- Wilderness spirituality is part of the tangible and intangible heritage of humankind.

Increasingly, accounting and payment for ecosystem services and biodiversity is being used to support the management of protected areas and resolve land use conflicts (TEEB 2010; Watson and Venn 2012). If intangible values, like spiritual and intrinsic values, can be included in the process without losing their fundamental nature and ultimate meanings, then that will ensure that the final “visible” picture of the values of nature and wilderness will be fuller and more complete (Cordell and others 2005; Harmon and Putney 2003).

For the Spiritual Replenishment of Wilderness Managers and Advocates

If according to Barnes (2003) wilderness is contested ground, then wilderness managers and advocates are right in the middle of it. Reflecting on her 20 years of experience working in the US Forest Service and managing wilderness, Oreskes (2006: 7) wrote: “There always will be people who tell you what you want is impossible, or that what you’re advocating is impractical and too idealistic. Those people can make an awful lot of noise, but we can’t let them stop us.” For many environmental advocates, the spirituality-related experiences they have had in nature are the motivations and reasons behind their engagement (see for example, Taylor 2010, 2012; Backes 1997; Kaye 2006b).

To sustain their passion and motivation in their work, wilderness managers and advocates not already conscious of the spiritual value of wilderness would probably benefit from regular experiences of wilderness spirituality. Immersing oneself in the silence and solitude of wilderness, one gains perspective and is refreshed, replenished, renewed, spiritually, emotionally and psychologically. However, it is not always possible to take time out to be in wilderness. In this case, regular mediated experiences, via nature contemplation, reading, reflection, looking at photographs or watching films about wilderness, can help to renew one’s spiritual connection with wilderness and provide the needed boost to sustain the long hours inside windowless offices.

Conclusions

Based on the discussions above, we suggest that:

- Direct experience of wilderness spirituality is a multi-dimensional construct that can touch on the wilderness visitor's feelings and emotions, sense of connection with existence and his/her ultimate meaning, and elevate his/her consciousness in possibly transcendental experiences.
- Art – through images and words – is a venue through which artists can express their sense of spirituality about nature. When viewing artworks about wilderness audience may experience spiritual feelings and inspiration when outside wilderness. Artworks about wilderness can communicate ideas of wilderness being a symbol of the sacred.
- Direct and mediated experiences of wilderness spirituality can be used as complementary approaches to energise the connections that people have with nature and their (individual forms of) spirituality.

In an increasingly urbanised and busy world, experiences in wilderness are more the exception than the norm. Wilderness areas are by nature difficult to travel to and wilderness experiences often demand significant investments of time, resources and organisation. For most people most of the time, wilderness remains a mental concept. Through mediated experiences, it is a concept that can be maintained in good health or even encouraged to flourish even when one is far away from wilderness. Furthermore, direct experience in wilderness is not always desirable, possible or even beneficial for some individuals, for example, as a result of poor health and lack of interest or knowledge. Large numbers of people travelling to remote wilderness areas can lead to undesirable environmental impacts (see for example, Eijgelaar and others 2010 on greenhouse gas emissions and impact on climate change from Antarctic tourism). In these cases mediated experiences are essential in order to maintain at least some level of connection to and reverence for wilderness.

We close with some reflections on the difficulties of objectifying and describing something that is intensely personal and which often escapes intellectual conceptualisation.

This paper may be seen as promoting the objectification of wilderness spirituality by seeking to 'define' it and also in the proffering of strategies to manage it. It is possible that our endeavours may in fact diminish the spiritual value of wilderness. A tension exists, we believe, between a perceived need for managers to know what it is they are managing, and the intangibility of the spiritual dimension of wilderness, which, by default, may defy management due to this intangibility. If all becomes known, and the sense of mystery that can pervade wild areas becomes commodified, then maybe it could lose its appeal or its value? Perhaps respect is all that is needed. We could simply acknowledge that wilderness can engender a spiritual response for some people and then do very little other than show the place respect for that reason. Just alerting people, particularly managers, to the fact that the spiritual dimension is a valued attribute of wilderness may be enough. Indeed, the promotion of the spiritual value of natural areas may be counterproductive

if potential visitors are not motivated to visit for spiritual reasons in the first place (Hazen 2009). Spiritual experiences in or spiritual inspirations from wilderness are not the only ways that humans may touch the ineffable.

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A Big Blank White Canvas? Mapping and Modelling Human Impact In Antarctica

Steve Carver and Tina Tin

Abstract—Antarctica is certainly what most people would consider being the world’s last great wilderness; largely untouched and undeveloped by humans. Yet it is not inviolate - there are scientific bases, tourist operations, expeditions, airstrips and even roads. Although these impacts are by and large limited in extent, their very presence in an otherwise “blank” landscape can have effects on the wilderness that far outweigh their relatively small physical footprint. The vastness of Antarctica and the relatively small size and sparseness of human infrastructure presents its own set of special conditions which force us to re-think and re-imagine the concepts of wilderness quality mapping in large polar wildernesses. Here our task is perhaps not to map out where wilderness is but, rather, to map out where human activities and impacts are. Antarctica’s vast size means that a multi-scale approach is required to develop an adequate understanding of the spatial pattern of wilderness and human activities. The disproportionate impact of the first human impact on to the “Blank Canvas” and subsequent fragmentation of the canvas as a result of increasing and scattered impacts need to be taken into account. A conceptual spatial modelling approach is developed and recommendations for future implementation made.

Introduction

By most definitions – biophysical, legal, sociological or cultural – Antarctica qualifies as one of the largest wildernesses on Earth. Permanent human infrastructure exists on less than 1% of the 14 million square kilometres of the Antarctic continent (Summerson, 2013). Under the 1991 Protocol on Environmental Protection to the Antarctic Treaty, the Antarctic Treaty area - the area south of 60 degrees latitude south, covering one-sixth of the Earth’s surface, or

85 million square kilometres – has been designated “as a natural reserve, devoted to peace and science” (Article 2). The legal protection of Antarctica’s “wilderness values” is required to “be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area” (Article 3(1)). More specifically, Antarctic Specially Protected Areas can be designated to protect areas with “outstanding” wilderness values (Annex V). Activities “shall be planned and conducted so as to avoid degradation of... areas of... wilderness significance” (Article 3(2)(b)(vi)), primarily through the use of Environmental Impact Assessments (EIAs) (Annex I).

Despite the multiple legal commitments and the obvious condition of Antarctica as wilderness, implementation of the legal requirements and pro-active protection of Antarctica’s wilderness have been slow to come by (Summerson and Bishop, 2012; Tin and Hemmings, 2011). Antarctica and other polar wildernesses, like Greenland and Svalbard, are unusual cases in the field of environmental management. In most other environments, humans are trying to protect the little land area that is wild and natural within a much larger matrix of that which is built-up, farmed and domesticated. Environmental management tools such as protected areas and EIAs have been developed primarily to address these situations. However, in a polar wilderness where 99% of the land has no permanent human infrastructure how does one identify areas of “outstanding” wilderness values to designate as a protected area? How does one conduct an EIA and assess the impact of the construction of human infrastructure on wilderness when every construction impacts wilderness irreversibly? Protected areas, EIAs and other existing environmental management tools may not be the most appropriate tools for wilderness protection in these places. If wilderness can be defined as areas with the absence of human disturbance (as proposed in New Zealand, 2011, for Antarctica), then the most direct way to protect polar wildernesses where there have been little or no human presence is to avoid human development entirely. Up till now, polar wildernesses have been protected from human development partly because of their remoteness and harsh climates. However, technological advances, climate warming, globalisation, geopolitics and increased demand for resources, have all contributed towards increasing the pressure to expand the human footprint across even these most remote parts of the planet (Tin et al., 2008; Branding Greenland, 2009; Berkman and Vylegzhnin, 2013). Existing environmental management tools, insufficient though they are, may provide some basic protection to these fragile environments. However, if they were to be used effectively in polar wildernesses where built-up areas are scattered within

Steve Carver is Director of the Wildland Research Institute and a senior lecturer in Geography at the University of Leeds, UK. E-mail: s.j.carver@leeds.ac.uk. Tina Tin is an independent environmental consultant, advisor to the Antarctic and Southern Ocean Coalition (ASOC) and a member of the Wildland Research Institute. She is based in Chambéry, France. E-mail: tinatintk@gmail.com.

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the much larger matrix of wilderness then their application needs to be re-thought and re-imagined.

In order for any environmental management tool to be effective in wilderness protection, there must be an a priori knowledge of the location of the area to be protected. This paper focuses on this issue of wilderness mapping in Antarctica. We start from the basic working definition that wilderness is where there is an absence of human disturbance (New Zealand, 2011). This definition is simple and overlooks nuances, such as time (e.g., How long do the disturbance and its impacts last for?), nature of disturbance and impacts (e.g., Do visual, audible, chemical or biological disturbances carry the same weight?) or characteristics of the terrain (e.g., Are areas with more biodiversity have more value as wilderness?). Nonetheless, it remains the one definition that has been debated over a long period of time (since the first meeting of the Antarctic Treaty System's Committee for Environmental Protection in 1999) with the participation of the now, 29 governments which are Consultative Parties to the Antarctic Treaty. Its simplicity also allows us to make some first explorations into some basic concepts of wilderness mapping in a "Big Blank White Canvas".

The terminology "wilderness mapping" is used as it is familiar to most mapping practitioners. However, in Antarctica and other polar wildernesses where the vast majority of the area is undeniably wilderness, our task is not to map out where wilderness is but, rather, to map out where human activities and impacts are located. In this paper, we assume only two categories of land: 1) with human activities and impacts, and 2) without human activities and impacts. We do not take into consideration the surface substrate or biodiversity of the land, duration or nature of human activities and their impacts, or whether any human being would likely to be present to experience such impacts. We focus on exploring the issues of the disproportionate impact of the first human impact on to the "Blank Canvas" and subsequent fragmentation of the canvas as a result of increasing and scattered impacts. We begin this paper with an overview of how wilderness has been mapped in Antarctica in the past. We then discuss a number of issues relevant to the special case of wilderness mapping on a "big blank canvas", including size, scale, effects of initial and subsequent impacts and permanent and transitory impacts. We conclude with some suggestions on the way forward.

Attempts at Mapping Wilderness in Antarctica

While a number of global scale maps of wilderness areas and wilderness quality have been produced, many of these are of little or no use in regard to Antarctica because they either describe all Antarctica as "wilderness" or avoid mapping the continent altogether because of a lack of suitable data. A small number of mapping exercises have been carried out specifically for Antarctica but these remain limited in their scope and their detail.

McCloskey and Spalding (1989) conducted the first global reconnaissance of wilderness by mapping those areas without large scale human impacts. This was based on very simple fixed criteria and used the Jet Navigation and Operational Navigation Charts to identify areas greater than 400,000 ha

with no mapped roads or other human structures. Due to the limited scale of these maps (1:1,000,000 and 1:2,000,000, respectively) the results for Antarctica are very much generalised with 100% being described as wilderness.

Many wilderness mapping projects adopt the wilderness continuum concept (or environmental modification spectrum) as their basic model (Carver and Fritz, 1999). This assumes that wilderness quality is inversely proportional to the degree of human impact. Pristine wilderness is at one end of the continuum (Hendee et al., 1990). At the opposite end of this spectrum is the indoor and totally urbanised environment of the city centre shopping mall or office block where a person is entirely isolated from the natural world. At all stages in between it is possible to identify various environments with varying levels of human modification and naturalness. The continuum concept has been adopted in more recent studies to model the degree of human impact based on such factors as human population density, settlements, roads, etc. such as the work on the Human Footprint and The Last of the Wild by Wildlife Conservation Society (WCS) and the Center for International Earth Science Information Network (CIESIN) (Sanderson et al., 2002), and land cover change, land-use intensity, fragmentation, climate change, atmospheric nitrogen deposition, and infrastructure development as used in the Globio GEO-3 project (Alkemade et al., 2009). However, because these models are dealing with global databases, the level of detail is low, and so generally results in highly generalised outputs. In addition, both the Human Footprint/Last of the Wild and Globio GEO-3 exclude Antarctica because of a paucity of data.

A recent development of the global wilderness map simplifies the mapping procedure by just mapping roadless areas based on Google map data. In the populated countries of the world this is an interesting first step to mapping opportunities for wilderness as lack of roads limits human impact by restricting accessibility. However, the lack of a road network in Antarctica limits the usefulness of this approach.

In Antarctica, the only continental-wide maps of the human footprint were developed by Summerson (Tin and Summerson, 2013; Convey et al, 2012). Data on the locations of permanent infrastructure and logistic routes were obtained from the public databases of the Council of Managers of National Antarctic Programs (COMNAP), International Association of Antarctica Tour Operators (IAATO), the Antarctic Treaty Secretariat and subsequent links to websites of National Antarctic Programs for 2011-2012. Once the data were compiled, no further analysis was conducted (such as, addition or scaling) and the locations were plotted on a map of the Antarctic continent. In the process, Tin and Summerson (2011) found that information on major human activity in Antarctica was reasonably well-maintained and relatively centralised, though accessibility was variable. They concluded that compiling data from the different repositories into a common format, building and updating a Geographic Information System (GIS) database of human infrastructure and activity in Antarctica would be a formidable challenge

On regional to local scales, Hughes et al. (2010) produced maps of human visitation in the Antarctic Peninsula. Based on the reports of field operations of British Antarctic Survey, their results showed a clear expansion of human activity in the region over time. Lynch et al. (2010) mapped the itineraries of tourist cruise ships around the Antarctic Peninsula. Their

results demonstrated the concentration of marine traffic at a few specific locations and the growth in tourism activity over two decades. Using aerial photographs, Klein et al. (2008) have mapped the evolution of the physical footprint of the U.S. McMurdo station over five decades. The station expanded rapidly from 1956 to the 1960s as buildings, fuel tanks and roads were built. Expansion has continued since, albeit at a slower rate.

Tearing Up the Big Blank Canvas

The largely untouched nature of Antarctica creates its own set of challenges for wilderness mapping. Since most of the region is devoid of obvious forms of human impact (global pollution and effects of climate change notwithstanding) any form or level of human development or impact in previously inviolate areas must have an impact that is disproportionate to its size, level or extent when compared to similar developments elsewhere in the world. This “Blank Canvas” model of first human impact is illustrated in Figures 1-3. The first infrastructure constructed on the “Blank Canvas” has the largest relative impact because subsequent developments impact an area that is already impacted. In addition, new developments impact new ground and contribute towards

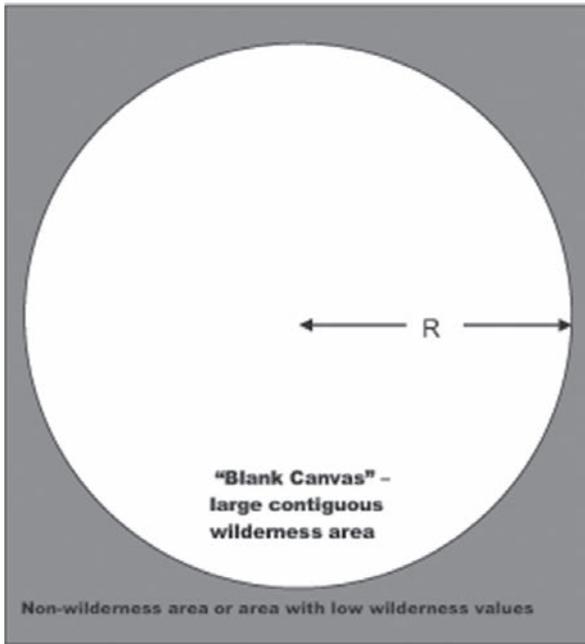


Figure 1—Pre-Impact: Assume that there is a large contiguous wilderness area which is largely non-impacted and inviolate. This is referred to as the “Blank Canvas”. For the purpose of the following geometrical demonstration, assume this wilderness area has the simple shape of a circle and that outside the area boundary are non-wilderness areas or areas with lower wilderness values. Hence:
 (i) Surface area of wilderness area = πR^2
 (ii) Length of area boundary (which serves as an interface between wilderness and non-wilderness areas) = $2\pi R$
 (iii) Maximum possible distance away from area boundary (and hence non-wilderness areas) = R

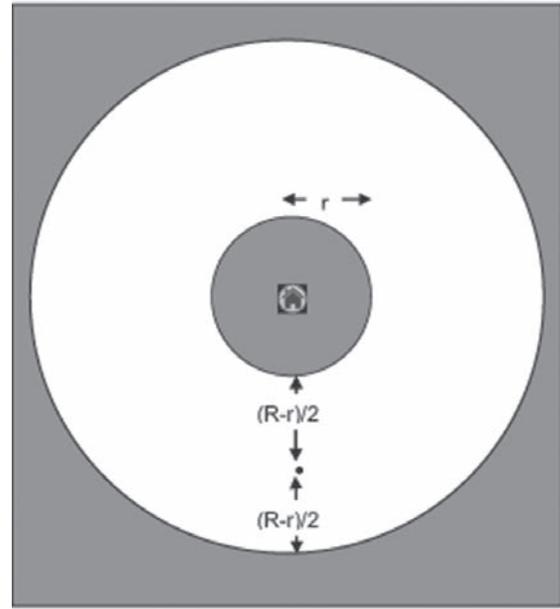


Figure 2—Initial impact: Assume that one building is constructed on the “Blank Canvas”. Assume that the building has a simple equidistant impact on the wilderness area in all directions. Hence, the impacts of this one construction are:
 (i) diminishing the surface area of the wilderness from πR^2 to $\pi R^2 - \pi r^2$
 (ii) increasing the length of the interface between wilderness and non-wilderness areas from $2\pi R$ to $2\pi R + 2\pi r$
 (iii) decreasing the maximum possible distance away from area boundary from R to $(R - r)/2$

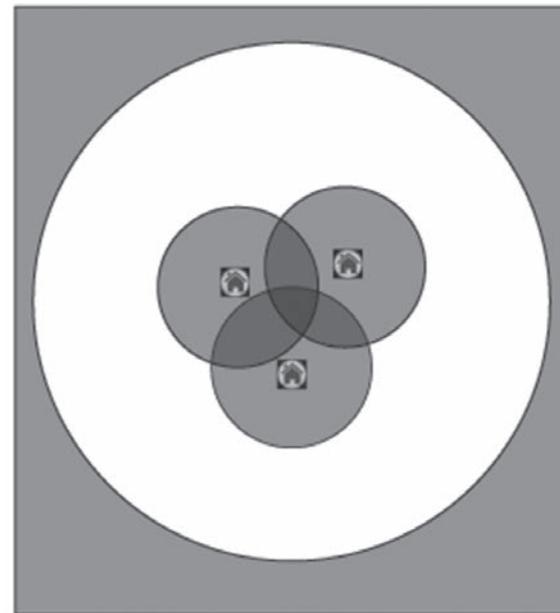


Figure 3—Subsequent impacts – the “Holey Flag” effect: Assume that two more identical buildings are constructed next to the first building. Impacts on the wilderness area will increase, but at a lower rate. For the 3 buildings, the total impacted area is less than $3 \times \pi r^2$ and the increase in area boundary is less than $3 \times 2\pi r$ because the impacted areas of the new constructions overlap with the area that has already been impacted by the first construction. The “hole” from the initial impact is enlarged. This demonstrates the “Blank Canvas” effect, i.e., that the first intrusion into a wilderness area has the largest relative impact.

overall cumulative impacts across the continent. Regardless of absolute scale, this emphasises the importance of detailed local scale modelling for all new developments in Antarctica, especially those in the wildest areas, to make sure that impacts are kept to an absolute minimum.

If new developments are built far apart, away from areas that are already impacted, their impacts on wilderness increase (Figure 4). They will cause the total surface area of the wilderness area to decrease, the length of the interface between wilderness and non-wilderness to increase, while within the wilderness area, the maximum possible distance away from non-wilderness reduces. Hence, the original contiguous wilderness area (or “Blank Canvas”), instead of being one large contiguous piece, becomes smaller and is made up of holes and smaller fragments connected through narrow sections (or “bridges”). In other words, it becomes a “Torn Canvas” (Figure 4).

Scale Issues

Large contiguous natural areas are a global rarity. In a global analysis of protected areas, Leroux et al. (2010) concluded that the current global protected areas network



Figure 4—Subsequent impacts – the “Torn Canvas” effect:

If three buildings are built far apart within a wilderness area, then:

- (i) the surface area of the wilderness diminishes to $\pi R^2 - 3 \times \pi r^2$
 - (ii) the length of the interface between wilderness and non-wilderness areas increases to $2\pi R + 3 \times 2\pi r$
 - (iii) the maximum possible distance away from area boundary falls below R or even $R - r$ at many locations within the wilderness area
- This demonstrates the “fragmentation” process. The original “Blank Canvas” becomes a “Torn Canvas” whereby the original large contiguous wilderness area becomes smaller, is split into smaller sections that are connected through bridges and where the maximum possible distance away from non-wilderness areas is reduced.

lacks large, strictly-protected areas with very low human footprint. The Antarctic wilderness is a unique treasure in this respect and so deserves the highest level of protection.

Scale is clearly one of the greatest challenges in mapping wilderness in Antarctica. The sheer size of the continent and the comparatively small and spatially confined human footprint means that a multi-scale approach is required to develop an adequate understanding of the spatial pattern of wilderness and remaining inviolate areas. At the scale of the whole continent, the best approach is perhaps to continue using maps showing the presence and scale of human features using symbols that are proportional to the size of the feature. Such an approach has limited utility however, because if the locations of research bases, etc. are shown to scale they will simply not be visible, thus giving a false impression of an entirely inviolate continent. At regional scales (e.g. the Antarctic Peninsula) more deterministic mapping techniques such as simple buffer zones can be used to show zones of human influence around roads, bases, airstrips, tourist landing sites, etc. At more local scales, such as for individual Antarctic Specially Managed Areas, complex and detailed models using the continuous and fuzzy data analyses such as those developed by Carver et al. (2012) for mapping wilderness in the Scottish national parks and Tricker et al. (2012) for mapping threats to wilderness character in the US national parks’ wilderness areas can be applied.

Further Challenges

Moving on from the simple definition that wilderness is where there is an absence of human disturbance opens up further challenges for wilderness mapping in Antarctic. For example, permanent impacts such as from research bases and survey stations are obvious, but how do we handle the temporary or transient impacts associated with over flights, helicopter access, visits by tourist ships, etc? In many respects this is dependent on frequency (e.g. number of visits per year) and magnitude/scale (e.g. snow-cat supply convoy versus a lone skier) as well as potential cumulative effects (e.g. possible crowding of certain popular locations by cruise ships). Knowledge of visitation history and visitation rates will also affect the sense of wilderness in the most remote parts of the continent. While these issues are often not taken into account (or irrelevant) in the wilderness areas of more populated areas, Antarctica is one of the last few places on earth where inviolate lands are known to exist with any degree of confidence, so it is important that these remaining unvisited areas are kept inviolate as much as is reasonably practicable.

In Antarctica, like many high latitude polar regions, much of the biodiversity is found in the extremely productive marine environment. The biodiversity that exists on land tends to be located around the coastal margins and in the rare ice-free areas. Terrestrial biota is extremely fragile and sensitive to human impacts. Vegetation develops extremely slowly in the harsh climatic conditions meaning that physical impacts from human activities such as tire tracks, etc. last for many years. Here, human activities can have disproportionate ecological impact on wilderness. In areas that are covered in snow, rock and ice—over 98% of the Antarctic continent—biological

activity is generally very low. Here, human activities will have low ecological impact on wilderness. However, their landscape impact can be disproportionate, especially if it were the first human impact on to the “Blank Canvas” and leads to the subsequent fragmentation of a previously large contiguous wilderness.

Pollution is global and Antarctica is known to be affected. However, local sources of pollution will have the greatest and most noticeable effect. These include light pollution from research base lights, noise pollution from on-site operations and transport (e.g. from helicopters and skidoos), chemical pollution from exhaust fumes, etc. and the physical pollution from buildings, supplies and other infrastructure. Several detailed modelling tools are available to model spatial effects of light, noise and visual pollution.

In populated countries with a well-developed road network, it is usual to model remoteness based on travel time, on foot or other non-mechanised means, from nearest point of mechanised access (normally the road head). This is done using either simple buffer zones describing areas of equal accessibility or by more complex models that take intervening terrain, barrier features and land cover into account (Carver et al., 2013). In Antarctica, modelling the effects of distance, remoteness and accessibility will have to be based on operational ranges of helicopters and fixed wing aircraft, availability of landing sites together with terrain accessibility for land/ice based travel. Several detailed modelling tools are available to model remoteness and accessibility using a combination of buffer and anisotropic access models and these can be applied at a local scale to areas of operation in Antarctica.

Conclusions and Ways Forward

Antarctica presents a number of challenges for the application of standard environmental management tools, such as wilderness mapping and EIAs focussed on wilderness values. The main challenges concern the size of the area relative to the extent of the human impact, and the fact that most human impacts are related to single sites or installations set in the context of a “Blank Canvas” with very little or no human impact. The sheer size and scale of Antarctica creates a problem for mapping in that the relatively small number and size of most bases and points of impact (e.g. flight paths, tourist landing points, etc.) mean that Antarctica appears almost wholly wilderness with a very high proportion of inviolate areas. Yet, the hitherto unspoilt and un-impacted nature of the region means that any human presence will have a disproportionately high impact relative to its size and context, especially in areas where there is no other human presence. This needs careful handling in such a way that wilderness mapping and EIAs do not hide or underestimate these effects.

At the Antarctic Treaty Consultative Meeting in 2013, the Wildland Research Institute (ASOC, 2013) recommended that the Antarctic Treaty Parties:

- Compile data on locations of human infrastructures and activities. Overlay the human footprint data on existing biogeographic domain maps of the Committee for Environmental Protection and the Scientific Committee on Antarctic Research.

- Develop a demonstration mapping project at three scales:
 - Continental Antarctica using simple, criteria-based mapping
 - Regional scale (e.g. for the Antarctic Peninsula) using index-based mapping
 - Local scale (e.g. James Ross Island) using local scale models

The recommendations received little concrete support, continuing the decade-long trend of the Treaty Parties’ lack of engagement on the issue of wilderness protection.

Despite the lack of interest from the Antarctic Treaty Parties, we continue to advocate for the need of a multi-scale modelling approach to map and monitor the scale, location and level of human activity in Antarctica as a key element in the implementation of the Parties’ legal obligation to protect Antarctica’s wilderness values. Clarity and the ability to zoom in to areas of interest (e.g. the holes in the “Blank Canvas”) to show greater detail is essential. This would allow managers and decision-makers to better understand the potential impacts of scientific, strategic and tourist developments in the region and thereby make provisions for minimising them through careful design, location and sharing of facilities, knowledge and timing of activities. While individual researchers and research institutes, including the Wildland Research Institute can take the lead and take on the task of developing new technologies and models, the active engagement of Antarctic Treaty Parties and their National Antarctic Programs are fundamental and indispensable. They need to provide access to the appropriate data on human activities, participate in a coordinated mapping effort and use the output in their planning activities to achieve on-the-ground protection of the Antarctic wilderness. Protection of the Antarctic wilderness will only be a reality if there is genuine commitment from Treaty Parties and their National Antarctic Programs to make it happen.

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Public Values of the Antarctic Wilderness: A Comparison of University Students in Spain and the United States

John Peden, Tina Tin, Javier Benayas, Luis Pertierra, Pablo Tejedo, Jessica O'Reilly, Kees Bastmeijer, and Pat Maher

Abstract—This paper summarizes preliminary results of a research study that investigated university students' perceptions of Antarctic wilderness and reports on discussions of these results at a workshop held at the 10th World Wilderness Congress. The purpose of the research study was to determine whether nationality and cultural differences were associated with beliefs about Antarctica, relationships between humans and the Antarctic environment, and support for resource development and tourism activities—a small but important step in deciding how to best meet the requirements of the Protocol on Environmental Protection to the Antarctic Treaty. Results were presented at the World Wilderness Congress as part of the CoalitionWILD Workshop Series, which was targeted towards engaging young people under the age of 30 in conservation projects. Discussions in the CoalitionWILD Workshop highlighted the issues of: (i) use of technology in wilderness; (ii) the public's lack of information about issues and threats to wilderness; and (iii) differences in what constitutes “wilderness” in the minds of people from different age groups, with different experiences, and different cultural backgrounds.

John Peden is Associate Professor of Recreation and Tourism Management at School of Human Ecology, Georgia Southern University, Statesboro, GA, USA. E-mail: jpeden@georgiasouthern.edu. Tina Tin is an independent environmental consultant and advisor to the Antarctic and Ocean Southern Coalition (ASOC) based in Chambéry, France. E-mail: tinatink@gmail.com. Javier Benayas is Professor at Department of Ecology, Universidad Autónoma de Madrid, Cantoblanco, Madrid 28049, Spain. E-mail: Javier.benayas@uam.es. Luis Pertierra is an environmental researcher at Department of Ecology, Universidad Autónoma de Madrid, Cantoblanco, Madrid 28049, Spain. E-mail: luis.pertierra@uam.es. Pablo Tejedo is a researcher at Department of Ecology, Universidad Autónoma de Madrid, Cantoblanco, Madrid 28049, Spain. E-mail: pablo.tejedo@hotmail.com. Jessica O'Reilly is Assistant Professor of Sociology, College of St. Benedict/St. John's University, St. Joseph, MN, USA. E-mail: jlloreilly@csbsju.edu

Kees Bastmeijer is Professor of Nature Conservation and Water Law, Tilburg Law School, Tilburg University. E-mail: c.j.bastmeijer@uvt.nl. Pat Maher is Associate Professor of Outdoor Recreation and Tourism Management Program, University of Northern British Columbia, Prince George, BC, Canada. E-mail: maherp@unbc.ca.

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Introduction

Antarctica, the area south of 60 degrees latitude south, comprises over 14 million square kilometres (over 5 million square miles) of the most remote wilderness on Earth. With annual precipitation of less than 20 centimetres (approximately eight inches), Antarctica is a windswept desert composed of ice, rock, and rugged coast lines. Surrounded by the Southern Ocean, it is also a region abundant in fish and wildlife. Less than 1% of the continent contains infrastructure development to support human visitation. Despite its remote location and inhospitable nature, annual visits for research and tourism purposes are estimated to be in the tens of thousands (Tin et al., 2014).

Antarctica is a common pool resource managed under the Antarctic Treaty System (ATS). The original Antarctic Treaty, signed in 1959, in its preamble recognizes “that it is in the interest of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord” (p. 2). Over the next fifty years, the ATS expanded to include other legal instruments. In 1991, Treaty Parties signed the Protocol on Environmental Protection to the Antarctic Treaty (the Protocol). In its preamble, it stated: “that the development of a comprehensive regime for the protection of the Antarctic environment and dependent and associated ecosystems is in the interest of mankind as a whole” (p. 1). The Protocol designated Antarctica as a “natural reserve, devoted to peace and science” and stipulated that:

“The protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research, in particular research essential to understanding the global environment, shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area.” (Article 3(1), p. 2)

As recently as 2012, the Treaty Parties “reaffirm[ed] their will to protect the Antarctic environment, in the interest of mankind as a whole” (Secretariat, p. 243). This raises the question of how “mankind” actually wants Antarctica to be managed.

What Does Mankind Want? The Birth of AntWILD

“Mankind” includes people of different genders, cultures, ages and propensities. While it is impossible to know what mankind as a whole wants, we initiated a research study to determine how different cultures and populations value the Antarctic wilderness. The work of the Consortium for Research on the Wilderness Values of Antarctica (AntWILD) began in 2007 when we initiated surveys and interviews with small groups of people in the Netherlands, in California, USA and onboard an Antarctic tourist ship (Neufeld et al., 2014). Since then, we have expanded and standardized our research methodology to focus on university students. University students have been chosen for two main reasons. First, research in the area of emerging adulthood suggests that a majority of university students belong to a unique demographic group, distinct from adolescents and young adults, that is characterized by identify exploration (Arnett, 2001). Arnett notes that one’s college years lead to new experiences that can transform previously held world views. Second, young people represent the present and future of “mankind”. Their opinions and choices will have implications for society for decades to come.

In 2012, we surveyed approximately 400 undergraduate students enrolled in environmental science and tourism courses in Spain and the United States. We sought to determine whether beliefs about the importance of Antarctica, relationships between humans and the Antarctic environment, and support for resource development and tourism activities differed across the Atlantic. Our intent was not to generalize to all university students in Spain and the United States, but to determine whether nationality and cultural differences were associated with variations in the ways respondents valued Antarctic wilderness. Thus, we used a purposive sampling approach designed to identify comparable groups of undergraduate students enrolled in similar courses at two large public universities.

All Things Wild: AntWILD, WILD10 and CoalitionWILD

The 10th World Wilderness Congress (WILD10) that took place in Salamanca, Spain, 4-10 October, 2013, had a strong intergenerational component. CoalitionWILD—a movement that seeks to engage young people under the age of 30 in innovative conservation projects that aim to make the world a wilder place—had its first gathering during WILD10 (CoalitionWILD, 2013). As part of its program during WILD10, CoalitionWILD organized a series of 90-minute workshops, one of which was entitled “A New Face for the Future of Wilderness.” Three conservation case studies were used as basis for discussion about how technology and the values of young people from different cultures will influence the future sustainability of wilderness. AntWILD’s project on Spanish and U.S. university students was invited to be one of the case studies of this session.

In this paper, we present preliminary results from the AntWILD study and discussions that arose during the CoalitionWILD session. By bringing together students’ survey

responses, researchers’ interpretations, and Congress delegates’ discussions, we hope to create a multi-dimensional tapestry that illustrates the different ways “mankind”—young and old, European and American—values the Antarctic wilderness.

Results and Discussion

AntWILD Survey Results

A total of 400 students (approximately 200 in Spain and 200 in the U.S.) were invited to complete a 15 question survey. The survey inquired about environmental knowledge; values of Antarctic wilderness; relationships between humans and the Antarctic environment; attitudes towards resource management and tourism development activities; and general perceptions about the nature of wilderness. Both categorical and open-ended formats were used (see Tin et al., 2011 for further information on the survey). After accounting for incomplete responses, the adjusted total was 368 (189 in Spain and 179 in the U.S.)—a response rate of 92%.

Responses from Spain and the United States exhibited several similarities. A large proportion of both samples considered the importance of Antarctica to lie in it being one of the world’s last great wildernesses (57% Spain; 62% U.S.) and an important science laboratory for the benefit of mankind (46% Spain; 41% U.S.) (Figure 1). Many respondents also agreed that nature is a force greater than mankind (51% Spain; 49% U.S.) and that it is important to protect the bequest values of Antarctica (59% Spain; 63% U.S.) (Figure 2). However, students in Spain were significantly more likely to value Antarctica as an integral component of the Earth’s climate system (65% Spain; 51% U.S.) and to state that Antarctica has existence value—that humans have a moral obligation to protect Antarctica irrespective of direct benefits to mankind (68% Spain; 34% U.S.). Students in the United States were significantly more likely to value Antarctica as a reservoir of mineral resources (24% Spain; 41% U.S.) and to state that human needs and protection of the Antarctic environment were of equal importance (12% Spain; 27% U.S.).

These findings were reinforced by significantly higher levels of support for ten resource management and tourism development activities among students in the United States. While the results reflect a more anthropocentric value-orientation towards Antarctic wilderness among students in the United States, there was no difference in level of support for designating Antarctica as a wilderness reserve where development of infrastructure is limited (Figure 3).

CoalitionWILD Discussions

At the CoalitionWILD session at WILD10, two other research projects were also presented. Elena Nikolaeva’s presentation focused on sustainable tourism in Russia’s Kamchatka Peninsula. John Shultis presented his findings on visitors’ attitudes about the use of technology in New Zealand’s wilderness areas. The session was moderated by Crista Valentino, one of the directors of CoalitionWILD.

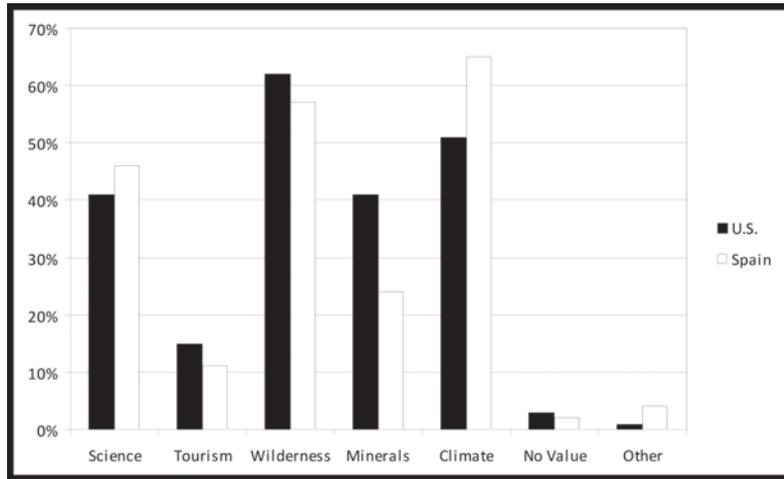


Figure 1—What is the value of Antarctica?

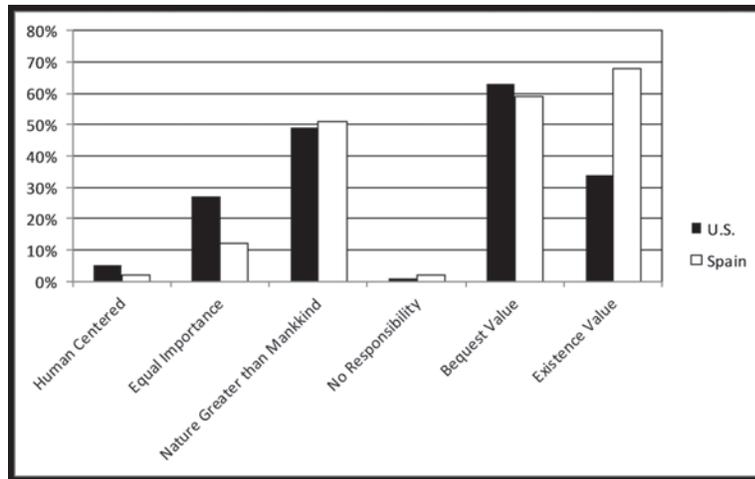


Figure 2—What is the relationship between humans and Antarctica?

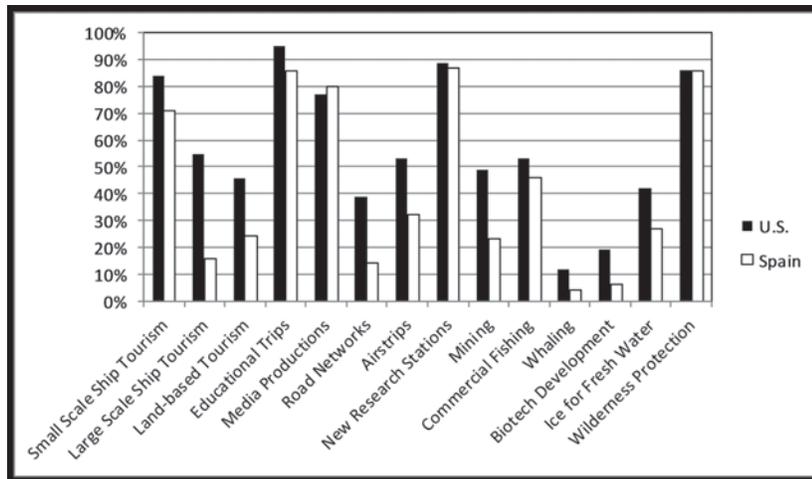


Figure 3—Support for resource management and tourism development activities

Each team had 15 minutes to introduce their studies and present their findings. Implications were addressed in a 40-minute discussion period that focused on the following questions: (1) What are the implications of these studies for the future face of wilderness? (2) How would you address the issues identified in these studies if you were a wilderness manager? During the 90-minute session there were, on average, 20 people in the audience. Together with the presenters, moderator and participants, approximately 20% of the people in the room were below the age of 30. Discussions were conducted in one single group.

Workshop participants were surprised by differences in the values of Antarctic wilderness among students in Spain and the United States. Despite the stated importance of protecting wilderness values and managing Antarctica as an important component of the earth's climate system, workshop participants recognized that students in the United States were more supportive of resource management and tourism development activities, than students in Spain. This was particularly true for extractive resource management, such as the construction of road networks, air strips, and mining development. Students in the United States were also more supportive of tourism development, including ship-based and land-based tourism. Workshop participants agreed that these findings could be explained in terms of differing beliefs about the relationship between humans and the Antarctic environment. Students in the United States were more likely to state that human needs and protection of the Antarctic environment are of equal importance, while students in Spain were more likely to state that humans have a moral obligation to protect Antarctica irrespective of direct benefits to humans.

Students in both Spain and the United States felt that Antarctica should be managed as a wilderness reserve. One workshop participant speculated that since wilderness is rare in Spain, the Antarctic wilderness could be treasured as an exotic and romantic idea by the Spanish people. However, another participant argued that, in reality, the Spanish public is generally reluctant to pay to protect nature, and seemed surprised by the level of support for wilderness protection.

We believe that the apparent contradiction between developing Antarctica and protecting the continent as a wilderness reserve among U.S. students may suggest what Hendee and Dawson (2009) refer to as a sociological, rather than legal definition of wilderness. Although the Wilderness Act of 1964 defines wilderness as "an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain" (U.S. Public Law 88-577), the law applies solely to lands within the National Wilderness Preservation System. Many residents of the United States are also unfamiliar with this definition of wilderness (Schuster, Cordell, and Phillips, 2005). In reality, the terms "wild" and "wilderness" are often used in a relative rather than absolute sense. A place is wilderness because it is wilder, less domesticated, and less developed than one's usual environment. If one's usual environment is highly urban, with high population density, and constant access to technology and information, a place that is less urban, with more green space may be experienced as wilderness. Outdoor recreation managers have long acknowledged that wilderness represents one end on a continuum of naturalness, and that quality experiences can be realized in a range

of outdoor settings (Moore and Driver, 2005). For those accustomed to recreating in areas characterized by roads and other forms of development, it may seem reasonable that an area as remote as Antarctica could be developed for resource extraction and tourism, while simultaneously protecting its wilderness character.

Shultis' presentation on attitudes about the use of technology in New Zealand's wilderness areas prompted workshop participants to suggest that the very definition of wilderness may be changing as technological advances have made places like New Zealand and Antarctica more accessible and safer to visit. Workshop participants from different age groups discussed the question of "who defines what wilderness is". Echoing the results of Shultis' research, younger workshop participants noted that they did not see technology to be incompatible with wilderness. Older participants explained how they have cherished their experiences in technology-free wilderness and expressed their desire to make such experiences available to future generations.

One participant reflected that all Antarctic visitors rely on technology to survive under harsh climatic conditions. While Antarctic tour companies often sell their tours as wilderness experiences, the facilities onboard cruise ships – restaurants, gyms, internet access and other forms of entertainment – result in experiences that are not typically those associated with wilderness. In addition, as a result of the growing concentration of cruise ships at the most highly visited destinations on the Antarctic Peninsula, a "Wilderness Etiquette" has been developed by the International Association of Antarctica Tour Operators (IAATO, 2008) in order to manage the positioning of cruise ships and timing of visits to create the illusion of solitude. One participant suggested that indicators and standards of quality (Manning and Halo, 2010) could be used to manage biophysical and social conditions as tourism opportunities continue to expand. This would help prevent a floating base line, in which first-time visitors perceive current conditions as normal and acceptable, despite increasing rates of visitation and associated impacts.

A theme that emerged from Nikolaeva's Kamchatka study was the general public's lack of information about the issues and threats facing wilderness. While the amount of publicly available information on Kamchatka is sparse, technological advances have greatly increased access to information about remote places, such as Antarctica. Nonetheless, many people are simply unaware of the range and scope of issues that affect Kamchatka, Antarctica, and other remote wilderness areas (Schuster, Cordell, and Phillips, 2005). We think that more research is necessary to determine the accuracy of people's beliefs about resource management and tourism development activities in Antarctica and elsewhere. This will allow managers to educate diverse stakeholders and engage in dialog about the importance of wilderness protection, ultimately leading to higher levels of environmental concern.

Conclusion

Conflicting definitions of wilderness, the use of technology, and the availability of information were themes that emerged from our discussions of managing Antarctica now and in the future. The discussions highlighted in this paper illustrate some of the trends and complexities underlying the management of Antarctic wilderness in the interest of

“mankind.” “Mankind” consists of people of different ages, cultures, and genders who perceive benefits differently at various stages of their lives. Although university students do not represent the majority of a country’s population, their opinions are of interest. This is particularly true given that research suggests young adulthood is not a universal life stage, but rather, one that is generally restricted to highly industrialized or post-industrialized societies (Arnett, 2011, 2000). In general, the numbers of university graduates are increasing across many countries. These young people will be active in society for the next 40 years and may hold decision-making positions in the future. While they may not be directly involved in environmental management decisions of the Antarctic, their everyday decisions and actions, such as fossil fuel consumption, voting in government elections, and choice of holiday destinations, will have ramifications for the polar regions in this globally interconnected world.

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Section 3—Africa and North America: Linkages Across Boundaries to Protect Nature



Evaluating Social-Ecological Aspects of Buffer Zones at the Borders of Etosha National Park, Namibia

Lelani M. Mannetti, Ulrich Zeller, and Karen J. Esler

Abstract—The study aims to investigate the premise that the implementation of a buffer zone around a national park provides opportunities for local communities to become active in the management of such areas. The study focuses on the Etosha National Park in Namibia, where the implementation of a buffer zone has been proposed, since the park fence is a potential barrier for ecosystem and social-ecological integrity. The research explores the extent to which the park fence influences the livelihoods of landowners and resource users in selected areas, by assessing local perspectives on the artificial boundary between them and their natural environment. Effectively implementing a buffer zone will require innovative solutions, dependent on consensus building and the formation of partnerships between the park and its neighbours. The study aims to assess the social-ecological edge effects and resulting land use conflicts at the borders of the park, as this will aid in identifying suitable implementation strategies. Current and potential institutional arrangements and linkages are to be investigated to further adaptive co-governance of land and natural resources.

Introduction

Situated on the southwestern coast of Africa, Namibia is best described as the continent's driest country south of the Sahara, one of its most recently independent states, with one of the world's highest income disparities and an unrivalled concentration of endemic dryland biodiversity. Rainfall is highly variable over space and time, while the combination of poor soils and low rainfall means that primary production is low with arable land accounting for less than 1% of the country (FAO 2011). This leaves Namibians to cope with considerable uncertainty regarding food security and

environmental outcomes, with drought being a common phenomenon. The means of coping is largely by developing diversification strategies at different levels, including a combination of livestock farming, use and sale of wild fruit, timber, fish as well as crop farming (Jones 2003). Many are turning to 'natural resource production', which is the use and management of indigenous plant and animal resources for commercial purposes (Mendelsohn et al. 2006).

Presently, approximately 17% of the country is classified as formally protected and is encompassed within 22 national parks, game reserves and recreational areas (Mendelsohn et al. 2006). This protected area system serves as an important core to the greater system of areas dedicated to conservation, which are ecologically and economically linked (Turpie et al. 2010). Formal, state owned protected areas are supplemented by a cluster of adjoining conservancies and similar privately protected areas on private and communal land, which further contributes to the conservation estate. Collectively, almost 40% of Namibia is under conservation management (Jones et al. 2009) through communal conservancies, freehold conservancies, tourism concessions and community forests and protected areas on state land (Figure 1). This conservation landscape presents unequivocal and unique conservation opportunities. The potential for rationalising management exists to facilitate the delivery of greater ecological and social benefits (Brown et al. 2005). On a regional level, the consolidation of protected areas into biosphere reserves or transboundary 'peace parks' is also a valuable prospect. In order to effectively expand, manage and develop protected area networks that will adequately protect natural diversity and landscapes, a need lies in devising a system of integrated land and natural resource management.

In terms of conservation, the most important areas in the north-west zone, where the present study is being conducted, include Etosha National Park (ENP), Skeleton Coast Park (SKP) and the conservancies in western Kunene. Due to its climate, elevation and substrates, the northw estern escarpment and desert is inhabited by many of the country's endemic species. Here the occurrence of free ranging herds of wildlife, together with the world's only expanding population of black rhinoceros (*Diceros bicornis*) outside of a park, adds to the attraction value of the area (Brown et al. 2005). A key challenge in this zone is enabling the continued growth of wildlife numbers, while simultaneously reducing conflicts between humans and wildlife. The ENP fence itself has been identified as interference for ecosystem integrity as well as for social-ecological integrity, due primarily to the contrasting land use strategies between the ENP and

Lelani M. Mannetti, Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa; e-mail: lmannetti@sun.ac.za. Ulrich Zeller, Department of Crop and Animal Sciences, Humboldt Universität zu Berlin, Ziegelstraße 5-9, Germany. Karen J. Esler, Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa.

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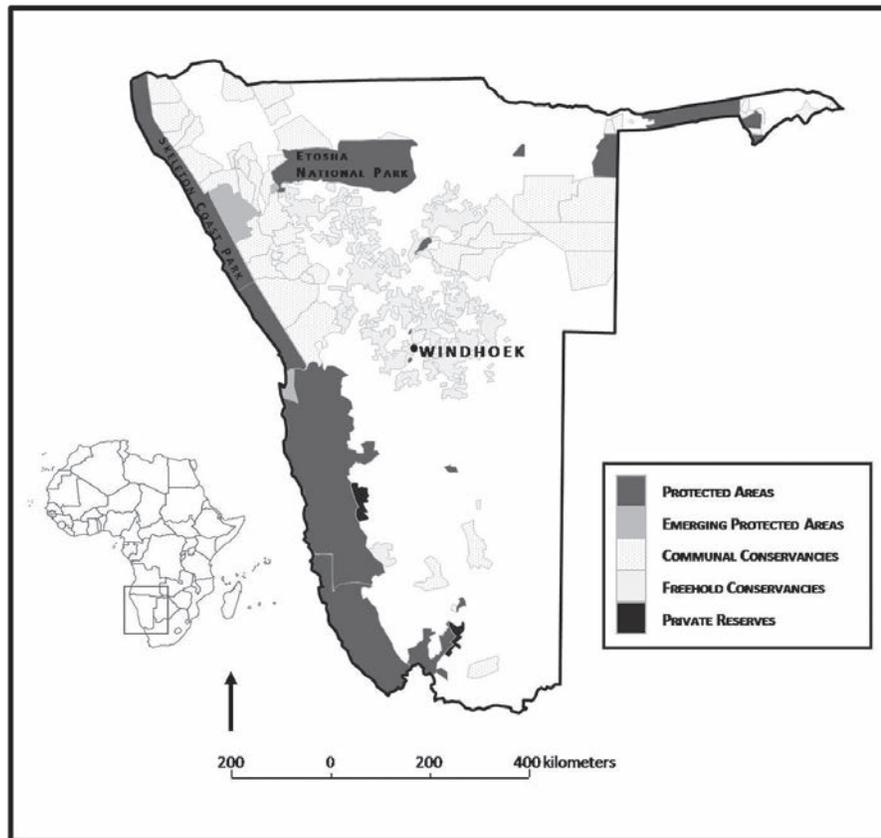


Figure 1—Map of Namibia's Protected Areas.

its surrounding areas (Göttert and Zeller 2008). It has been recommended that ENP management and park neighbours would benefit from entering into strategic conservation agreements to ease pressure on Etosha's boundaries (Brown et al. 2005). Addressing the issue requires innovative solutions, dependent on consensus building and the formation of partnerships between the park and its neighbours. In the context of adjacent land use and low population densities, ENP is ideally situated compared to many other African parks and as such, an excellent opportunity presents itself for implementing a park-and-neighbours strategy focused on developing surrounding areas towards effective buffer zones for the ENP (Figure 1).

Buffer zones overcome artificial boundaries between society and its natural environment (Wells and Brandon 1992). Based on the concept of linking a strictly protected core area with additional zones, buffer zones and transition areas allow for the use of resources (e.g. natural resource use by local communities, non-consumptive tourism etc.) according to fixed criteria (e.g. IUCN categories IV-VI). The concept rose to prominence as a conservation tool in the 1970's when it became an integral part of the management approach of UNESCO's 'Man and Biosphere Programme', which emphasised the incorporation of local peoples' needs and perceptions in the conception and management of reserves (Batisse 1986, Martino 2001, Neumann 1997, UNESCO 2000, Wells and Brandon 1992; 1993). Theoretically, such biosphere reserves

consist of a protected core area surrounded by a buffer zone, the use of which is limited to activities compatible with the protected core area, such as research, recreation, tourism, education and training (Batisse 1986, Hough 1988, Wells and Brandon 1993).

Initially, ecological and biological concerns typically steered the design of buffer zones, while they are now increasingly also presented as a means of strengthening local land and resource claims (Makombe 1993, Mbanjo et al. 1995, Newmark 1993). Properly understanding the interaction between human activities and ecosystem functioning and the resulting dynamics is a complex issue. As such, determining appropriate land uses is complicated. Buffer zones potentially perform a corridor function, alternatively, such areas could themselves provide refuge for valuable species, such as those dependent on traditional forms of agriculture for example. Restricting human activities in buffer zones could also impose costs on local landowners and users, raising the question of compensation. Land use management thus plays a critical role in the extent to which buffer zones can be used as effective conservation tools. Lastly, buffer zones may be designated not only for their restrictive 'buffering' purpose, but also as less strictly protected core areas, thereby ensuring connectivity within large transition areas. This is particularly relevant in cultural landscapes, in which the buffer zones may have a defined conservation function of its own (UNESCO 2005).

Despite the concept of a buffer zone being rather straightforward, its design and on the ground functioning raise many challenges. Considerable confusion exists over key issues, such as the purpose, location and management of buffer zones as well as what criteria should determine their shape, area and permitted uses (Martino 2001, Wells and Brandon 1993). The buffer zone concept has been criticized in the literature since these areas potentially influence the rate of environmental degradation of protected areas, increase the exploitation of natural resources, fail to take local communities into consideration and primarily promote top-down approaches to development and management (Lynagh and Ulrich 2002). Rathore (1996) argues that, due to pressures from adjacent settlements, most forest buffers have been reduced to a degraded status. In India, studies have shown that core protected areas are not at all pristine or unspoiled areas of wilderness and that 69% of surveyed protected areas had human populations and resource use activities inside them (Kothari 1996, Suri 1996). Kemf (1993) reports that in South America, 86% of protected areas are inhabited at times, while in Thailand many parks have at least 10% of the total area cleared and occupied by people from the surrounding areas. One of the biggest criticisms of buffer zone implementation is the unlikelihood that limited benefits to local people will change their behaviour or reduce pressure on natural resources in the protected area, and thereby enhance the conservation of biological diversity (Wells and Brandon 1992). The objectives of buffer zones are often viewed as controversial, contemplated as a bribe to lessen local resistance to the establishment and expansion of parks and reserves, rather than an alternative sustainable livelihood option (Ghimire 1994).

Despite considerable controversy surrounding buffer zones, theoretically, they offer a positive and worthwhile concept and practice. However, there is little empirical evidence showing that buffer zones are effective since the objectives of a specific buffer zone are highly context specific (UNESCO 1995) and variable objectives have been shown to hinder the success of buffer zones (Martino 2001). How then do we establish the objectives of the ENP buffer zone when dealing with a mosaic of land uses, each with its own social-ecological conflicts? A need lies in first understanding those social-ecological issues, from the perspective of resident communities themselves. This will then facilitate the comparison between other examples and the opportunity to learn from these experiences so as to ultimately lead to the involvement of the various stakeholders to promote institutional interplay. Imperative to the development of strategies to overcome the artificial boundaries of the ENP is the incorporation of different forms of land use, where various conflicts occur/potentially can occur and where contextual solutions and approaches are called for. In order to successfully implement a buffer zone and to overcome the artificial boundaries encapsulating the ENP, a need lies in a) incorporating the different forms of land use and their ensuing conflicts; and b) including the opinions of different stakeholders and considering their different interests and needs so as to create ecologically and socially sustainable solutions.

This integration of different ecological and social aspects, stakeholders and functions is central to the study. In particular, it aims to assess the social-ecological edge effects and

resulting land use conflicts at the borders of ENP, investigating to what extent the fence influences the livelihoods of landowners and local communities in different areas (private farms, communal farms and communal conservancies). Insight gained will potentially inform the integrated joint governance of land and resources surrounding the ENP.

The intended study aims to give a more holistic perspective on the complex and interdependent conflicts and developments surrounding the buffer zone concept. More specifically, the study objectives are:

1. To identify and map the different groups and stakeholders around the enp so as to assess the social-ecological nature and consequences of the park fence;
2. To analyse how the existing scenario (based on #1 above) compares to other case studies to provide an informed indication of how the implementation of a buffer zone would affect social-ecological dynamics and adaptive co-governance of land and resources;
3. To identify significant collaborations and linkages between relevant stakeholders to foster improved institutional arrangements; and
4. To identify best practice solutions for policy makers, planners, conservationists, businesses and communities around the enp and in general.

Research Questions

- What is the nature and consequences of social-ecological edge effects and land-use conflicts at the borders of ENP (private land, communal land and communal conservancies)? (i.e., what is the significance of the fence in the social-ecological context?)
- How does the ENP and its proposed buffer zone compare to other case studies in Africa?
- What are the significant existing collaborations and institutional interplay in and between communities, different forms of land users, national park management and NGO's?
- What are the potential/alternative institutional arrangements and linkages?

Conclusion

A great deal of research has been dedicated to comprehending the complexity of social and ecological systems and the need to understand the linkages between these systems in adaptive management aimed at conserving resilience (Berkes and Folke 1998, Berkes et al. 2003). The proposed study aims to identify means for achieving biodiversity conservation through effective links between national parks management and natural resource use by resident communities, as alternatives to fence-and-fines approaches that typify much of present-day national parks management. Conservation literature is replete with concerns about the increasingly island nature or isolation of protected areas, corresponding threats to ecological integrity and biodiversity protection within parks, and growing threats to biodiversity on the landscape level surrounding designated protected areas. Many have argued that the way forward is to integrate

conservation with community development. The research aims to apply the theory of complex social-ecological systems, managing for both ecological and social resilience (Berkes et al. 2003, Holling and Meffe 1996). A specific research objective of the study is to identify and understand institutional linkages and interplay, both horizontal and vertical (Berkes 2004, Young 2002), involved in the implementation of a buffer zone on the ENP border. The identification of possible institutional arrangements and network structures to re-couple local people and protected areas is also central to the research. Biodiversity conservation in protected areas and its adjacent land use conflicts and edge effects, demand partnerships in collective action among multiple stakeholders. In terms of practical outcomes, the case study will also contribute to Namibia's Ministry of Environment and Tourism current attempt at strengthening the country's protected area network. The findings could assist various agents in creating cooperative or partnership management approaches. The research is topical in terms of emerging new fields of interdisciplinary inquiry concerning the future of community-based conservation and evolving community management models for national parks and protected areas, particularly concerning adaptive co-governance of natural resources.

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Using Biodiversity Stewardship as a Means to Secure the Natural Wild Values on Communal Land in South Africa

Kevin McCann, Dr Roelie Kloppers, and Dr Andrew Venter

Abstract—South Africa is one of the most biodiversity-rich countries in the world, with much valuable biodiversity situated on a range of different land tenure types, including state, private and communal land. Despite this, these wild lands are being lost at an unprecedented rate, with the resultant loss of natural areas and associated ecosystem services. The challenge lies in the need to protect the unique biodiversity, by integrating the development needs of poverty-stricken communities with the need to secure the remaining natural wild places, and thereby secure the very areas on which these communities rely for their daily requirements (water, firewood, medicinal plants).

Biodiversity Stewardship is increasingly becoming the principal strategy to secure land, in favour of more traditional methods such as land acquisition. This mechanism recognises landowners as custodians of their land, and promotes and supports the wise use and management of natural resources and biodiversity, through the form of voluntary legal agreements, thereby making rural landowners effective “stewards” of their land. This paper analyses discussions with three separate communities in the province of KwaZulu-Natal (South Africa) considering voluntary agreements, each highlighting the relevance of the Biodiversity Stewardship approach in securing areas under different types of communal land tenure. These communities are the Gumbi, AmaZizi / Amangwane and Mabandla communities. Collectively, they own and manage 61,600ha of land. This comprises the Somkhanda Game Reserve, 11 600 ha of land claimed by the Gumbi community through the land reform process in 2005, which was formally proclaimed as a protected area in 2011; the 45 000 ha Upper Thukela community area (land owned by the Ingonyama Trust), which is in the final stages of obtaining formal conservation security; and the 5 000 ha Umgano Reserve on state owned land, secured through multiple agreements.

Kevin McCann, Deputy Director, Wildlands Conservation Trust, P.O. Box 1138, Hilton, South Africa, 3245; e-mail: kevinm@wildlands.co.za. Dr Roelie Kloppers, Executive Director, Wildlands Conservation Trust. Dr Andrew Venter, CEO, Wildlands Conservation Trust.

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These voluntary Biodiversity Stewardship agreements are characterised by innovative, pro-poor green enterprise-based approaches to sustainable development and the conservation of biodiversity. They aim to create a green economy where the conservation of ecosystems and biodiversity is the foundation of sustainable development and where a closer alignment of environmental and economic systems is imperative, ensuring direct community benefit through improved natural resource management.

Introduction

As a developing country that needs to reduce poverty levels and ensure sustainable livelihoods for its people, South Africa faces critical challenges relating to the need to protect biodiversity and at the same time implement programmes and policies that seek to address the inequalities within the broader society as a result of the country’s recent past. In addressing issues relating to sustainable development in South Africa, government policy has been redressed to formulate a New Growth Path, which needs to be achieved against a backdrop of South Africa being a mega-biodiverse country (Cadman et al. 2010). South Africa is ranked as the third most biologically diverse country in the world, with an exceptionally large proportion of endemism, including the Maputoland, Pondoland and Albany Centres of Endemism. As such, South Africa is not only a signatory to the Convention on Biological Diversity (CBD 1992), but also the Cancun Declaration of Like-minded Megadiversity Countries (2002). In addition, three global biodiversity hotspots straddle the national borders of the country. It is also the only country that has an entire plant kingdom within its national borders – the Cape Floristic Kingdom, and the only desert identified as a biodiversity hotspot. As such South Africa has a responsibility, from an international and national perspective, to properly protect the natural environment in pursuing this New Growth Path.

This paper explores a mechanism allowing the achievement of biodiversity security in the communal areas of South Africa, in a manner that allows sustainable development by the rural population relying on these areas for their daily needs.

South African Context

According to the latest census data, 53 million people live in South Africa (Statistics South Africa, P0302 - Mid-year population estimates, 2013). Despite rapid urbanisation,

almost 40% of people still live in rural areas. These rural communities are mostly accommodated on land which is referred to as “communal land”, either being: a) state land (allocated through a government gazette notice to a specific community Traditional Authority); b) Ingonyama Trust land, established in 1997 to act as the landowner-in-law for the land held in Trust on behalf of His Majesty the Zulu King (incorporating approximately 2,8 million hectares); or c) land returned to its previous inhabitants through the Land Restitution programme (including 2.6 million hectares since 1995). For reasons relating to the past political system, rural areas under this communal land tenure (some 13–15% of total land surface) are characterised by extremely poor infrastructure, high levels of poverty and very few economic opportunities. As a result, there is a massive reliance of these people on the natural environment, resulting in South Africa’s natural resources being vulnerable to over-exploitation and misuse. Therefore, local people must be helped to plan local resource use and to manage and conserve their environment for the benefit of future generations (DRDLR 2009).

Linking Biodiversity to Human Livelihoods

Biodiversity continues to be lost at a rapid rate across the planet. The National Biodiversity Assessment 2011 (Driver et al. 2012) of South Africa points to multiple indicators of continuing decline in those components critical for rural communities to survive, including:

- a. Very low protection (only 18%) for South Africa’s critical “high water yield areas”;
- b. Wetlands being the most threatened of all South Africa’s ecosystems, with 48% of wetland types listed as critically endangered;
- c. River tributaries generally being in better condition and less threatened than main rivers, which tend to be hard working;
- d. Rates of natural habitat loss are high in many parts of South Africa;
- e. Almost 10% of the traded medicinal plants are listed as threatened;
- f. Coastal and inshore marine ecosystems are more threatened than offshore ecosystems.

With it being widely accepted that biodiversity is a critical and essential foundation of human well-being and economic activity, protecting the functioning ecosystems that provide the basic necessities of life through delivery and provision of a variety of ecosystem goods and services should be an essential component of our response to this knowledge (Cadman 2010). Natural resources, living systems and ecosystem services can be viewed as ecological infrastructure (the natural functional ecosystems that allow and form the basis of development), providing opportunities to support development and socio-economic activities and enables human communities to build sustainable livelihoods and attain an adequate quality of life.

This is most prevalent and visible in the rural areas of South Africa, where poor people depend directly on local natural resources (catchments, corridors or intact natural vegetation) for their daily existence. These people are usually the least able to afford substitutes, in the few cases where they exist. Maintaining and restoring ecological infrastructure allows

the diversification of rural livelihoods, creation of sustainable jobs, alleviation of poverty and the improvement of the quality of life of all South Africans. Responding to this requires a development path in which options for relieving pressures on biodiversity and ecosystems also provide opportunities for addressing poverty, securing essential services and addressing a range of other social improvement needs (Green Economy, UNEP, 2011).

The social and economic costs of not managing ecosystems in a sustainable manner are high. This is demonstrated through accelerated land degradation, biodiversity loss, loss of ecosystem resilience, loss of freshwater resources, increased infestations of alien plants, declines in fish stocks, reduction in water quality and quantity, and the deterioration of air quality, all of which were identified as areas of concern in the South African State of the Environment Report (DEAT 2008).

Globally there is therefore a recognition of the need to reduce the loss of natural resources resulting from unsustainable land-use practices, but at the same time manage and use these ecosystems and biodiversity in a way that caters for the development needs of growing populations (Cadman 2010). There are often direct conflict demands between these values, which are expected to worsen as a result of human-induced climate change. Therefore, development choices and land use decisions have a significant effect on the impacts on biodiversity, and therefore the resulting ability of rural communities to improve their livelihoods and quality of life.

Wildlands’ Strategy for Sustainable Development

The Wildlands Conservation Trust is a South African Non-Profit Organization, working to conserve South Africa’s biodiversity. It aims to achieve this through the development and facilitation of innovative solutions which take into account the unique biodiversity and socio-economic needs in South Africa today. Their VISION is “A Sustainable Future for All”. This Vision reflects the growing global awareness of the fragile state of our planet. The ever present threat of significant climate change is testament to this fragile state. Years of exploitation, pollution and willful destruction have degraded our planet’s life support systems. These ecosystems — oceans, rivers, wetlands, forests, grasslands, etc. — have been seriously damaged, and the ongoing increase in global population is putting further pressure on these systems. Wildlands Conservation Trust is therefore dedicated to reversing this situation, by using these ecosystems and their values as a means to stimulate a “green economy”, allowing communities to derive direct benefit from the environment and thereby ensuring its long-term conservation

The long-term preservation of South Africa’s wild lands and the conservation of its unique biodiversity therefore cannot happen in isolation. Many of the communities living in and around these areas live in poverty, and therefore rely heavily on the natural resources provided by the land for their daily requirements (water, firewood, medicinal plants). For this reason Wildlands has adopted a CEBA (Community Ecosystem Based Adaptation) model as a philosophical approach to where we work and what we do. CEBA moves beyond the more traditional concept of Ecosystem Based Adaptation (EBA), mainstreaming it into the green economy

as an adaptation tool that promotes social inclusiveness and sustainable development. The CEBA approach highlights the interconnectivity between local communities and their supporting ecosystems. Wildlands' growing footprint focuses on the ecological infrastructure supporting the delivery of ecosystem services (catchments, forests, etc.) and the communities that depend on these areas. Working at a community level, Wildlands partners with these communities to develop the tools that enable them to strengthen their ecosystems, making them more robust through activities such as the removal of waste from rivers and other natural systems, removal of alien plants, re-forestation of degraded forests, maintenance of healthy grasslands and the rivers, and the management of conservation areas as vital core areas and linkages in adaptation and mitigation corridors. Wildlands is therefore focusing on using conservation land use development as the means to encourage the improved sustainable management of the natural environment, based on the premise that responsible management of our natural assets, which are used extensively by these rural communities, is recognised world-wide as being a critical success factor for sustained economic development and the upliftment of all communities. In doing this, Wildlands has developed a four-pronged approach –

1. Developing a network of “Green-preneurs” across five of South Africa’s provinces. These are individuals marginalised from conventional economic activities due to their location (living on communal land), as well as their lack of skills and training. Wildlands enables their participation in the green economy by creating a platform for them to barter indigenous trees (tree-preneurs) and recyclable waste (waste-preneurs) for livelihood support such as food, building materials, bicycles, solar panels and rain water harvesting tanks. Through this model, community ecosystems are restored and alternative modes of transport and energy introduced into the communities.
2. Community ecosystems are rehabilitated or restored using the resulting trees grown by the tree-preneurs.
3. Training and capacity building is a focus of our green-preneur teams, providing support on basic life skills and financial management.
4. Finally, identifying areas on communal land with high biodiversity value, and engaging and supporting the community in setting this land aside for conservation purposes, using the Biodiversity Stewardship mechanism, allowing the development of viable conservation related businesses.

These initiatives are focused on reducing the impacts to the core community conservation areas, which are characterised by innovative, pro-poor green enterprise based approaches to sustainable development and the conservation of our precious biodiversity, i.e. creating and stimulating a green economy where the conservation of ecosystems and biodiversity is the foundation of a sustainable economy, where a closer alignment of environmental and economic systems is imperative.

New Approach to Biodiversity Conservation

Over the past two decades, recognition has grown that the existing protected area network alone will not be adequate to conserve a representative sample of biodiversity and maintain functioning ecosystems. Maintaining ecological processes, and the services derived from these, requires management over larger areas of land, or landscapes, and conservation efforts need to extend beyond the boundaries of the protected area system (Cadman 2010). By nature of the communal land system in South Africa, a specific community may have a significant area of land allocated to it, from which the community derives its needs and economic benefits.

A community owned protected area forms part of the community's essential social and economic fabric and not merely a disused piece of land that can be fenced off to produce jobs and money through “ecotourism”. This perceptual shift extends further than surrendering previously held views of protected areas; from an IUCN perspective it will involve expanding our horizon beyond Category II (National Parks) and recognizing that broader biodiversity objectives, as well as those of priority species, can be better met with the additional and combined use of Categories III-VI (Natural Monuments, Habitat/Species Management Areas, Protected Landscapes and Managed Resource Protected Areas). In terms of South African law, the Biodiversity Stewardship mechanism was developed with this specific intention, to broadening our perspective beyond the “nature reserve” category to utilize additional categories and management agreements to secure our wild lands.

Biodiversity Stewardship Mechanism

In response to this thinking, the South African conservation community have developed an innovative programme namely the Biodiversity Stewardship programme (DEA 2009), to address this need. Biodiversity Stewardship recognises landowners/users as custodians of their land, including the biodiversity and natural resources. It is a mechanism that promotes and supports the wise use and management of natural resources and biodiversity, and the ecosystem services they provide, through the form of voluntary legal agreements with private and communal landowners/users. In this regard, a formal protected area becomes only one of the options available to the community in generating appropriate land use options, as it also provides an array of other more flexible options for the landowner. The Biodiversity Stewardship Programme focuses on priority biodiversity areas, as identified through Systematic Conservation Planning processes, creating an enabling environment in which functional partnerships with all relevant landowners inside and outside protected areas are fostered where natural resource maintenance and management is a demonstrated goal, ensuring the sustainable management and utilisation of biodiversity resources. This innovative approach is therefore required that will enable, encourage and assist communal landowners to protect priority species and habitats. In return, the Biodiversity Stewardship concept allows the role of landowners to be recognised in conservation activities, by

providing incentives and benefits to the landowners to compensate them for possible restrictions on their land directed towards conservation as the land-use. The key principles of biodiversity stewardship include:

- Focus on priority biodiversity and protected area expansion areas to ensure the best use of limited capacity and resources, aiming for formal declarations of high biodiversity value land.
- Support South Africa's broader socio-economic objectives through the land reform process and encourage socio-economic benefits, either through job creation, or improved land management.
- Biodiversity stewardship agreements are voluntary commitments between landowners/users and conservation agencies. A relationship of trust and support should be fostered, both in entering into agreements, and going forward.
- The landowner remains owner and manager of the Biodiversity Stewardship Site.
- The monitoring and evaluation function that forms an integral part of the programme ensures continued interaction with stakeholders and their support for conservation, while ensuring the identification of problems at an early stage, enabling conservation agencies to address these effectively.
- The success of biodiversity stewardship rests on partnerships and co-operative governance between conservation agencies and various other governmental agencies, NGOs, landowners/users, companies, etc.

The hierarchy of Biodiversity Stewardship is one of the fundamental features of the programme. It allows the stewardship tool to be applicable across the landscape, and provides a mechanism for landowners to move from less

formal to more formal conservation as they feel more comfortable. The various Biodiversity Stewardship categories available are shown in Figure 1.

The detail and differences of each Biodiversity Stewardship category are shown in Table 1.

Case Studies

Against this backdrop, many areas of South Africa are very rural in natural, characterised by extensive wild areas, many of which are still in good ecological condition. It is essential for South Africa's sustainable development that these areas are maintained and protected. The following section highlight the process of implementing the Biodiversity Stewardship process in one of the provinces of South Africa, namely KwaZulu-Natal, on three different types of communal land tenure, namely land reform, Ingonyama Trust land, and state land, using three specific case studies (their location shown in Figure 2), specifically highlighting the flexible nature of the programme.

Somkhanda Game Reserve

Landscape corridors are among the most important conservation strategies in the face of global changes such as habitat fragmentation, habitat destruction, and climate change. Wildlands is working with a number of adjoining landowners, supporting the development of compatible conservation land use activities, with the vision of developing a broader conservation corridor in the landscape, allowing natural processes to maintain suitable habitats for key species to persist, whilst ensuring a sound economic model for the benefit of the actual landowners. Strategically placed

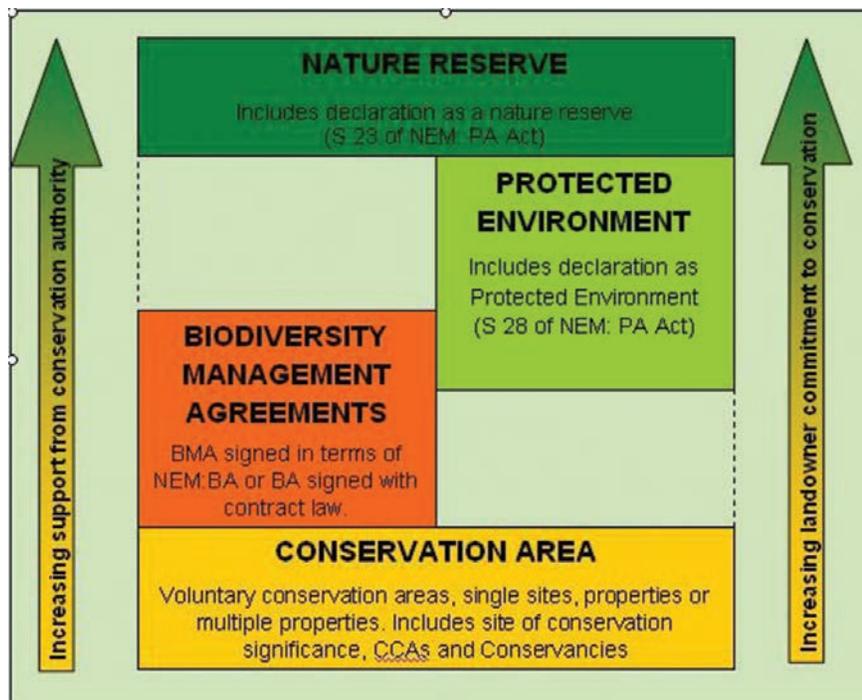
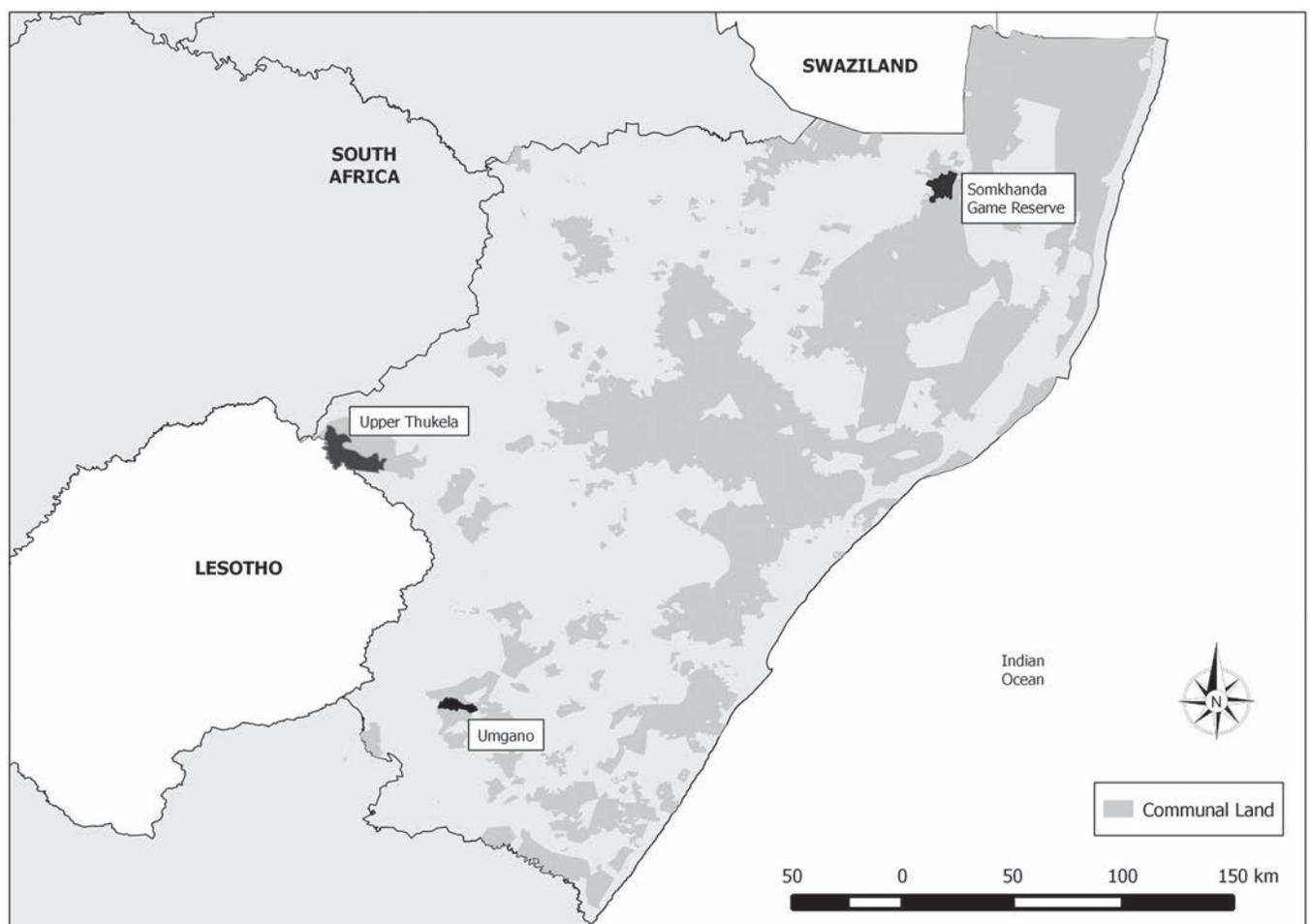


Figure 1—Hierarchy of biodiversity stewardship categories.

Table 1—Differences between the Biodiversity Stewardship categories, in relation to their relevant IUCN category.

Category	IUCN equivalent	Definition
Conservation Area	N/A	This category accommodates landowners/users who either do not want to commit to serious management changes, or who do not really have important biodiversity on their property, but who do manage their land with conservation objectives in mind
Biodiversity Agreement	Category VI	This category commits landowners/users to certain management practices on their land for a minimum of five years, while committing the conservation agency to ongoing support and monitoring for this period.
Protected Environment	Category V	Protected Environments are the most flexible but least secure type of protected area described in the NEMPAA (Act 57 of 2003). A Protected Environment is a legal mechanism for single or multiple landowners to control and direct landuse on the properties concerned, ideally secured for 30 years or longer.
Nature Reserve	Category III	The Nature Reserves category is reserved for landowners/users with high commitment and land of high biodiversity significance. It should aim for a contract and title deed restriction in perpetuity, or for 99 years, and a management plan with strong conservation objectives. The responsibility of the conservation agency to support and monitor these sites, should be significantly higher than with any of the other categories

**Figure 2**—Map of KwaZulu-Natal (South Africa) indicating the location of the 3 case study sites in relation to “communal land”.

with a conservation corridor in northern KwaZulu-Natal of South Africa is land owned by the Gumbi community. The Gumbi community are located in the northern parts of the province of KwaZulu-Natal, 50km south of the border with Swaziland. In the past the community was dispossessed of their land, which was then returned to them as a result of a series of successful land claims in 2005, through a process in South Africa referred to as the Land Restitution Programme. The entire claimed land was approximately 33,000ha, of which approximately 24,000ha has already been transferred to the community, allowing them legal rights and ownership to the land. Historically, the majority of this land was managed as commercial game and cattle ranches, with the challenge being the development of this land, in an appropriate manner to support these claimant families.

Of the 24,000ha, engagements with the Gumbi community through the Biodiversity Stewardship process has resulted in the community setting aside 11,600ha as a formally proclaimed core nature reserve, the highest and most restrictive category of Biodiversity Stewardship. This is supported by the community signing a formal legal agreement in February 2011, allowing this area to be secured in perpetuity. The balance of the land has been set aside for residential and livestock grazing for the 657 families representing the land claim.

The protected area itself has allowed an investment of more than R20 million (US\$2 million) into the establishment of Somkhanda Game Reserve as a vibrant Big 5 nature reserve. Through financial and direct investment, this support is aiding in training up reserve managers and field rangers, setting up tourism and game-related businesses, and employing more than 50 staff from the local community surrounding and owning the reserve. This will be assisted by the reintroduction of several threatened species such as African Wild Dog and Black Rhino. Further to this is the environmental education of the schools within the local community where children are exposed to their environment and learn the importance of wildlife and conservation. This will facilitate the smooth transformation from private land ownership to a communally owned and fully functional game reserve.

Despite the significant investment in Somkhanda Game Reserve by Wildlands over the past 7 years, there is a distinct realization that the protected area alone cannot provide the necessary economic support for the entire community, but does provide the basis for maintaining the ecological infrastructure of the community's land. In further support of the protected area (Somkhanda Game Reserve), Wildlands has activated its green-preneur programme into the Gumbi community surrounding the protected area. The investment into "greening" activities will reduce the burden and impacts on the boundary of the protected area, by generating and catalysing local economic development, and thereby improving the livelihoods of the people. The "Trees for Life" programme has been initiated within the past year, allowing 5 full-time community facilitators to develop a small network of 29 tree-preneurs, who grew and bartered 2512 trees worth R13730 (or approximately US\$1,300 equivalent). Although this indicates a small initial benefit to the community, these activities can only expand and further improve the livelihoods of the community.

The ultimate aim of this project is to develop a successful community land reform example, highlighting the fact that conservation land use can provide a viable alternative to other more destructive land uses which continue to degrade our ecological infrastructure and move us away from a sustainable future.

Upper Thukela Community Stewardship Site

The vision underwriting the Upper Thukela project is the integration of communal land (45,000 ha) into the uKhahlamba Drakensberg World Heritage Site, thereby formally protecting the upper catchment of the Tugela River. To achieve this, Wildlands has been working with several parastatal and NGO partners to support the two local communities, the AmaZizi and AmaNgwane communities, to establish a benchmark community Biodiversity Stewardship partnership that will effectively secure this area whilst underwriting the sustainable development of these communities.

Although in the early stages of the process, both communities are very supportive of the formal security of the upper reaches of the communal land. The biodiversity and water catchment values of the Drakensberg Mountains were recognised in the mid-1990s and formally proclaimed as a protected area and World Heritage site, known as the Maluti Drakensberg Park World Heritage Site. A portion of the Drakensberg Mountains between the Royal Natal National Park and the Cathedral Peak Section of the World Heritage Site was not included in the Water Catchment Area and/or the World Heritage Site, as it was and still is under communal land tenure, specifically under ownership of the Ingonyama Trust. The Ingonyama Trust was established in order to own land in trust on behalf of the Zulu King, King Goodwill Zwelidini. This posed a significant challenge to the Biodiversity Stewardship process in that it introduced a third party to the negotiations.

Wildlands has identified this as one of the most important CEBA projects in KwaZulu-Natal, specifically for its biodiversity value and its challenges in developing a sound business model around payment for ecosystem services and securing ecological infrastructure model. The basis of the development of this CEBA has been the negotiation of the highest category of Biodiversity Stewardship for the 45,000 ha upper reaches of the communal land, namely a formal nature reserve. A key element to this is the integration of the zonation and management of this area with the Maluti Drakensberg World Heritage Site, allowing the delineation of a "wilderness buffer boundary" by the Wilderness Action Groups, as it provided a defined geographical entity with which the Biodiversity Stewardship process could begin working.

In support of the management of the protected area, Wildlands has employed a restoration team of 35 local community members who are focusing on erosion rehabilitation, fire management, livestock management and alien plant clearing. This will provide significant benefit to the management of the protected area, and the inclusion of the area into the World Heritage Site. This inclusion will also assist

in unlocking the “payment for ecosystem services” potential of the area through the “avoided degradation” mechanism, particularly its water services and carbon storage potential. In addition, Wildlands will be activating its green-preneur model in the two communities, focusing on waste collection and more appropriate medicinal plant bartering in this grassland region.

Securing this community conservation area will achieve a dual aim of linking portions of the Maluti Drakensberg World Heritage Site (which has been identified as an international priority), and at the same time providing a business model for improving the lives of the local community through conservation and restoration management.

Umgano Project

The Umgano Project is an initiative of the Mabandla Traditional Authority, under the leadership of Chief Baleni. The project area is approximately 7,000 ha in extent, located in the province of KwaZulu-Natal, consisting entirely of State land, on lease to the community. Chief Baleni set this land aside primarily to establish and maintain a range of sustainable land-uses, to benefit the Mabandla community, making it possible for the Mabandla community to access donor and other funds, and to enter into a range of business opportunities.

The biodiversity resources of the area lie at the interface between two internationally recognised biodiversity hotspots, and are therefore of global importance. Fortunately, certain of its natural communities (including high altitude grasslands and associated wetlands, indigenous forests, Protea and cycad savannas) are of very high conservation value. The importance of these habitats is confirmed by the presence of relatively large numbers of endemic, rare and threatened bird species such as Striped Flufftail, Southern Ground Hornbill, Forest Buzzard and Cape Parrot.

Included in the overall purpose of the project are to achieve the following:

- Benefit the people of Mabandla through promotion of sustainable land uses and a flow of business and employment opportunities;
- Generate a sustained income flow for the Trust;
- Conservation of the natural environment, biodiversity, scenic beauty and cultural resources of the area, to sustain the provision of ecosystem services, such as water production, natural products and other benefits.

Due to the biodiversity value of the project area, a combination of Biodiversity Stewardship categories was contemplated and implemented for different regions of the area set aside. A grassland area of approximately 3,500 ha was secured for a 30 year period as a Biodiversity Agreement, comprising a lower level of formal security, allowing the grassland values to be secured through an economic activity not normally appropriate within a formal nature reserve, i.e. used for a sustainable commercial livestock management project. This innovative approach of combining historically conflicting economic development with conservation management is what makes Biodiversity Stewardship the most appropriate process. In addition, an area of 1,400 ha has been identified specifically as a nature reserve, focusing on natural grassland and indigenous forest management. This is supported by a

team of 6 field rangers and biodiversity monitors, and 13 community members being trained as conservation custodians.

Wildlands has identified the need to support these conservation activities with a network of green-preneurs, focusing on the propagation of appropriate indigenous forest trees, medicinal plants and threatened cycad species. This will assist not only as an economic driver in the community, but will support the maintenance and rehabilitation of the indigenous forests and grasslands, the ecological infrastructure base for the Mabandla community.

Lessons Learnt From the Process _____

In developing sustainable development options for communities on communal areas in South Africa, the key message is that we cannot only confine our conservation efforts to the core protected areas in the landscape, as we need to extend our work into the surrounding production landscape, those areas between protected areas utilized by people, focusing on supporting people to mainstream biodiversity conservation into their daily land use practices. This again fully supports Wildlands’ vision of developing new community conservation areas (protected areas to secure biodiversity), but then focusing on improving communities livelihoods in and around these protected areas through our green-preneur and sustainable livelihoods activities. The Biodiversity Stewardship mechanism has been recognised as a very useful and flexible approach to achieve this combination of economic development and biodiversity conservation, and works in a range of different land use and ownership tenure models.

In summary, a number of lessons can be taken from these case studies in highlighting the value of the Biodiversity Stewardship approach -

- It is a mechanism that is relevant and can be utilized on all forms of communal land.
- The establishment of a core protected area is critical to achieving protected area targets and secure basic ecological infrastructure required for community livelihoods and daily needs, which is achieved through the highest Biodiversity Stewardship category.
- It is imperative that these protected areas be supported by broader land use planning in the broader communal land surrounding the protected area, in order to reduce impacts by reducing the needs from the protected area.
- This allows a focus on investing into restoring ecosystems (ecological infrastructure) as the building blocks for a green economy, and thereby the development of financial and job creation mechanisms to protect this infrastructure.
- This can be achieved through the implementation of community-relevant and community-sensitive greening activities.
- This ensures that livelihoods are improved, and communities thereby support the continued maintenance and management of these protected areas.
- This landscape approach to communal land management will have positive benefits for the community, local biodiversity and broader climate change adaptation and resilience.

The main driver of protected area management success is “socio-economic” factors, which correlates with our thinking

of dealing with improving livelihoods as a means to secure a conservation footprint in communal areas. Due to the fact that biodiversity directly contributes to local livelihoods and economic development, we need to do better at proving that conserving biodiversity is not a sacrifice, but an opportunity that brings many benefits. The value of nature is irreplaceable and essential to human well-being.

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Camdeboo-Mountain Zebra National Park Corridor: Opportunities for Conservation and Socio-Economic Development

Matthew Norval

Abstract—The Wilderness Foundation, in partnership with South African National Parks has initiated a two year project in the Karoo; The Mountain Zebra-Camdeboo Corridor Project. Through either voluntary Contractual National Park or Protected Environment agreements, the project aims to work with, rather than displace, current conservation-compatible land-use practices such as eco-tourism, livestock grazing and other sustainable resource use. Less formal conservation options, such as biodiversity agreements, will also be offered to landowners. These agreements provide benefits to landowners in terms of protecting the environment as well as contributing towards the conservation of threatened wildlife species. Protection contributes to safeguarding the recently-identified Sneeuberg Centre of Endemism, part of the Amathole-Sneeuberg Montane Belt. The project will stimulate conservation-friendly economic development in the region while protecting it from inappropriate development. It is envisaged that the outcome of the project will be a mosaic of properties, including both SANParks-managed and privately-owned land.

Introduction

The idea of a corridor between the Camdeboo and Mountain Zebra National Parks was first officially proposed in 2003 and more recently South African National Parks (SANParks) identified an opportunity to consolidate and expand the protected area estate in an area stretching from Mountain Zebra National Park (MZNP) to Camdeboo National Park by means of voluntary contractual agreements with private landowners. The project footprint includes one of the top three identified priorities for large formal protected areas within the grassland biome.

Matthew Norval, Director Conservation Programme, Wilderness Foundation South Africa; Email: matthew@sa.wild.org

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The Mountain Zebra National Park Complex is an identified Critical Ecosystem Partnership Fund (CEPF) priority with the prioritization based on the presence of a range of Red Listed Species (especially the larger charismatic threatened mammals), the potential importance as a climate change adaptation corridor, and to a lesser extent for the delivery of ecosystem goods and services. The area forms a large part of a corridor known as the Amathole-Sneeuberg Montane Belt, and now also contains the recently identified Sneeuberg Centre of Endemism.

The project aims to capitalise on the opportunities created through the emergence of a significant private conservation land holding in the area with land use compatible for formal inclusion as contractual national parks. If this opportunity is not pursued immediately there is a danger that the consolidation of this complex will not be possible in the future due to fragmentation of land parcels and irreversible impacts from incompatible land use.

The first phase of the project is being implemented through a partnership between Wilderness Foundation, a Non-Government Conservation Organisation, and South African National Parks and is being implemented over a two-year period that commenced in March 2012 and concludes in February 2014.

The aim of the project is to create a conservation corridor through either Contractual National Park or Protected Environment agreements with private landowners, and through doing so stimulate conservation-friendly economic development in the region and protect it from inappropriate development. Both these are categories of formal protected area which represent significant benefits in terms of protection by national legislation and provide long term security of conservation tenure (e.g. National Park status completely protects areas from prospecting and mining, while Protected Environment status provides significant protection). The Contractual National Park category is most suitable for larger conservation and ecotourism operations, while the Protected Environment category is focused on ensuring the effective management of landscapes (especially rangeland and sustainable resource use areas). In addition, the project will offer less formal conservation options to landowners (e.g. biodiversity agreements). The project will not be looking at purchasing land but rather aims to voluntarily include privately owned and managed land as part of the corridor.

The project will work with, rather than displace, current conservation-compatible land-use practices such as appropriately managed rangeland, eco-tourism and sustainable resource use areas (such as hunting). The expected outcome of the project is an enlarged and consolidated corridor of for-

mally protected areas made up of a matrix of both privately and SANParks managed land that addresses various conservation objectives, e.g., reducing the threat from natural gas prospecting; encouraging conservation compatible range management; improving the protection of endangered species; and stimulating a sustainable agriculture, eco-tourism and conservation driven economy.

The objective of the corridor is: To maintain the current landscape in terms of its scenic, biodiversity and landscape values through collective action by the private landowners and to protect the area from detrimental developments.

Conservation Corridors Defined

Biodiversity conservation corridors are strategically located regions that link key habitats for plants and animals, including protected areas. Typically they can be broad landscapes that cover a range of land uses, including agriculture, human settlements, and in certain cases even industrial activities (Lane 2008).

Broadly speaking, corridors connect fragmented habitats and protected areas and play a number of roles that can include: conserving threatened species; protecting territory needed by wide ranging species; sustaining natural processes, like water cycles and pollination; and developing solutions that protect nature while supporting human well-being (Lane, 2008).

The corridor concept has a number of advantages. Most threats to critical habitats actually originate far from the sites and well outside of the control of park managers and conservationists, like decisions made by national and provincial governments or the pressures of changing market demands. Conservation corridors, however, can help foster and encourage collaboration among stakeholders at all scales. Planning a corridor is essentially creating a sustainable landscape that's optimized for both human and nonhuman inhabitants over the long term (Lane 2008).

Challenges and the Project Approach

Successful corridor planning must involve a thorough understanding of local and regional communities and their economic needs. This then needs to be followed by a strategy for addressing those needs while achieving the biodiversity goals set for the corridor.

Conservation strategies at the landscape scale inevitably revolve around the question of development versus conservation and this is very much the case in the Karoo. Challenges include generating information on tradeoffs and costs, and also finding the synergies that exist between the economic tools and options including more productive agricultural practices and ecotourism—to support development while lowering the costs of conservation to the government and local people



Figure 1—Map indicating the Corridor planning domain in relation to the two anchor national parks.



Figure 2—The Mountain Zebra Camdeboo Corridor is characterised by typical Arid Karoo landscapes. Photo credit: Chris Marais / Wilderness Foundation.

The project will focus on a planning domain (project footprint) of 530,000 ha. Existing privately owned, but not formally protected conservation areas cover 97,000 ha within the corridor, and includes well established privately owned nature reserves.

The Camdeboo-Mountain Zebra Corridor has significant biodiversity value and meets the criteria of the National Environmental Management: Protected Areas Act (No.57 of 2003) for the declaration as a Protected Environment (to be known as the Mountain Zebra Camdeboo Protected Environment: MZCPE).

The purpose of the MZCPE is captured in the motivation for its proclamation.

- Enable owners of land to take collective action to conserve biodiversity on their land and to seek legal recognition therefore
- Protect the area if the area is sensitive to development due to its – biological diversity; natural characteristics; scientific, cultural, historical, archaeological or geological value; scenic and landscape value; or provision of environmental goods and services
- To maintain the current landscape of the area which has, through the current management, maintained its biodiversity value

The medium term objective was to contract 30,000 ha into the corridor as Contractual National Park or Protected Environments both of which are categories of formal protected area which represent significant benefits in terms of protection by national legislation and long-term security of conservation tenure. The 30,000 ha already represents 10% of the Maputaland-Pondoland-Albany Hotspot conservation areas expansion target, and in planning the potential was identified to consolidate up to 100,000 ha or a third of the overall target for the hotspot. A number of private landowners have already expressed interest in contractual consolidation. The medium to long-term outcome would be an enlarged

protected area made up of a matrix of both privately and SANParks managed land that addresses the conservation challenges of the region.

Some risks do exist mostly related to landowner willingness but the project team believes that this can be overcome as a result of clear planning and implementation. This view is based on some successful initial work already undertaken in the area.

A dedicated project manager has been appointed and is based in Camdeboo National Park and in Graaff-Reinet and they are responsible for the day to day management of the project and coordinating the implementation of the work plan. Strategic support, work plan development and oversight are carried out by experienced staff from both SANParks and the Wilderness Foundation. This is achieved by setting up a joint steering structure as well as by providing on the ground support as required. The Project Manager will be able to operate independently as well as in close cooperation with the park managers of both national parks involved.

Initially the project collated existing planning documents and data as well as specific information on private landowners and land uses in the area. This project was used by the broader management team to develop an operational plan that includes entering into negotiations with these landowners in order to secure long term contractual national park partnerships and/or the establishment of protected environments.

The expected outcome of the project is an enlarged, consolidated corridor of formally protected areas made up of a matrix of both privately and SANParks managed land that addresses the conservation challenges detailed earlier. In addition to protecting the recently identified Sneeuwberg Centre of Plant Endemism, the area has the potential to play a key role in permanently safeguarding the threatened Cape Mountain Zebra and Black Wildebeest, as well as playing a significant role in Black Rhino and Cheetah conservation.



Figure 3—Extensive livestock farming with sheep and cattle is the predominant agricultural practice within the planning domain. Photo credit: Chris Marais / Wilderness Foundation.

This project is also complimentary to and supportive of the outcomes of another project being implemented by the Wilderness Foundation that is working with national, provincial and private protected area managers to promote management effectiveness within reserves in this region.

The Planning Domain: Landscape, Natural Features and Biological Environment

The planning domain stretches from Cradock in the east to Graaff-Reinet in the west. The area is bounded in the north by the main Graaff-Reinet/Cradock Road (R61) and then runs along the N9 for 20km before following secondary roads westwards for approximately 25km and then due south to the N9. The planning domain is then generally bounded on the south and southwest by the N9 and R75, except around Graaff-Reinet, where the town is excluded from the planning domain. The domain boundary then runs north of the R63, before following the R337 to Cradock. The total area encompassed by this planning domain covers some 523,000 ha.

Climate

The climate is best described as cool and arid. Mean monthly minimum and maximum temperatures vary from 6-28°C in summer (September to March) and from 0-20°C in winter (April to August) (Brown and Bezuidenhout, 2000). Rainfall averages about 400 mm, with most (70%) falling in the summer months. Average annual rainfall for the period 1963 - 1996 was 382.6 mm with a distinct summer season peak between October and March (74 %). February had the highest rainfall with 56.7 mm while June had the lowest with 11.5 mm. Periodic light snow occurs during the winter months. Frost is common between May and October.

Topography and Terrain Morphology

The mountainous terrain of the MZNP is part of the south quarter of the Karoo Mountain Veld Complex which forms part of the Great Escarpment separating the Great Karoo and Upper Karoo (van der Walt, 1980). The planning area is dominated by the Sneeuberge (running north-south in the central portion of the area) and the Tandjiesberge (running east-west through the centre of the planning domain). Low altitude plains of the Great Karoo (at approximately 850m asl.) are found in the southeast, while the higher altitude (approximately 1,200m asl.) plains of the North Karoo extend into the planning domain in the northwest.

Hydrology and Aquatic Systems

The Sundays River (and its ephemeral tributary, the Voël River) drain the southern and western slopes, while the headwaters of the Great Fish River drain the eastern and northern slopes). The proposed planning domain for the MZNP would be an important area for the conservation of the water catchments for the Great Fish River which drains the basins to the north of the Tandjiesberg (Holness et al 2003)

Vegetation

The protected environment is located in a transitional area between four biomes: Grassland, Nama Karoo, Thicket and Savanna. According Low and Rebelo (1996) six major vegetation types are present in the area:

- South Eastern Mountain Grassland covers 36% of the planning domain, predominantly within the central mountainous region. These areas are sweet to mixed grasslands with *Merxmüllera disticha*, *Melica decumbens*, *Karoochloa purpurea* grasses and shrubs such as



Figure 4—The conservation of the plant diversity of the Karoo is an important motivation for the establishment of the corridor. (*Aloe ferox* pictured here). Photo credit: Chris Marais / Wilderness Foundation

Euryops annuus, *Sutera macrosiphon* and *Elytropappus rhinocerotis*. In places, owing to overgrazing, Karoid elements appear to have moved into the plant community.

- Eastern Mixed Nama Karoo covers the northern plains (32% of the domain). The Eastern Mixed Nama Karoo is a mix of grass and shrub dominated vegetation types that are subject to dynamic changes in species composition depending upon rainfall and probably fire. It remains the only Karoo vegetation type shaped by fire. Shrubs such as *Pentzia incana*, *Eriocephalus ericoides* and *E. spinescens* dominate, while grasses such as *Aristida* spp. *Eragrostis* spp. and *Themeda triandra* are common. The river valleys generally have dense stands of *Acacia* karroo.
- Valley Thicket (16% of the planning domain) occurs on the southern slopes of the Tandjiesberge. *Olea europea* subsp *africana*, *Ziziphus mucronata*, *Scutia myrtina* and *Rhus pallens* are common. Succulents are rare.
- The southern plains are covered by Central Lower Karoo (13% of the planning domain). Typical shrubs, succulents and grasses include *Euclea undulata*, *Tylecodon paniculatus*, *Rhus undulata* and *Eriocephalus ericoides*.
- Spekboom Succulent Thicket (3% of the planning domain) occurs at the transition between Valley Thicket and Central Lower Karoo vegetation types. The Spekboom *Portulacaria afra* dominates, with other shrubs such as *Carissa haematocarpa*, *Maytenus polycantha* and *Grewia robusta* being present.
- Small areas (1% of the domain) of Sub-Arid Bushveld savanna biome elements are found along the Southwest border of the domain.

The combination of different vegetation types is important from the point of view of preserving biodiversity, as well as from an aesthetic viewpoint. The area is one of transition between biomes allowing for an interesting mix of flora and fauna, as well as preserving important ecological and

landscape processes. The warm north-facing slopes with a wide diversity of habitats ranging from mountaintops to valley bottoms have the potential to provide suitable habitat ideal to cater for the seasonal requirements of the large herbivores (Novellie 1988). In addition the north aspect provides for productive land capable of supporting relatively high densities of game, with greater proportions of the more productive Karoo veld types allowing the carrying of large herbivores. Herbivore densities within the rocky grassland areas are likely to be low.

Importantly, all of the major vegetation types in the potential corridor are currently very poorly conserved elsewhere in South Africa and the corridor will play a critical role in the long-term preservation of biodiversity.



Figure 5—Mountain Zebra in their stronghold in the Mountain Zebra National Park, in the east of the corridor. Photo credit: Chris Marais / Wilderness Foundation.

Fauna

Mountain Zebra National Park was initially proclaimed in 1937 to preserve the rapidly declining Cape mountain zebra population that had been reduced to about 100 animals (Novellie, Lloyd and Joubert 1992). From 11 animals in 1950, the mountain zebra population in MZNP grew to 200 in 1981, after which the population has been maintained at this level through removals until recent expansion allowed the population to increase. The population now stands at over 300 animals and is an important source of genetically uncontaminated zebra from which to stock other conservation areas within the historical range of the species.

However, the habitats and vegetation communities within the park support a variety of other fauna and the conservation of biodiversity is also a priority. There are 7 mammal species in the proposed corridor that are currently or have previously been listed as red list species. These are:

- White-tailed mouse (*Mystromys albicaudatis*);
- Sclater's golden mole (*Chlorotalpa sclateri*);
- Black-footed cat (*Felis nigripes*);
- Aardwolf (*Proteles cristata*);
- Honey badger (*Mellivora capensis*);
- African wild cat (*Felis silvestris*); and
- Aardvark (*Orycteropus afer*).

The existing MZNP currently supports 15 species of large mammal of which black rhino, eland, red hartebeest, black wildebeest, blesbok, springbok, and Cape buffalo have been successfully reintroduced.

The consolidation of the corridor has the potential to hold some of largest populations of grassland herbivores, namely blesbok and black wildebeest, and in this regard would be an important national park. Furthermore, if and when appropriate, the introduction of large predators, such as lion, cheetah, and wild dog could be considered and would be a considerable draw card.

The corridor will also become an important refuge for resident large raptor species such as the *Martial Polemaetus bellicosus*, and Black Eagle *Aquila verreauxii*, as well as the Red Data Book Cape Vulture *Gyps coprotheres*. Following IUCN criteria the Camdeboo National Park is of global ornithological importance (Barnes, 1998). The globally threatened Lesser Kestrel is seasonally present in numbers from 500-3000. 20-50 breeding pairs of the globally threatened Blue Crane are also present. Nationally threatened bird species include the Tawny Eagle, Martial Eagle, Kori Bustard, Ludwig's Bustard and Stanley's Bustard; all of which are thought to breed in the reserve. Other near threatened species includes the Blue Korhaan, Secretary Bird and Ground Woodpecker. In addition to these species, a number of restricted range and biome restricted species are present, including the Karoo Korhaan, Sicklewinged Chat, Karoo Chat, Layard's Titbabbler, Namaqua Warbler and Blackheaded Canary.

Of the bird species that have been confirmed to occur in the corridor seven are listed as vulnerable and eight are listed as near threatened. The vulnerable species are:

- Tawny eagle (*Aquila rapax*);
- Martial eagle (*Polemaetus bellicosus*);
- African marsh harrier (*Circus ranivorus*);
- Lesser kestrel (*Falco naumanni*);
- Blue crane (*Anthropoides paradiseus*);
- Kori bustard (*Ardeotis kori*); and
- Ludwig's bustard (*Neotis luwigi*).

The Near Threatened species are:

- Black stork (*Ciconia nigra*);
- Greater flamingo (*Phoenicopterus ruber*);
- Lesser flamingo (*Phoeniconaias minor*);
- Secretary bird (*Sagittarius serpentanus*);
- Black harrier (*Circus maurus*);
- Peregrine falcon (*Falco peregrinus*);
- Lanner falcon (*Falco biarmicus*); and
- Blackbellied korhaan (*Eupodotis caerulescens*).



Figure 6—Agriculture, conservation and tourism are important drivers of the Karoo economy. Photo credit: Chris Marais / Wilderness Foundation.

There is good herpetofaunal representation with 45 recorded reptiles, with the potential to encounter an additional 12 species, while the amphibians are relatively well represented with 12 species. The reptiles include 13 regional endemics and one extremely local endemic.

Potential Land Use and the State of Transformation

Soil characteristics and topography within the planning domain play a fundamental role in determining potential land use, with much of the area being covered by soils unsuitable for arable agriculture or grazing. Forty nine percent of the planning domain is unsuitable for use other than conservation, water catchments or recreation. A further 29% is unsuitable for arable agriculture, but may be used for grazing when conditions permit. This suggests that much of the planning area could be converted to conservation use, without a significant opportunity cost in terms of either arable agricultural land or good grazing being lost. Further, the poor agricultural potential of the land suggests that the cost of acquiring land will be relatively low, or alternatively that the attractiveness for landowners of incorporation under a contractual basis within the extended park will be high (Holness et al 2003).

The planning domain is relatively untransformed at present. Holness et al (2003) suggest that only 5.1% (26733ha) of the planning domain has been transformed by ploughing, urbanization, erosion, or long term degradation by overgrazing. Further, almost all the land transformation has occurred along the periphery of the planning domain. Important areas of land degradation are the southern Great Karoo Plains, the area around Graaff-Reinet, and the farms (especially De Rust and Doornhoek) that were recently incorporated into the MZNP. Within the core area of the planning domain

only 1.2% of the land has been degraded. This may be an underestimate of the actual levels of transformation within the study area, as overgrazing of grassland areas is suggested to have allowed the invasion of karroid shrubs.

Creating Development Options: Partnerships and the Long-Term View

The two national parks are important components of the corridor as they provide the institutional support, experience and long term commitment that will give the corridor the sustainability required. Both park managers are involved in the implementation of the corridor project and this was done deliberately to demonstrate commitment and to encourage the building of relationships between landowners and SANParks staff.

While the Mountain Zebra National Park was initially proclaimed in 1937 for the sole purpose of protecting a remnant population of the Cape Mountain zebra *Equus zebra zebra*. The importance of the park has now grown beyond a "species park" focus on the mountain zebra, to an important site for the vegetation type typical of this north-eastern area of the Karoo (Novellie, Lloyd and Joubert 1992). The park has expanded over the years and is now 28,000 ha and with the increased value being placed in tourism, the park is now seen to form an important nucleus for tourism to this part of the Karoo.

Similarly the Camdeboo National Park was established in 1979 (as the Karoo Nature Reserve) and it protects a variety of Karoo fauna and flora. It includes the scenic Valley of Desolation and Spandaukop. The park is currently 19,102 ha in size and surrounds the historic town of Graaff-Reinet and includes the Vanryneveldspas Dam.



Figure 7—Establishment of the corridor aims to conserve biodiversity as well as important heritage and cultural features of the Karoo. Photo credit: Chris Marais / Wilderness Foundation.

Given the stated tourist needs and the costs of transport and infrastructure, it is desirable that SANParks makes its greatest investments in tourism into those parks that have the capacity to maintain a high diversity of large mammals and are situated relatively close to areas of high human population density (for the domestic tourist) or close to international centres or attractions (for overseas tourists). A varied and attractive landscape, capable of supporting a high diversity or high density of animals, including rare or threatened species, in a malaria-free zone is also necessary. In this regard the MZNP (as a key feature of the corridor) has the potential to fulfil the criteria in being able to provide a unique South African experience in the form of the Karoo, with good game viewing in a topographically diverse landscape, free of malaria, close to the N10 national road about three hours drive from Port Elizabeth on the main road to Bloemfontein, and on the N9 National Road between Gauteng and the Garden Route.

Apart from the range of attractions found on private land and those yet to be developed the consolidated conservation corridor would be able to offer a number of unique attractions:

- ◇ Some the best Karoo scenery available, including the Valley of Desolation and Spandaukop.
- ◇ A Globally Important Bird location, offering a good opportunity of seeing a variety of Karoo endemics and raptors, as a draw card for birders.
- ◇ A base for cultural tourists, located around historic Graaff-Reinet and near to the internationally known "Owl House" of Nieu Bethesda.
- ◇ The largest concentrations of grassland herbivores in South Africa.

Further, the expansion proposed motivated for here will hopefully stimulate conservation-friendly economic activity in this otherwise depressed part of South Africa, in a way similar to that experienced around the Greater Addo Elephant National Park project and other conservation and development initiatives. While the corridor may contribute to increasing the potential for the further development of nature based tourism it also aims to not only maintain the current landscape, but in time promote better management of the land in the future.

A fundamental principal of the protected environment (as a key component of establishing the corridor) is that it integrates conservation with livestock production, arable agriculture, hunting and ecotourism.

The focus on biodiversity conservation efforts will be to:

- ◇ Protect the landscape and its scenic characteristics
- ◇ Secure key biodiversity features and ecological functioning within the corridor
- ◇ Promote conservation minded farming

As one of the outcomes of the project is to promote appropriate development, a regional conservation and ecotourism forum is being established which will play a role in establishing opportunities linked to the corridor. Importantly, it is envisaged to remain in place after the project to continue to pursue conservation related development options. The purpose of the forum is primarily to identify and develop opportunities for ecotourism and conservation within the corridor. In addition it will act as a forum for role-players

to discuss areas of common interest related to conservation, agricultural and tourism issues. In time, it is hoped that it will also act as a conduit for encouraging the sharing of scientific information and on-the-ground expertise to promote effective co-operation between those involved in conservation management, agriculture and tourism in the area. It will also promote the awareness, understanding, appreciation and active conservation of the special qualities, status and natural processes of the area

The Forum's sphere of activity includes a wide range of environmental issues including wildlife and habitats; landscape; heritage and archaeology; natural resources including air, water and soils; agriculture and land management; public access and recreation; and environmental awareness and education.

Conclusion

The Camdeboo-Mountain Zebra Corridor Project is taking a holistic approach to the conservation and development challenges of the Karoo. The corridor provides opportunities for private landowners and SANParks to cooperate to create the envisioned matrix of land uses that promotes conservation, facilitates economic opportunities and focuses on development options that will not limit those of future generations.

The Camdeboo-Mountain Zebra Corridor Is deserving of formal protection status for many reason, any one of which would be sufficient for such status:

- ◇ The MZCPE falls within the Sneeuberg centre of endemism
- ◇ The protected environment houses a diverse assemblage of plants and animals
- ◇ The area is a transitional area between four biomes and includes six major vegetation types poorly conserved elsewhere in South Africa
- ◇ Includes a Globally Important Bird Area
- ◇ It is an important area for conservation of the water catchments for the Great Fish River which drains the basins to the north of the Tandjiesberge
- ◇ It is an area with unique and valuable scenic and landscape characteristics

In years to come it is unlikely that our children's children will wish that we had hydrofracked more in the Karoo but it is very likely that they will wish that we had set aside more land for conservation and created more corridors. We look forward to doing just that in partnership with conservation agencies, landowners and local communities.

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Conservation Easements in the Adirondack Park of New York State

Chad P. Dawson, Steven Bick, Peter D’Luhosch, Matthew Nowak, and Diane Kuehn

Abstract—The use of conservation easements to keep private lands undeveloped and protect open space and large scale landscapes has grown rapidly. The New York State Adirondack Park includes 2.5 million acres (1 million ha) of state owned land and 3 million acres (1.2 million ha) of private lands; over 781,000 acres (316,194 ha) of these private lands were under publicly held conservation easement by 2012. Private landowners include commercial forest and agricultural owners, second homeowners, residential landowners, conservation organizations, educational institutions, and others. The conservation easements convey property rights from the landowner to the state in perpetuity. The specifics of each conservation easement are individual and varied, with the main purposes being to protect natural resource and landscape values such as open space, scenic areas, wetlands, riparian areas, critical ecosystems, water quality, wildlife and fisheries habitats, and other purposes.

Introduction

The Adirondack Park, established in 1892, contains both state-owned Forest Preserve and private lands. As New York State sought to add more public lands within the Adirondack Park, it attempted to acquire most if not all the rights associated with each private land parcel purchased. Political and economic realities have made less than fee-simple transactions like conservation easements more practical (Merenlender et al. 2004). Nationally, the use of conservation easements dates back to the 1890s, but it wasn't until some key governmental policies regarding common-law and the open market were established in the 1980s that easements received widespread use as a preservation strategy (Fairfax et al. 2005).

Chad P. Dawson is a Professor Emeritus, State University of New York, College of Environmental Science and Forestry, Syracuse, NY, 13210 U.S.A.; e-mail: cpdawson@esf.edu. Steven Bick is a consulting forester, Northeast Forests LLC, Thendara, NY, U.S.A. Peter D’Luhosch is a Conservation Easement Specialist, New York State Department of Environmental Conservation, Division of Lands and Forests, Potsdam, NY, U.S.A. Matthew Nowak is a Forestry Technician, New York State Department of Environmental Conservation, Division of Lands and Forests, Potsdam, NY, U.S.A. Diane Kuehn is an Associate Professor, State University of New York, College of Environmental Science and Forestry, Syracuse, NY, U.S.A.

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Conservation easements, using the classic “bundle of sticks” analogy (i.e., each landowner right is part of the bundle), transfer selected property rights from the landowner to another party (Harris 1953). Conservation easements have been increasingly used to keep private lands undeveloped and protect open space and large-scale landscapes in New York’s Adirondack Park. Conservation easements are permanent legal agreements purchased by New York State or donated by the landowner that are recorded with the property deed and are binding on future landowners (Wright 1993). Conservation easement agreements convey property rights from the landowner to the state in perpetuity and the specifics of that agreement are individual and vary in purpose. The use of conservation easements in the Adirondack Park has been in practice for over two decades and while many claim these easements to be a beneficial conservation approach, it is not without serious controversy and debate (Porter et al. 2009). Proponents point to protection of natural resource and landscape values such as open space, scenic areas, wetlands, riparian areas, critical ecosystems, water quality, wildlife and fisheries habitats, and other purposes. Those opposed to or concerned about the use of conservation easements point to such issues as the lack of the capacity of state agencies to manage additional lands, potential restrictions on forest harvesting practices, potential reduced local land tax revenues, or concern for additional recreation impacts on public lands that adjoin conservation easement access points.

By 2012, the Adirondack Park included 2.5 million acres (1 million ha) of state-owned land and 3 million acres (1.2 million ha) of private lands; over 781,000 acres (316,194 ha) of these private lands are under publicly held conservation easement (Weaver 2013, personal communication). Private landowners include commercial forest and agricultural owners, second homeowners, residential landowners, conservation organizations, educational institutions, and others. Landowners enter into these conservation easement agreements for a variety of reasons (such as property tax benefits) and maintain continued private ownership and traditional uses, such as agriculture and forestry, as long as the conservation goals of the agreement are met. Many of the forestlands are under sustainable forestry management plans certified by third party organizations (e.g., Sustainable Forestry Initiative). The state takes on the responsibility of maintaining the terms of the agreement (such as planning and managing for public or recreation access where allowed) and other rights granted under the agreement. The terms and conditions of each agreement are unique depending on the purposes for entering into the agreement; however, there are some common components that have merged to

meet multiple objectives of both parties (e.g., conserving open space and unique habitats) in the Adirondack Park and the northern forest area of New York State (Figure 1).

Conservation Easement Grantor Motivations

The acquisition of conservation easements, rather than fee simple purchase or allowing subdivision and development, has been identified in many cases as a favorable alternative for conserving forestland in the Adirondack Park (Hubacek et al. 2002). Harris et al. (2012) reviewed the perception of property rights within the Adirondack Park and speculates that as a result of the multiple stakeholders influencing conservation easement acquisition, easements now represent community values rather than just a civil liberty in property rights ownership. Existing academic literature on the subject of granting conservation easements consists of conceptual works and a growing number of empirical case studies. Each case represents a specific locale and land-use scenario that contributes to the mosaic of knowledge concerning landowners' motivations for encumbering their land (Brenner et al. 2013).

Koontz (2001) speculates that existing literature addressing landowner motivations to grant a conservation easement may overly generalize behavior. A review of this literature yields results that often contradict one another, represented by a collection of individual cases that inform specific locations and land uses. Study results have identified both financial and non-financial factors as the primary influences on landowners who grant a conservation easement. Koontz (2001) studied financial versus non-financial landowner motivations, determining that 80% of land use decisions were motivated by non-monetary rather than financial considerations. Anderson and King (2004) utilized a laboratory to study motivations, contrarily finding participants conserved their lands at the point of greatest financial incentive. LeVert et al. (2009) supported the notion that granting a conservation easement is primarily an economic decision; however, he reported education and environmental ethics as secondary influences. Financial benefits associated with granting a conservation easement include revenue from the sale of the easement and potential for reduced income, estate, and/or property taxes (Bick and Haney 2001).

Kabii and Horwitz (2006) summarized existing research concerning landowner motivations for granting easements in a conceptual model. They identified private property rights and nature conservation equity as negatively related to granting conservation easements, and nature conservation ethic and confidence in permanent covenant mechanisms as positively related to granting an easement. They also identified economic dependence on property and personal financial conditions as an influence on a landowner decision to grant an easement or not. A list of other factors which have been studied includes:

- length of property ownership (positive relationship) and distance of the conservation easement land from the property on which owners live (negative relationship) (Rickenbach and Kittredge 2009);
- attachment to land (negative relationship) (Farmer et al. 2011; Gruver 2010; Keske et al. 2011);

- desire to control land use down the road (positive relationship) (Gruver 2010; Miller et al. 2011);
- desire to conserve open space and wildlife habitat (positive relationship) (Miller et al. 2011);
- size of property (positive relationship) (Koontz 2001);
- whether a term or perpetual easement is more likely to be granted (term is more likely);
- importance of conservation within the community (positive relationship); and
- inclusion of public access terms within the easement (negative relationship) (McGaffin and Graham 2009).

The demographic characteristics of landowners have also been studied, but often yield inconsistent statistical results:

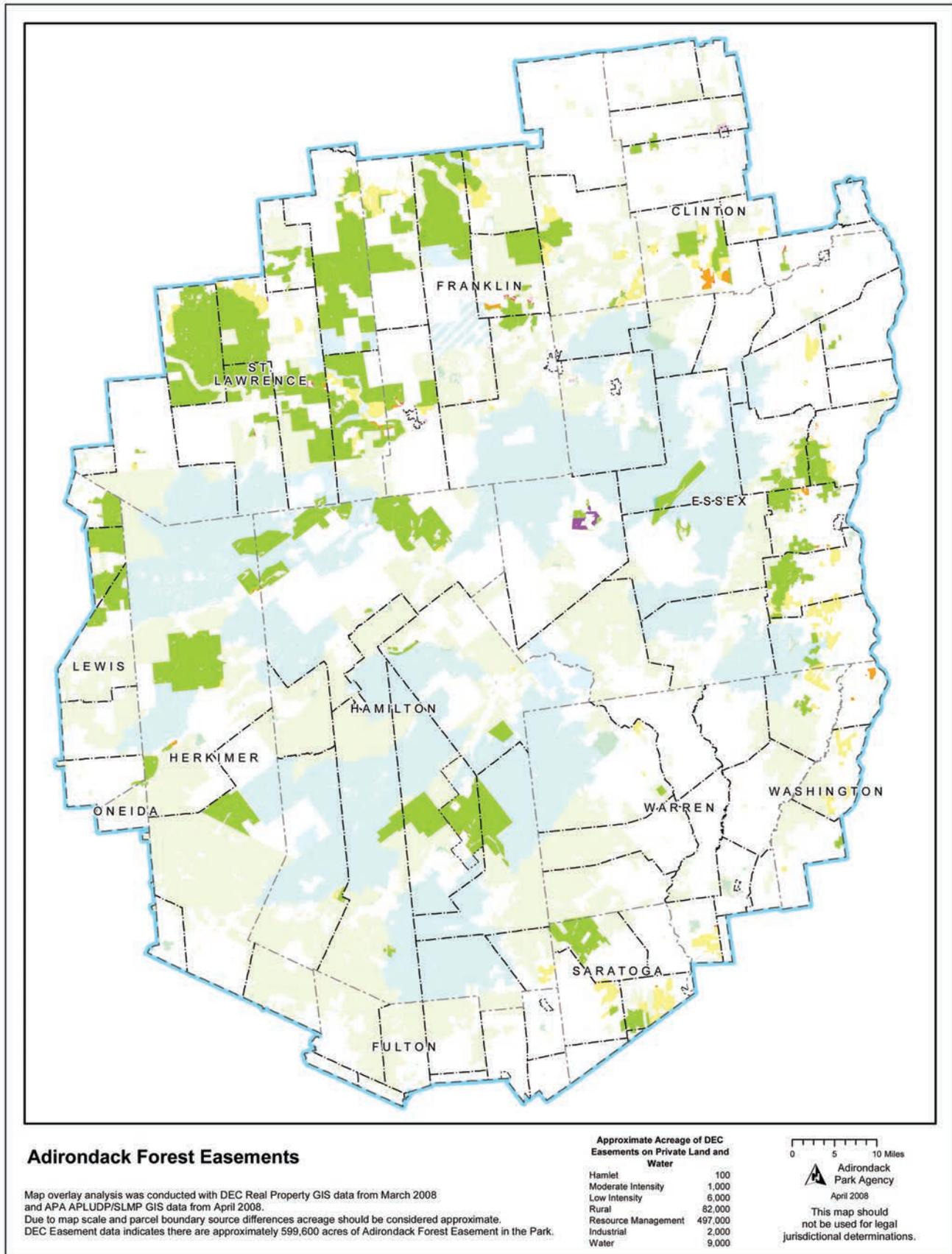
- landowner income (positive relationship),
- education level (positive relationship),
- age (positive relationship) (Farmer et al. 2011; Keske et al. 2011); and
- gender (males more likely) (Kabii and Horwitz 2006).

Notably missing from published literature are studies that address institutional landowners, such as Real Estate Investment Trusts (REITs), Timber Investment Management Organizations (TIMOs), and timber management companies. These landowners own and manage the majority of acreage encumbered by conservation easements in the Adirondack Park, and own land primarily as an investment, something which is not always true of family forestland owners. Additionally, conservation easement grantor satisfaction is a topic worth studying in the Adirondack Park, as well as an analysis of the inclusion of specific terms in easement deeds and subsequent landowner satisfaction.

Conservation Easement Grantors in the Adirondack Park

Bick (1996) studied northern New York forestland owners and identified the primary reasons for granting conservation easements to be the prevention of development, tax considerations, financial benefits, and the protection of open space. Financial considerations of cash payment, income tax deductions, lower estate tax burdens, and lower property assessments were identified as factors encouraging easement adoption, while loss of value in terms of development rights, loss of timber income, costs of compliance with easement, and unpredicted effects on property value were identified as discouraging factors. Feinberg (1997) found that easement grantors were motivated primarily by personal attachment to the land, altruism, and stewardship, while social pressures and financial benefits were not identified as significant influences.

Nowak (2012) used a hybrid of Kabii and Horwitz's (2006) model and sociological theory (Theory of Planned Behavior) to evaluate a conceptual model of factors influencing the granting of easements by forestland owners in the Adirondack Park. Results suggest that residential landowners within the park who had a more positive attitude towards easements were generally older, felt less strongly about the importance of private property rights, and were more confident in conservation easements as a means to permanently conserve their land. Those who perceived their peers as viewing conservation easements favorably (also shown



Conservation easements in the Adirondack Park, New York, USA. Courtesy of the NYS Dept. of Conservation and the Adirondack Park Agency.

to increase intent to grant an easement) were again, more confident in conservation easements.

Bick (1996) interviewed northern forest region landowners in New York who had granted easements. Owners expressed overall satisfaction with the terms of their current easement, and most said they would consider buying another property encumbered by a conservation easement or adding an easement to other land they owned. Feinberg (1997) surveyed forestland conservation easement grantors in the northeast, finding that, in general, grantors were satisfied with the easement encumbering their land. Grantors were more satisfied with easements on their land than successive landowners; portions of both grantors (19%) and successive owners (37%) expressed a desire to change the terms of an existing easement, if allowed. Grantors also identified that money and time requirements in the granting process were points of dissatisfaction. Feinberg (1997) reported that 20% of successive landowners of property encumbered by conservation easements were dissatisfied with the terms of their easement, and 25% felt they were restricted from carrying out activities due to the easement. These results suggest that the lower satisfaction of future conservation easement landowners may be noteworthy; however, the specific terms of an existing conservation easement that were not agreeable to successive landowners were not identified (Feinberg 1997).

Values and Economics

The State of New York and its Department of Environmental Conservation (NYSDEC) have policies and programs in place for the protection of open space and working landscapes. It is widely recognized that both public and private lands provide open space benefits (Harper and Crow 2006). The main objective of the NYSDEC's conservation easement program is "to allow the purchase of easements over productive forest land so that landowners are paid to limit their right to develop their land, while retaining it as private property dedicated to resource use" (NYSDEC 2009). Thus, both public and private lands can provide open space benefits.

Purchasing conservation easements from private landowners allows the state to protect open space in a cost effective manner, with prices that are usually less than half of those for outright land purchase. Private land purchased outright in the Adirondack Park must become part of the state's constitutionally protected Forest Preserve, precluding timber harvesting. This lower acquisition cost allows the open space protection of more private land area. Accepting donated conservation easements, while not cost-free, is also fiscally prudent. In both cases, properties remain part of the working landscape, but their future development potential is eliminated or diminished. Since 1995, "the State has invested more than \$100 million to purchase working forest conservation easements on three quarters of a million acres of productive private forest lands to ensure continued sustainable forestry on these private lands" (NYSDEC 2010).

Conservation easements have lower recurring costs to the state than forest preserve lands. The State of New York makes a payment in lieu of taxes to local governments on its Forest Preserve holdings. Although it pays taxes based on the assessed full value of the lands it owns, it pays only a portion of the land-based tax assessment on conservation easement lands.

As an open space protection agent, the state is the primary market for purchasing conservation easements and a significant player in the market for donated easements. This market opportunity allows both sellers (generally larger or multiple parcels) and donors (usually families with smaller holdings) to grant conservation easements as one means of realizing their land ownership and management goals.

Private forestland in this region has multiple uses. The highest and best use of most forestland has been joint production of both timber and amenities, with limited development potential also being a significant aspect with sales value. Landowners realize these values in several ways. Industrial landowners who grow timber to supply pulp mills and sawmills realize amenity values through revenues generated by sport hunting and fishing leases. Private landowners (primarily families) realized revenue from occasional timber sales and amenity value through their on-site uses and existence values. Due to the increase in the cost of holding property, shifts in the management philosophies of timber and forestland companies, and the generational transfers of private land ownerships, landowners are motivated to look for alternative means of realizing a property's values.

Industrial forest landowners have given way to more timberland investment management organizations (TIMOs), real estate investment trusts (REITs), and other land investors. Industrial landowners secured their timber supply through agreements that are bound to the properties they sold. Investment owners paid a price that reflects the ability of the land to produce timber, supply recreation, and be subject to a certain amount of large lot development. With their primary motivation being timber management for revenue, conservation easement sales have provided a very good way to recoup the portion of their investment that was tied up in recreation and development rights. A cash influx from the sale early in long-term investment increases the rate of return. The conservation easements purchased by the state limit development rights and provide varying amount of public recreation access. When a TIMO or REIT is involved, an easement will usually be sold rather than donated (Hickman 2007); recreation access is an important determinant of sale prices. Few donated conservation easements contain significant public recreation rights.

Family landowners face financial pressure in high landownership holding costs and in trying to achieving intergenerational transfers of their held lands. Rising property taxes make it difficult to balance timber revenues and their on-site enjoyment of the property with costs. The sale of conservation easements may provide the revenue necessary to settle family equity issues and allow continued stewardship of the land, with lower holding costs. The same is true of donated conservation easements, except that there is no cash influx. "State law also provides tax credits applicable to State income tax obligations for State taxpayers who donate conservation easements" (Dinapoli 2010). The combination of income, estate, and property tax benefits may be sufficient to accomplish succession and private land protection goals.

Often the grant of a conservation easement in the Adirondack Park is facilitated by the involvement of nongovernmental organization (NGO) land trusts (e.g., The Nature Conservancy). NGOs may purchase or accept conservation easements that are destined for the State of New York, serving as an intermediary landowner until the state can

work through their bureaucratic processes to purchase the easement. In other cases, these NGO entities will purchase land outright, negotiating a conservation easement with the state and a willing purchaser of the encumbered property. These timely transactions serve to meet open space protection goals when time is of the essence.

Conservation Easement Deeds _____

Conservation easements are a less-than-fee ownership interest in land and are conveyed with a deed that makes them part of the public record in a county clerk's office. Though conservation easements are often referred to as agreements, this term fails to convey the full division of interests in a property that become forever separated and the manner in which all future owners of these rights are encumbered. Conservation easements have evolved to include very detailed deeds that attempt to prescribe and address all future uses of the property.

The length, details, and formats of conservation easement deeds vary, but there are several categories of items found in each. These include a statement of purpose (with accompanying boilerplate), restrictions (actions the grantor is prohibited from or limited in doing), affirmative rights (on-site rights of the grantee), reserved rights (rights retained by the grantor and often listed as exceptions to restrictions), and terms and conditions (administrative requirements, liability, amendments, etc.). Some deeds list these items in distinct sections and others follow a less structured format.

Conservation easement deeds began to exhibit more uniform levels of detail when the Internal Revenue Service (IRS) approved charitable contributions for conservation purposes in 1976. Acceptable purposes to the IRS include public recreation and education, protection of ecosystems, and preservation of open space for the scenic enjoyment of the general public. All such purposes must be consistent with a federal, state, or local policy. The core elements of most donated conservation easements arise from IRS requirements. Fairly strict requirements must be met to qualify for a charitable deduction. The IRS provides detailed direction for the auditing of donated conservation easements (Internal Revenue Service 2012). Common restrictions include those on development and subdivision, mining, alteration of surface topography, dumping, and billboards. Mobile homes, exterior lighting, and commercial recreation are often restricted. All restrictions are subject to the grantor's enumerated reserved rights.

Deeds often contain a blanket reserved right for uses consistent with the purpose of the easement that are not specifically prohibited. Specific reserved rights can be very detailed. In general, reserved rights for development are carefully defined to distinguish them from the overall restrictions. A statement of purpose can be a key element of a deed or it can simply be boilerplate. One manner of dealing with future uncertainties in the deed is to condition interpretations of restrictions and reserved rights on their being consistent with the stated purpose of the easement. A statement of conservation values present on the property has similar potential weight.

Affirmative rights in the earliest round of donated conservation easements in the Adirondack Park area were generally limited to grantee inspections (with prior notice). In some

cases very limited public recreation access was conveyed (e.g., trail corridor) along with the rights to do scientific and nature studies, and a right of the grantee to view the property. When New York State began purchasing conservation easements for the dual purpose of open space protection and providing public recreation opportunities, affirmative rights in deeds became much more detailed. The NYSDEC and landowners have refined these details through trial and error over the past 25 years. In some cases, broad public access for wild land recreation opportunities is granted and, in others, only limited rights (spatially, seasonally, or by use) are granted. Recreation rights are subject to a grantee management plan that must be approved by the grantor (or its successors).

Detailed affirmative rights require a continuous interaction between grantors and grantees. This relationship transcends the initial grant and is carried forward by future owners and agency staff. This association can call for cooperative interpretation of easement details. Terms and conditions within deeds include a collection of legal and administrative considerations, such as that the easement is perpetual (almost always) and binding of subsequent owners. Notification terms for interactions and property tax burdens are included. Liability protection is discussed. Early deeds indemnified only grantees – subsequent deeds indemnify both parties. Language for these considerations is more detailed when public access rights are conveyed.

Large working forests were protected as open space when the state purchased conservation easements. The largest of these contain many parcels and span multiple jurisdictions. Deeds for easements on lands managed as working forests show significant evolution over early ones, both in details of affirmative rights and in promotion of land management standards in restrictions. Timberland Investment Management Organizations and similar investors have retained certain recreation rights because they provide annual revenues. The challenge to the state has been to acquire limited recreation rights and then administer them into the future. Deeds cannot always address the specifics involved, and so references to management plans and the planning process are embedded.

Land management standards promoted through deed restrictions are most evident in management plan requirements, and while sometimes listed as conditions to reserved rights, they are clearly restrictions. Initially deeds specified a requirement for a forest management plan that was subject to state approval. As the NYSDEC gained experience in working with these requirements, the content and duration of these plans were carefully spelled out in newer deeds. Third party certification (such as the Forest Stewardship Council) has grown in popularity and is now presented as an alternative to state approval for management plans. This option appeals largely to TIMOs and other large landowners who were pursuing it anyway, but may represent an added expense for some landowners.

Conservation Easements in the Adirondack Park _____

There are currently 781,000 total acres (316,194 ha) of conservation easement land within the Adirondack Park. This total includes 168 separate tracts of land encumbered

by 181 separate deeds between New York State and approximately 128 separate landowners (Weaver 2013, personal communication). The conservation easements within the Adirondack Park are each unique agreements, but most center on development and recreation rights, and forest management goals. Of the total number of encumbered acres, 560,000 acres (226,720 ha) are third-party certified to meet sustainable forestry management language specified by the conservation easement deed: 50,000 acres (20,243 ha) are Sustainable Forestry Initiative (SFI) certified, 70,000 acres (28,340 ha) are Forest Stewardship Council (FSC) certified, and 440,000 acres (178,138 ha) of certified by both the SFI and FSC (May 2013, personal communication).

Erikson (2009) suggests that conservation easements were first adapted by New York State in the 1990s and early twenty-first century to implement a conservation policy that sought to curtail development rights on large forested tracts while increasing opportunities for public access in the Adirondack Park. Early easement agreements created a category of land, neither wholly private nor wholly public, that altered the long standing tradition of exclusive ownership which had become ingrained in the Adirondack Park culture since its inception (Harris et al. 2012). Besides securing lands from development and ensuring them as economically viable working forests, recreational reasons were additional impetus for the growth of easements in the Adirondack Park. There was already precedence for this trend on some of these lands; hunting and camp leases are a long-standing historical tradition in the Adirondack Park.

Restrictions on some earlier easement deeds failed to account for the social impacts associated with recreational use of the land. When New York State entered into easement agreements with the Champion International Paper Company in 1998 (International Paper 2005), it stipulated that the leases on 48 hunting camps be extinguished (Green et al. 2004). Lease holders argued that they lost important recreational privileges and the experiences derived from them. It has been suggested that the consequences to hunting club members were not properly evaluated by parties to the easement (Property Rights Foundation of America Inc. 1999). In subsequent years, New York State has reversed its position regarding the value of camp lessees as stewards of the property (NYSDEC 2012). The recent renegotiation of the original Champion easement agreement with the current landowner (Heartwood Forestland Fund) reflects this trend as it allows the landowner to continue leasing recreational camps on former Champion lands within the Adirondack Park (NYSDEC 2013a). This evolution in planning and management strategy can be viewed through changes to the Tooley Pond easement. Located in St. Lawrence County, the Tooley Pond Easement covers 25,000 acres (10,121 ha) abutting 6,000 acres (2,429 ha) of forest preserve which buffer a 16-mile (25.8 km) stretch of the scenically designated South Branch of the Grass River, and includes 220 private camp buildings (NYSDEC 2013b). The historic lease camps located on the property were originally scheduled to be removed in 2014, but this was changed in an amended conservation easement deed. In exchange for the right to retain lease camps on the property, the landowner relinquished exclusive access during the fall hunting seasons. The property will now be open to the general public as well as lessees.

Analysis over time of early easements demonstrates some important changes (Gustanski and Squires 2000). For example, newer easements have become increasingly focused on restricting subdivision. Subdivision of a property can create the problem of having to maintain land management relationships with multiple landowners. These subdivisions of the original parcel, under a conservation easement, fragment land management and complicate matters such as inventory and monitoring for the resource limited agencies charged with maintaining them (Rissman et al. 2007). Legal professionals have noted difficulties in maintaining the perpetual nature of conservation easements (McLaughlin 2005). Contemporary conservation situations attest to the challenges involved with amending and terminating perpetual conservation easements in the face of changing economic conditions, landscapes perspectives, climate change, and public interests (Jay 2012). Issues encountered during the Champion land conservation easement renegotiation convinced New York State to develop a process and prepare guidelines for the NYSDEC to follow if the modification or termination of a NYSDEC held conservation easement is warranted in the future (NYSDEC 2012 and 2013c).

Despite the seemingly cautionary trends regarding subdivision and term lengths, NYSDEC continues to view conservation easements as a productive strategy for land conservation (NYSDEC 2013d). The three tracts that comprise the greater Elk Lake Conservation Easement complex (the original Elk Lake preserve, the Elk Lake conservation easement, and the adjoining Elk Lake-Three Brothers conservation easement) further illustrate the evolution of easement development and management within the Adirondack Park. Vested in November of 1963, the original Elk Lake Preserve Easement was the first conservation easement recorded in New York State and comprised 1,565 acres (634 ha) of shoreline, islands, and lake bed. The conservation easement deed was developed "for the purpose of preserving the natural scenic beauty thereof all lands affected by the aforesaid easement" (Deed dated July 31, 1963). The conservation easement of 2012 added an additional 10,713 (4,337 ha) acres to the greater Elk Lake Conservation Easement complex. Terms of the conservation easement convey development and public recreation rights to New York State and require that Elk Lake Land, Inc., when harvesting timber on the protected property, follow established principles of sustainable forestry (Knight 2013). A major goal in the expansion of the Elk Lake holding was to buffer adjacent Forest Preserve lands from potential development while increasing public access to the adjoining High Peaks and Dix Mountain Wilderness Areas (Protect the Adirondacks 2013).

Conclusion

Conservation easements remain controversial to some people; however, conservation easements are evolving as legal documents for conveying selected property rights from private landowners into NYSDEC management in the Adirondack Park. Conservation easements are often referred to as agreements; however, this term fails to convey the full division of interests in a property that become forever separated and the manner in which all future owners of these rights are encumbered. Changes and amendments to

existing conservation easements, incorporation of lessons learned, and careful negotiations via new acquisitions and amended conservation easements suggest that conservation easements will continue to play an important role in the growing history of land use in the Adirondack Park. The 781,000 acres (316,194 ha) of conservation easement land within the Adirondack Park represents a 24% overall increase in the total lands protected under NYSDEC management in the Adirondack Park. Conservation easements will continue to offer protection of natural resource and landscape values such as open space, scenic areas, wetlands, riparian areas, critical ecosystems, water quality, wildlife and fisheries habitats, and other purposes (e.g., preservation).

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Protecting Public Values on Private Lands in the State of Maine, USA

Tom Rumpf

Abstract—The State of Maine in the US is 94% privately owned, and is the most forested state in the country. Fifteen years ago, Maine ranked last among US eastern states in its percentage of land under conservation; today it ranks near the top. The Nature Conservancy and its many partners have achieved this extraordinary turn-around through a combination of bold acquisitions and strategic innovations. This paper will explain The Nature Conservancy's pioneering strategies for the protection and restoration of large, privately owned forested landscapes; strategies that are applicable in many other private land settings. In Maine these strategies have included using silviculture as both a conservation and financing strategy, tax-free exchanges with other landowners, development by design, conservation easements, and even making low interest loans to paper companies in exchange for conservation restrictions.

Introduction

The mission of The Nature Conservancy, one of the world's leading conservation organizations, is to conserve the lands and waters on which all life depends. The Nature Conservancy has been working to conserve important lands and waters since 1951. Over the years, our mission has grown from protecting small (< 50 ha) rare plant sites, to encompass the conservation of landscapes of lands and waters around the world. This paper will describe examples of how we have worked with private landowners in Maine to protect large areas of wild lands – both reserves and working forests – that may prove useful in your work with private landowners around the world.

The State of Maine is predominantly privately owned – 94% of our lands are private – with only 6% in combined federal, state and local government ownership. Maine is the most forested state in the United States (90%) with a long history of forest exploitation (Figure 1). In the 1860s Maine was the center of lumbering in the United States. The forest economy remains important today, both for traditional forest products and for recreation and tourism.

Tom Rumpf, Associate State Director, The Nature Conservancy, Brunswick, Maine; e-mail: trumpf@tnc.org.

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To achieve our mission in Maine, we need to work with private landowners. Fortunately the history of human settlement and ownership in Maine has resulted in more than half of the private lands (>67%) being held in large ownerships (>40,000 ha). Much of this private ownership, and much of Maine, is without significant human settlement. One half of the state (4 million ha) has no organized town government and very few people, and is known as the Unorganized Territory (UT). Land use in this area is overseen by a state agency (Figure 2). This pattern results from the disposition of the public domain by the state in the early 1800s. Lands were sold off in blocks of townships to investors to pay off state debt, and to encourage settlement of the frontier. The investors were interested in the economic value of their timberlands, and discouraged settlement as they thought it would lead to higher taxes. In addition, the soils in the UT were generally not suitable for agriculture, limiting settlement.

Prior to the late 1990s, The Nature Conservancy in the United States had a 40-year history of conservation success – at the time we were protecting lands at the rate of roughly 400 hectares per day across the United States. In the late 1990s we completed a series of ecoregional conservation plans, looking at large landscapes with similar climate, geology and vegetative cover. In the Northern Appalachians/Acadian Ecoregion, including Maine (Figure 3) there remain large areas of intact forest cover, largely representative of the species present in the original pre-settlement landscape.



Figure 1—Maine's forests fueled its economy in the 1800's.

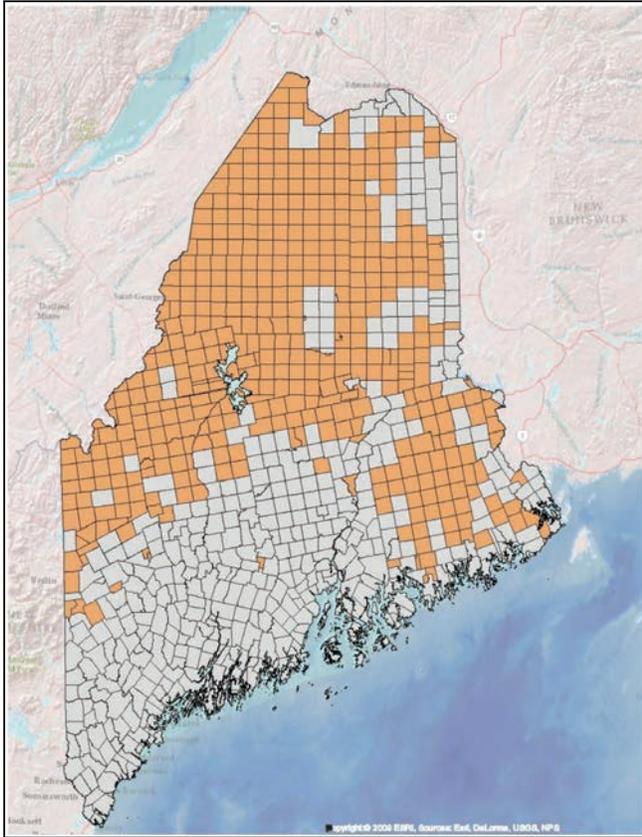


Figure 2—Maine’s Unorganized Territory

In completing our analysis of the Northern Appalachians we soon came to realize that at the rate we were conserving lands, we would not be successful in accomplishing our mission to maintain functioning natural systems to support wildlife and human needs in perpetuity. We needed to work at a larger scale. Starting in 1998, Maine became the stage for a series of significant private land conservation transactions that changed the scale of conservation action, and served as a model for our work in the United States and around the world (Clark and Howell 2007). Between 1997 and 2012, the amount of permanently conserved land in Maine increased from 6% to 20% through the work of TNC and our partners.

Three case studies are presented here – one large-scale private land acquisition; one private industrial debt for nature swap; and a large scale conservation planning and development plan sanctioned by the state land use regulatory agency in the Unorganized Territory (Figure 2). In each of these projects we achieved large-scale conservation, while learning new ways to work with private landowners.

The St. John River – Conserving Timberland At The Wholesale Level

The Nature Conservancy had long been interested in the upper St. John River, a remote free-flowing river that harbors a number of rare plant species and the endangered Canada lynx (*Lynx canadensis*), (Figure 4). In the 1990s traditional forest products companies began selling off their



Figure 3—The Northern Appalachians/Acadian Ecoregion – Land Cover



Figure 4—Canada lynx (*Lynx canadensis*)

timberlands due to pressure from Wall Street to redeploy their capital in manufacturing infrastructure. In trying to increase our impact we started talking to some managers of the private forestland investor owners who replaced the industrial owners. In the summer of 1998 we entered into a partnership with a Timber Investment Management Organization (TIMO) to cooperate in submitting a bid for 75,000 hectares of timberland for sale along the upper St. John River (Figure 5). The Conservancy would acquire a 650 meter wide corridor along 65 kilometers of the river for \$3 million (US) to protect natural and recreational values. The TIMO's investors would purchase the remaining 70,000 hectares to manage as productive timberland.

When the bids were opened, our combined bid had lost – with two others ahead of us. Then things started to get interesting. A few weeks later State Director Kent Wommack received a call from our TIMO partner, with a combination of good and bad news. The good news? – The first two bidders



Figure 5—St. John River

had dropped out of the running for different reasons. The bad news? – The investor lined up by the TIMO to purchase the managed timberlands had already moved on and invested in another timberland acquisition and was no longer available to participate. The Nature Conservancy could still buy the land, but we needed \$35.1 million dollars to complete the deal – 10 times our initial investment.

In summary, Kent was able to line up pledges from key supporters over the next four weeks, we borrowed \$35 million from The Conservancy's Land Preservation Fund, and we closed on the St. John lands six weeks later, in late December 1998 – at that point the largest conservation transaction ever undertaken by The Nature Conservancy anywhere in the world. To date 25,000 hectares has been set aside as ecological reserve (wilderness), with the remaining 50,000 hectares managed sustainably for wildlife and forest products (Figure 6).

Lessons From The St. John River Project

1. Don't be afraid to be bold – take advantage of unexpected opportunities.
2. Buy at the wholesale scale – timberlands are much less expensive per acre when bought in bulk.
3. Planning from the beginning to retain a significant portion of the land as sustainably managed timberlands helped mitigate the fundraising risk and provided the Conservancy with a “green” endowment, as well as working forest lands that could be traded for other, higher value, conservation lands within the watershed. At the same time we learned a lot about the potential for and limitations of managing timberlands for a combination of wildlife and timber values.
4. The power of a compelling vision in raising private contributions – the scope of the St. John Project captured the imagination of donors, many of which had not invested in conservation previously.

The Katahdin Forest—A Private Debt-For-Nature Swap

Three years after the initial St. John deal, we made another step in creative financing with the Katahdin Forest Project. Great Northern Paper was once the largest landowner and one of the largest employers in Maine, with its 800,000 hectares of forest land and two large pulp and paper mills. But at the end of the 20th century it suffered under global forces of competition and a succession of corporate owners who sold much of the land to cover debt, leaving a core ownership of about 120,000 hectares (Figure 7). By the spring of 2002 Great Northern was struggling to survive under the leadership of a Quebec entrepreneur. His vision was to rebuild one of the paper machines to produce a more profitable line of paper as the key to reviving the Millinocket mill. He borrowed \$50 (US) million from Hancock Insurance Company to invest in the mill.

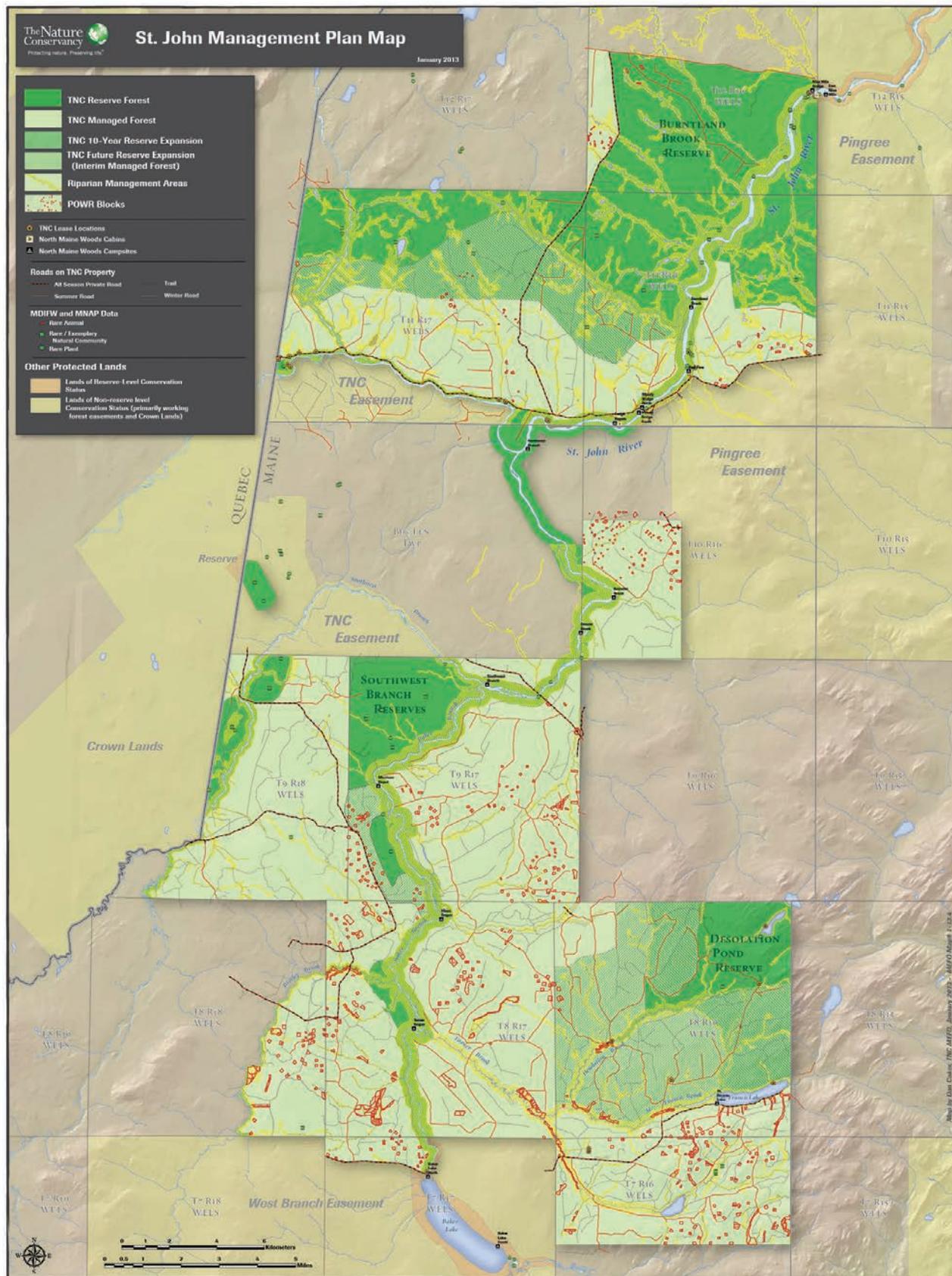


Figure 6—St. John Project

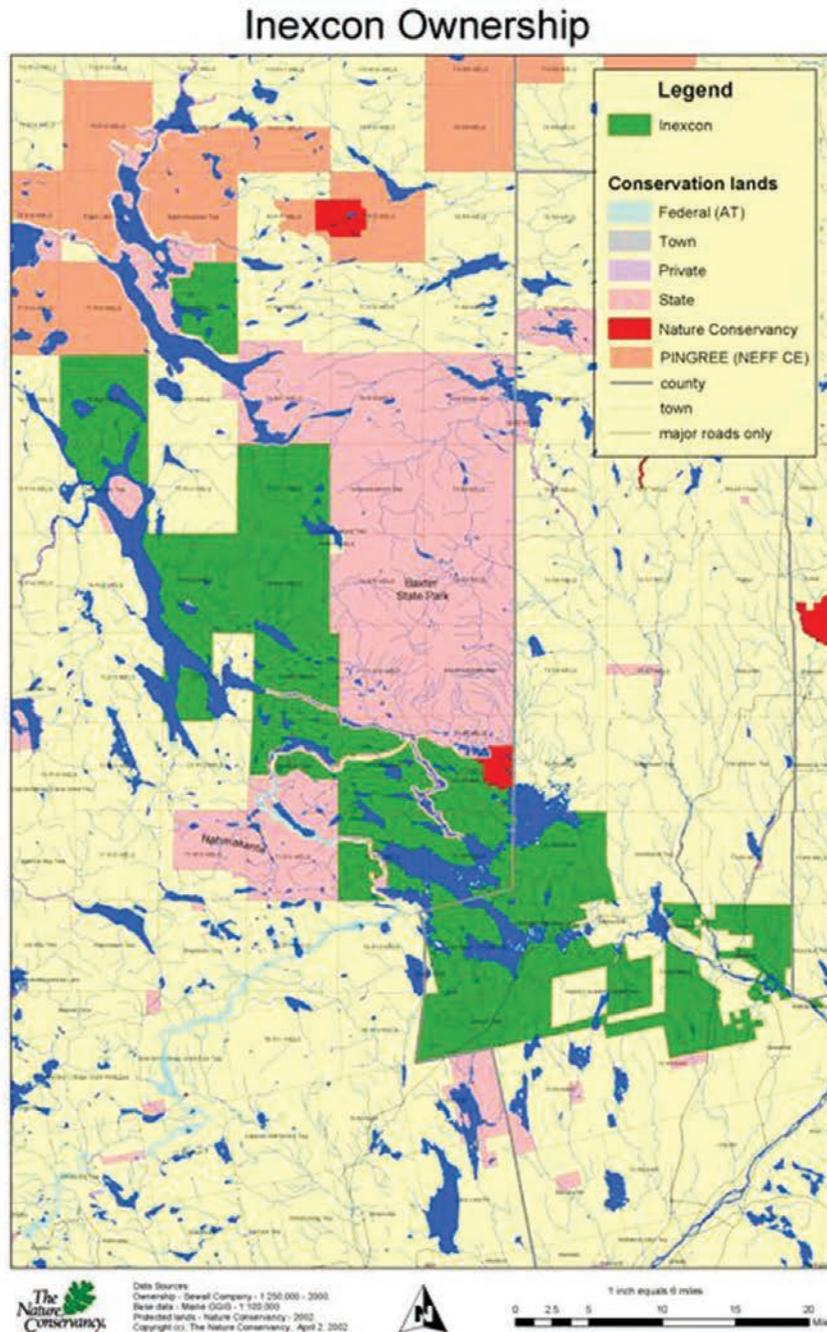


Figure 7—Great Northern Paper (Inexcon) Land Ownership.

Great Northern owned the Debsconeag Lakes area (Figure 8), which had long been on the conservation priority list for the State of Maine and many conservation NGOs. Sensing an opportunity to conserve this area, Kent Wommack, Bill Ginn and Tom Rumpf met with the principles of Great Northern in the spring of 2002. When the chief financial officer found out that he had worked at Mead Paper Company with Kent’s father, we were able to establish a connection. The President, Lambert Bedard, relaxed and explained that though the company would benefit from the cash flow generated from selling some timberland, the land was tied up as collateral in the note with Hancock Insurance Co.

Never one to be shy about pursuing an opportunity, and having recently learned of a new federal tax credit program that might be able to assist us, Bill Ginn offered that we might be in a position to acquire the note from Hancock. We provided a \$4 million short-term loan to help the mill with its cash flow problems, and using contacts through our board president, Hank Paulson, CEO of Goldman Sachs at the time, Bill was able to successfully negotiate with Hancock. We acquired the note, forgave \$18 million of it in return for acquiring 20,000 hectares to create the Debsconeag Wilderness Preserve, and refinanced the remainder, working with

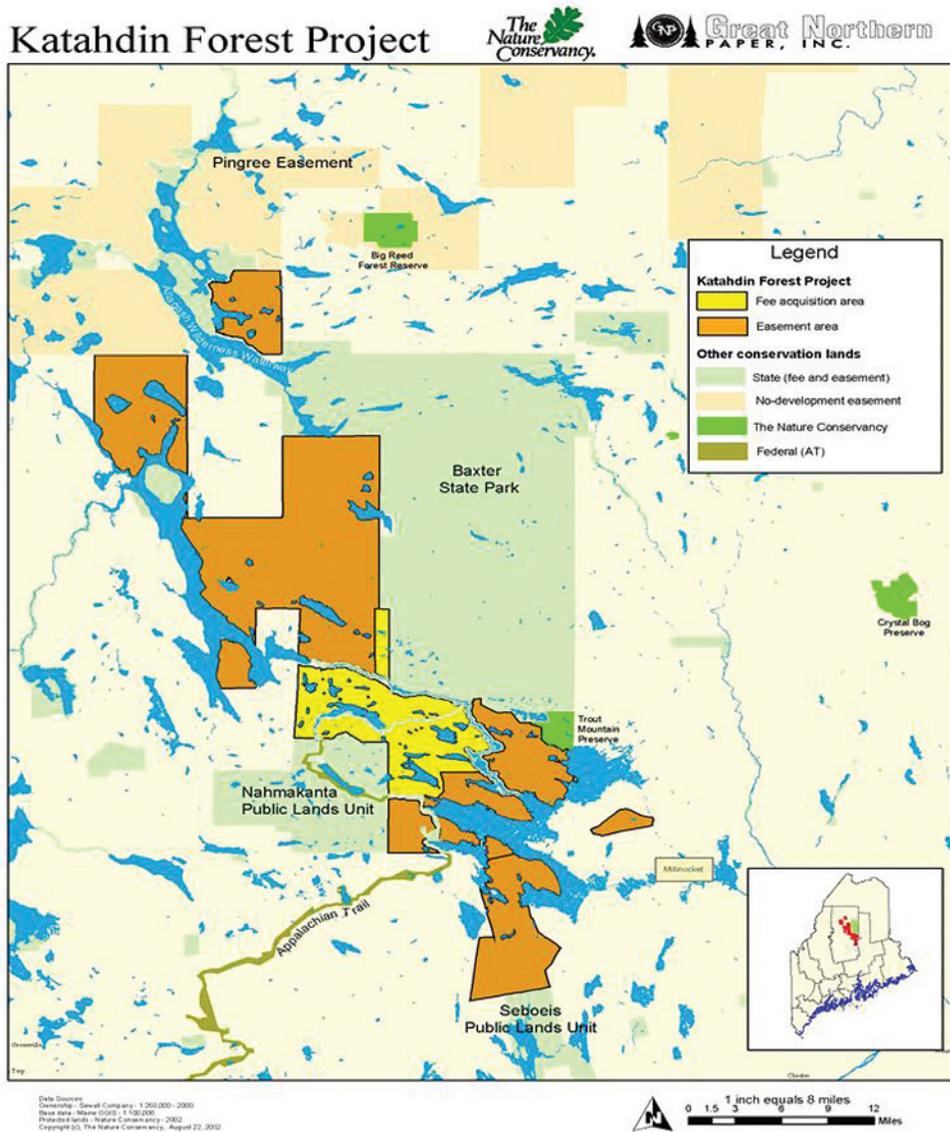


Figure 8—Katahdin Forest Project

Coastal Enterprises, Inc., a community development organization and conduit for the New Markets Tax Credit Program of the US Treasury, improving Great Northern’s cash flow by \$3 million a year. In return we acquired a no-development conservation restriction on 80,000 hectares of sustainably managed working timberlands surrounding the Debsconeags for a total conservation package of nearly 100,000 hectares (Figure 9). We sold the conservation easement to the State of Maine, and raised an additional \$12 million over the next 18 months to complete the transaction (Ginn 2005).

Lessons From The Katahdin Forest Project

1. Think creatively to work around obstacles.
2. Working with non-traditional partners can create opportunities.
3. Connections to the business community can open the door for conservation.

The Moosehead Conservation Framework – Combining the Strength of Government Regulations and Private Investment

The final case study involves a complicated interaction between the largest private forest landowner in the US – Plum Creek Timberlands, a state regulatory agency that oversees land use in Maine’s four million hectares of Unorganized Territory (UT), and The Nature Conservancy in partnership with two other conservation NGOs.

Plum Creek moved into Maine in the late 1990s, when they acquired 360,000 hectares of productive forestland from South Africa Pulp and Paper. By 2005 they were looking for ways to diversify their return from the timberlands, and proposed a large planned development and conservation package for the 160,000 acres (64,777 ha) they owned

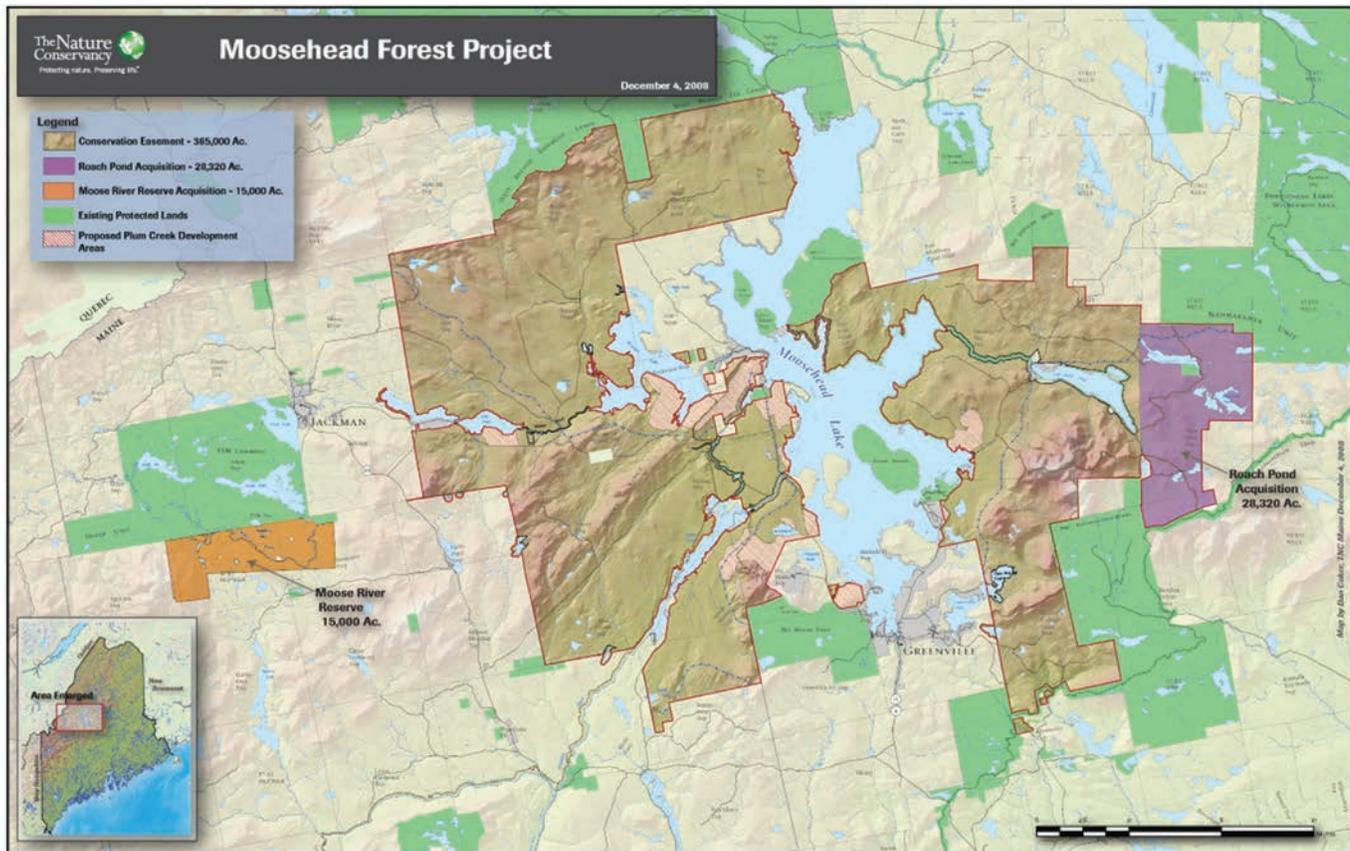


Figure 9—Moosehead Conservation Framework.

within the UT on and around Moosehead Lake, Maine's largest lake (Bell 2007). Under the Concept Plan process, in return for rezoning of about 8,000 hectares for vacation home lots and two resort developments, Plum Creek proposed to permanently conserve about 25,000 hectares, including the shorelines of a number of remote ponds. The remainder would continue to be managed as working forestlands, but without permanent conservation.

We met with Plum Creek to share our conservation assessment of the lands in question, and to explore creative ways we might increase the amount of conservation. After a series of negotiations, including our partners The Forest Society of Maine and the Appalachian Mountain Club, we announced the Moosehead Conservation Framework Agreement with Plum Creek. Under the framework, Plum Creek agreed to sell 18,000 hectares in two separate parcels to us and the AMC to be permanently conserved for wildlife habitat and remote recreation, and to sell a no-development conservation restriction on all the land within the plan area that was not either rezoned for development or conserved as required balance for the rezoning proposal before the regulatory agency. Plum Creek revised its concept plan and resubmitted it for review. The proposal was controversial, as many people felt that no development should be allowed. The constitutions

of Maine and the United States guarantee some economic use for private lands, and an analysis by the Open Space institute showed that Plum Creek could accomplish nearly as much development outside of the concept plan process, but with minimal conservation in return (Table 1).

Following a long and fractious process before the regulatory agency, including four public hearings and two weeks of hearings with organizations that intervened in the proceedings, the plan evolved considerably to improve the ultimate result. In the end, the development envelope was consolidated closer to the existing developed areas adjacent to the plan area, and reduced to 6,000 hectares. Plum Creek donated a permanent no-development easement on 38,000 acres (15,385 ha) surrounding the development, and we and our partners assisted the state in acquiring a permanent conservation restriction on the remaining 106,000 hectares of working forest lands. Following two and a half years of legal appeals, the regulatory agency's decision was upheld and the conservation transactions were completed. In the end this complicated and difficult partnership resulted in 6,000 hectares of land rezoned for development, balanced by 162,000 hectares of permanent conservation, which connected a network of 800,000 hectares of conservation lands in northern Maine (Figure 9).

Table 1—Comparison of development and conservation components: Moosehead Concept Plan vs. unplanned development without plan (Source: Open Space Institute)

Scenario Component	Concept Plan	Unplanned Development
Residential Lots	975 lots 236 shorefront 739 back lots	618 lots 252 shorefront 366 back lots
Resort Development	Big Moose 4,450 acres; 800 accommodations Lily Bay 750 acres; 250 accommodations	Big Moose 4,450 acres; 800 accommodations No Lily Bay Resort
Total Residential Units	2025	1,418
No. of Lakes with Development	6	25
Permanent Shoreline Protection	156 miles 10,000 acres	55 miles 3,500 acres
Back Land Protection	395,000 acres	none
Trail Corridor Protection	160 miles	none

Lessons From The Moosehead Conservation Framework?

1. Engaging in the regulatory process with voluntary private conservation is complicated and messy, but can yield tremendous outcomes if done right.
2. An effective process for public and stakeholder input is critical in complicated regulatory proceedings. In this case the agency hired professional consultants, at the cost of the applicant, to plan and facilitate the process – it made all the difference.
3. Partnerships can be complicated, with different NGOs having different priorities, but they can also be helpful in building public credibility. It’s important to be clear up front on the partnership agreement – put it in writing.

What’s Next?

In our continuing efforts to find creative ways to conserve large private landscapes, we are currently exploring the feasibility of attracting large amounts of private “impact investment” capital, matched by a small amount of our own funds, to acquire large tracts of forest land in partnership with conservation-minded investors.

Here’s how it would work. Many high net worth individuals are now investing in timberland as a hedge against the stock market. They are long-term owners of the asset, looking to transfer wealth between generations. Many have an interest not only in financial return, but also in making a conservation impact. We would enter into a partnership with one or more of these investors to acquire 100,000 hectares

or more of private timberland, with the investor providing up to 95% of the capital, and TNC providing the balance, as a demonstration of our commitment. The partnership would last 10-15 years, during which time TNC would be responsible for managing the land, providing the investor with a very modest return, in the 1-2% range, while we worked on specific high value conservation take-outs using our 5% contribution and traditional sources of conservation capital through public and private fundraising. After the 10-15 years, the investor would end up with the bulk of the timberland, subject to a conservation easement, which would prevent development but would allow for continued timber management.

We are currently applying this concept in the southern US, working with a charitable foundation, and hope to apply it in Maine before long.

There are many ways to work with private landowners to conserve large areas of wild lands. There are many opportunities if you remain adaptive and take advantage of the opportunities in each situation.

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Section 4—Old World and New World: Relationships Between Wilderness, Human Health and Culture



Wilderness, Biodiversity, and Human Health

Daniel L. Dustin, Keri A. Schwab, and Kelly S. Bricker

Abstract—This paper illustrates how wilderness, biodiversity, and human health are intertwined. Proceeding from the assumption that humankind is part of, rather than apart from, nature, health is re-imagined as a dynamic relationship that can best be conceived in broad ecological terms. Health, from an ecological perspective, is a measure of the wellness of the individual and the ecosystem considered together. Health, at its core, is symbiotic in nature. To make the case, seven organisms are discussed that have great potential medicinal value for humankind if only their habitats are protected and preserved. Human-induced threats to those habitats are also examined to illustrate humankind's increasing power to change the face of the earth in cataclysmic ways. Finally, the importance of reducing the psychological distance that increasingly separates humankind from nature is emphasized if nature's biological storehouse of health-promoting properties--especially those contained in wilderness--is to be preserved.

Introduction

While acknowledging and respecting the intrinsic value of wilderness, the case we make for its protection and the biodiversity it contains is rooted in our belief that human health is inextricably intertwined with the health of the world's pristine natural areas. Our position is underpinned by our belief that humankind is part of, rather than apart from, nature, and that anything we do to compromise nature's health ultimately compromises the health of our own species. In the end, our lesson is straightforward. We must save wilderness if only to save ourselves.

D.L. Dustin is Professor of Outdoor Recreation Planning and Policy in the Department of Parks, Recreation, and Tourism at the University of Utah, Salt Lake City, Utah, U.S.A. FAX: 801-581-4930, e-mail: daniel.dustin@health.utah.edu. K.A. Schwab is Assistant Professor of Youth and Family Development in the Recreation, Parks, and Tourism Administration Department at California Polytechnic University, San Luis Obispo, CA, U.S.A. K. S. Bricker is Professor of Sustainable Tourism and Interim Chair of the Department of Parks, Recreation, and Tourism at the University of Utah, Salt Lake City, Utah, U.S.A.

In: Watson, Alan; Carver, Stephen; Krenova, Zdenka; McBride, Brooke, comps. 2015. Science and stewardship to protect and sustain wilderness values: Tenth World Wilderness Congress symposium; 2013, 4-10 October; Salamanca, Spain. Proceedings RMRS-P-74. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 208 p.

We focus on wilderness as it is largely understood in the Western industrialized world. When discussing the distancing of people from nature in modern life, we know we are not doing justice to indigenous peoples worldwide who relate intimately to their fundamental ground of being, and who often see themselves as "kin" with nature (Salmon 2000). Moreover, when reviewing the potential medicinal value of organisms living in wilderness, we also realize that wilderness offers a much wider range of health benefits for humankind, including clean air, fresh water, opportunities for spiritual renewal, etc. What we offer here is but one of many arguments for wilderness preservation, an argument we believe will resonate with people even if they are not wilderness enthusiasts.

We highlight seven groups of organisms found throughout the world that have great potential for combating human disease, organisms that are threatened with extinction by humankind's impact on their habitats. In each case, we describe the organism's potential medicinal value as well as its threatened status. We then tie the concept of ecosystem services to an ecological model of health promotion in a way that portrays human and environmental health as inextricably intertwined. Finally, we advocate for a kind of day-to-day living that safeguards biodiversity and enhances ecological health over the long run. Once again, the lesson is straightforward. If we want to realize the medical benefits hidden in nature's storehouse of biodiversity, we had best live our lives in a way that sustains biodiversity.

Much of what we say is derived from Chivian and Bernstein's (2008) *Sustaining Life: How Human Health Depends on Biodiversity*. As Chivian and Bernstein contend, scientists know the answers to a lot of questions about the relationship between biodiversity and human health. The challenge is to communicate that understanding to the world's citizenry in a way that resonates with them so they will change the way they, their families, businesses, communities, and governments conduct themselves. This is the interpretive challenge we undertake in this paper.

Ecosystem Services

The context within which we make our claims is commonly referred to as "ecosystem services." Generally speaking, ecosystem services refer to a complex array of symbiotic relationships that characterize the Earth's ecosystems. These relationships are typically broken down into four categories: provisioning services, regulating services, cultural services, and supporting services (Melillo and Sala 2008). They represent functions that different organisms play for one another in ecosystems characterized by biodiversity. Provisioning services include products obtained from ecosystems like food, fuel, and medicine. Regulating services

include processes that clean air, purify water, mitigate floods, control erosion, and detoxify soils. Cultural services refer to nonmaterial benefits obtained from ecosystems, including aesthetics, intellectual stimulation, and a sense of place. Supporting services enhance all other ecosystem services and include functions like nutrient cycling, pollination, and seed dispersal. As we note throughout the paper, human-induced changes compromise the ability of ecosystems to deliver services across all four categories--an unwelcome turn of events for everyone--including the change agents.

Amphibians

We begin with gastric brooding frogs, an amphibious species discovered in the Queensland rain forests of eastern Australia in the 1970s. What is particularly intriguing about gastric brooding frogs is their unique reproductive system. The female gastric brooding frog swallows her fertilized eggs, hatches them in her stomach, and then regurgitates them as tadpoles through her mouth. What is highly unusual about this arrangement is that acids and enzymes common to digestive systems in all vertebrates' stomachs are muted in the female gastric brooding frog by secretions from the developing tadpoles that prevent the tadpoles from being digested by their mother. Understanding the chemistry of these secretions could have important implications for treating peptic ulcers in humans, a disease that affects more than twenty-five million people in the United States alone (Chivian and Bernstein 2008).

Unfortunately, within a decade of their discovery gastric brooding frogs disappeared from the face of the Earth. The exact cause (s) of the frog's extinction is unclear, but it is likely related to human induced impacts in the Queensland rain forests coupled with the frog's narrow habitat requirements that evolved over eons of time. While attempts are ongoing to reverse the extinction of gastric brooding frogs through cloning (ABC News 2013), it appears that any human medical benefits that might have been derived from studying their reproductive system have disappeared along with them. Their loss was humankind's loss.

Amphibians are the most threatened group of organisms on the planet. Of the approximately 6,000 known species, almost one-third are in danger of extinction due to loss of habitat, alien species, increasing exposure to ultraviolet B radiation, pollution, global climate change, and infection (International Union for Conservation of Nature and Natural Resources 2006). This is especially disconcerting for humans given that amphibians possess an enormous variety of biologically active compounds that hold much promise for their medicinal value. Additionally, amphibians have played a critical role in the advancement of biomedical research, including serving as models for how electricity works in our nervous system, tissue regeneration, embryonic development, organ transplantation, and cryogenics (Chivian and Bernstein 2008).

Beyond these provisioning services, amphibians also carry out critical regulating and supporting services in decomposing organic matter and nutrient recycling as well as preying on insects too small for birds and mammals (Chivian and Bernstein 2008). Their centrality to the healthy functioning of ecosystems is obvious, and we should do all we can to

ensure the reversal of what some scientists have termed the "Amphibian Extinction Crisis" (Mendelson and others 2006).

Bears

Bears have long been prized for their medicinal value, especially in Asia. Bears are killed for their body parts, chiefly for the bile contained in their gall bladders. In the early 1900s scientists discovered that bear bile contained ursodeoxycholic acid (UDCA), a potent chemical that helps bears maximize absorption of their high fat diets to ensure they have adequate fat stores during their long periods of dormancy (Chivian and Bernstein 2008). UDCA has proven effective in treating primary biliary cirrhosis (PBC), an inflammatory, and often fatal, liver disease affecting women between the ages of 30 and 60 (Shi 2006).

In winter, when food is scarce, bears enter into a prolonged period of metabolic inactivity called "denning." They do not eat, drink, urinate, or defecate for three to five months. They recycle their bodily wastes in a way not found in any other animal. Understanding these chemical processes has important implications for the treatment of osteoporosis, renal disease, and Type 1 and 2 Diabetes in humans. Unlike humans, prolonged inactivity does not cause bears to lose bone mass [osteoporosis] (Floyd, Nelsen, and Wynne 1990); going without urinating for five months does not cause urinary waste toxicities in bears as it does in humans leading to renal disease and kidney failure in a few days (Chivian and Bernstein 2008); and the unique metabolic processes of denning bears discourages rather than encourages insulin-related problems that cause Type 1 and 2 Diabetes (Ahlquist and others 1984; Cattet 2000). In sum, the manner in which denning bears manage the metabolism of fat in their bloodstream holds considerable promise for combating human diseases associated with increasing incidents of obesity.

Nine species of bears are listed on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Animal Species, including the Polar Bear, the Giant Panda, and the Asiatic Black Bear (Chivian and Bernstein 2008). Bears are particularly vulnerable to human-induced environmental impacts, especially as a result of human encroachment on bear habitat, pollutants, and global climate change. Indeed, the U.S. Geological Survey has predicted that two-thirds of the world's Polar Bears will be lost by 2050 due to global warming (U.S. Geological Survey 2007). Under the circumstances, the protection of bears and bear habitats is wise, if only to serve anthropocentric ends. Moreover, it should be understood that killing bears for their medicinal value in and of itself is a threat to their existence in some parts of the world.

Primates

Nonhuman primates are the closest relatives to our own species. Indeed, humans are part of the superfamily, Homonoidea, which includes gibbons, orangutans, gorillas, Chimpanzees, and Bonobos. Our biological similarity to non-human primates is astounding. Human DNA, for example, is almost identical with that of Chimpanzees, differing by a mere 1.3 percent (Chivian and Bernstein 2008). This closeness in anatomy, physiology, and behavior makes nonhuman primates critically important models for biomedical research.

Scientists have identified three areas of biomedical research on nonhuman primates that are vital to the advancement of human medicine: infectious diseases and the development of vaccines to combat them; neurological disorders; and behavioral disorders. Nonhuman primates played a pivotal role in developing the polio vaccine in the first half of the 20th century. More recently, they have been instrumental in work on Hepatitis B and C, Malaria, the Ebola and Marburg viruses, rotaviruses, and HIV/AIDS. Again, it is the biological similarity between humans and nonhuman primates that makes nonhuman primates so indispensable to biomedical research. This extends to neurological research as well because the brains of nonhuman primates come closest to our own in organization and complexity. The similarities have aided researchers in understanding the nature of Parkinson's Disease (Burns and others 1983) and Alzheimer's disease (Price and Sisodia 1994). Studying the behavior of nonhuman primates has also shed considerable light on mother-infant interactions, motivational states, and the nonhuman primate equivalent of human psychiatric states, such as depression and anxiety. Of greatest note, Jane Goodall's (1988) work in Africa has demonstrated that Chimpanzees have highly complex societies, experience deep humanlike emotions, use tools, and conduct wars.

It is likely that the closeness of nonhuman primates to our own species accounts for the international attention paid to them. That same closeness also explains the empathy, concern, and objections raised by animal rights activists over using nonhuman primates in biomedical research. Of more than 350 primate species, almost one-third are threatened, and of this one-third, more than half are considered Endangered or Critically Endangered by human practices. Controlled burns to clear land, logging, hunting, habitat encroachment, and climate change have all contributed to the gradual demise of nonhuman primate habitat across the globe. Given their biological proximity to humankind, and the crisis proportions of the threats posed by human induced changes in the environment, protecting nonhuman primate habitat is vitally important to the future of all the Earth's species, not the least of which is our own.

Gymnosperms

Gymnosperms are a group of common plants known for their exposed seeds. Among the oldest of plants, common gymnosperms include trees such as pines and spruces. Gymnosperms also include the conifers, of which there are 600 species, trees that are widely used for home construction, paper pulp, and other provisioning services. Among the many medicines derived from gymnosperms are ephedrine, a compound used to treat asthma by dilating the respiratory track to make breathing easier, and isoproterenol, used to stimulate patients' heart rates when they experience heart blockage (Newman, Cragg, and Snader 2000). The bark of the Pacific Yew Tree, long discarded as useless in logging operations in the Pacific Northwest of the United States, has yielded the most important drug, paclitaxel, a drug that has been shown to be effective for inducing remissions in ovarian cancer (McGuire and others 1989).

Threats to gymnosperms come mainly from unsustainable harvesting, pests, and global warming. A poignant example of the harm that can be done to an otherwise healthy ecosystem

comes from Alaska's Kenai Peninsula, where from 1987 to 2000, 90 percent of the White and Lutz spruce trees were wiped out by the North American Spruce Bark Beetle, a beetle indigenous to the region, but historically non-threatening. Scientists have determined that global warming

led to greater beetle survival and dryer forest conditions resulting in reduced spruce tree sap production, which compromised the trees' defenses against the beetles (Egan 2002; Holsten and others 1999). Similar stories abound, including the devastating effects of White Pine Blister Rust in Montana's Glacier National Park and Bob Marshall Wilderness, killing about half the White Pines in both areas, and the Mountain Pine Beetle, which has done considerable damage to Whitebark Pine trees in the Yellowstone ecosystem (Gibson 2006). In the first instance, an early 20th century infection has finally wreaked havoc (McDonald and Hoff 2001), and in the second instance global warming accounts for the damage (Keane, Morgan, and Menakis 1994; Kendall and Keane 1994). In both instances, human beings have been the principal instruments of change threatening ecosystem biodiversity.

Cone Snails

Moving from land-based organisms to water-based organisms, we begin with cone snails, of which there are approximately 700 species. The most common cone snails live in shallow waters associated with coral reefs and mangroves. The medicinal value of cone snails is derived mainly from their production of highly toxic peptides, compounds which have proven very effective for treating pain. Indeed, one conopeptide, ziconotide, is believed to be 1,000 times more potent than morphine, the standard treatment for severe pain (Bowersox and others 1996). Moreover, unlike opiates, which can lead to addiction and often result in higher tolerance levels requiring higher doses, pain treatments derived from conopeptides do not lead to addiction or increased tolerance. Conopeptides are now relied on for patients whose pain no longer responds to opiates.

While cone snails are not considered to be threatened *per se*, the habitats they reside in, coral reefs and mangroves, are quickly being degraded around the world. Marine biologists estimate that 20 percent of the world's coral reefs are damaged beyond repair and an additional 50 percent are in danger of collapsing (Wilkinson 2004). Mangroves are in even more jeopardy as 50 percent of the world's supply has been cleared for wood, development, and aquaculture (Spalding, Blasco, and Field 1997). The potential opportunity cost for human health, should cone snail habitats be totally destroyed, resides in the fact that each of the 700 species of cone snail creates approximately 100 to 200 distinct peptides, so there may be as many as 70,000 to 140,000 peptide toxins in all. To date, scientists have studied only 100 or so conopeptides for their medicinal value (Chivian and Bernstein 2008). Obviously, the potential for cone snail peptides to contribute to biomedical research and human health has hardly been tapped. Ongoing work suggests that conopeptides may be effective in treating spasticity secondary to spinal cord injury, clinical depression, urinary incontinence, and cardiac arrhythmias, to name but a few of the medicinal possibilities. As Chivian and Bernstein conclude, "of all the families of organisms on Earth, cone snails, the Conidae, may contain

the largest and most clinically important pharmacopoeia of any in Nature” (p. 264.)

Sharks

Sharks present yet another watery example of an organism that may have tremendous medicinal value for humans, if only they and their marine environments are protected over the long run. Long maligned by humans as vicious predators, there are approximately 400 known species of sharks, and their numbers are dwindling rapidly by overharvesting. Scientists estimate, for example, that 75 percent of the large coastal and open ocean sharks in the northwest Atlantic Ocean have disappeared in the last 15 years (Baum and others 2003). Sharks are harvested for their meat, fins, and cartilage. Shark fins are especially prized in Asian countries, where customers pay top dollar for shark fin soup.

Sharks are also the apex predator in the open ocean, so as the shark population declines, rippling effects are felt up and down the food chain. Indeed, the precipitous decline in the shark population along the United States’ eastern seaboard is thought to have led to the demise of the Bay Scallop fishery, including the destruction of North Carolina’s century-old bay scallop beds (Myers and others 2007).

The potential medicinal value of sharks remains largely speculative. Shark cartilage has been studied for its potential anticancer properties, and squalamine, an aminosterol found in shark tissue, has been shown to be an effective antibiotic for a variety of bacteria (Moore et al., 1993), as well as showing some promise for the treatment of age-related macular degeneration (Garcia and others 2005). Because sharks are among the earliest vertebrates dating back 400 to 500 million years, their immune systems have received increasing scientific attention. Sharks have evolved a highly adaptive immune system, which allows them to fend off a wide range of threats. The implications for human health are equally wide ranging, including potential benefits for organ transplantation.

The wantonness with which the shark population has been treated is cause for alarm. Overcoming stereotypical portrayals of sharks as unfeeling man-eaters has led to a cultural bias against sharks that should be reversed. Sharks are far less of a threat to humankind than bees and lightning, and what can be learned from sharks stands to benefit human beings in countless medical ways.

Horseshoe Crabs

Finally, horseshoe crabs are remarkable for a host of reasons. They have four eyes as well as six other light-detecting organs, one of which can be found in the tail, six pairs of legs, and blood that turns a brilliant cobalt blue when exposed to air (Chivian and Bernstein 2008). Horseshoe crabs can be found along the Atlantic Coast of North America and the shores of Southeast Asia. They are harvested for their shells, which are pulverized and used for fertilizer, and as bait for eel and whelk fisheries. Additionally, the eggs of horseshoe crabs are a popular food source for migratory shorebirds.

The blood of horseshoe crabs is prized for its contributions to biomedical research. For decades, scientists have known that horseshoe crab blood kills bacteria, and that blood has

been used to develop antibiotic therapies. Additionally, horseshoe crab blood contains several novel molecules that may contribute to the treatment of other major diseases, including HIV/AIDS, leukemia, prostate cancer, breast cancer, and rheumatoid arthritis. Horseshoe crab blood has also been instrumental in developing an extremely effective test that detects endotoxins in humans, a critically important diagnostic tool (Levin, Tomasulo, and Oser 1970). Finally, horseshoe crab eyes have played a critical role in better understanding human vision (Graham, Ratliff, and Hartline 1973).

The principal threat to horseshoe crabs is overexploitation through fishing. It takes horseshoe crabs about a decade to reach maturity and out of approximately 90,000 eggs laid per female each breeding season, only tenor so survive, making the species particularly vulnerable to overfishing. Overharvesting in the Pacific Ocean has led to increasing pressure to exploit Atlantic stocks. A decline in horseshoe crabs has also had rippling effects on migrating shorebirds, who rely on the horseshoe crab eggs to fuel their bi-annual 10,000 mile journeys. One species, in particular, the North American Red Knot, is on the verge of extinction because of the rapidly dwindling numbers of horseshoe crab eggs in Delaware Bay along their route from Tierra del Fuego at the southernmost tip of South America to the Arctic Circle (Morrison, Ross, and Niles 2004). Once again, the horseshoe crab example illustrates the intricate and often delicate web of life that supports ecosystem services in biologically rich marine environments, environments that are continually being degraded by short-sighted human actions.

Humankind’s Role in Changing the Face of the Earth

The common denominators in all seven of these stories are human-induced impacts that threaten other species and their habitats. Humankind’s ability to change the face of the earth in dramatic and often cataclysmic ways has increased significantly in the last two centuries (Thomas 1956). A species that was once at home in nature now finds nature to be “outside” of its day-to-day comings and goings, particularly in the Western industrialized world. Urbanization and advancing technology serve as buffers between human beings and the natural world, resulting in an increasing sense of physical and psychological detachment from humankind’s fundamental ground of being. This disengagement comes at the same time human beings assume more and more power to affect nature in positive and negative ways. Under the circumstances, the environmental philosopher Max Oelschlaeger’s proposition that humankind is nature’s way of keeping track of itself (Oelschlaeger 1991), that nature has evolved a self-reflective organism that has the capacity to step outside itself, reflect on its circumstances, and change its ways takes on more and more import. While it is clear that nature can do without our species (Weisman, 2007), it is equally clear that our species cannot do without nature. It is time to exercise restraint and extend ethical consideration outward to other species and the Earth in its entirety, if only for selfish human-centered reasons (Dustin 1997).

Ecological Model of Health Promotion

These seven organisms are merely illustrative of the vast potential that a biologically diverse planet offers human beings to advance medical knowledge. As the architect Buckminster Fuller observed, “Nature is trying very hard to make us succeed, but Nature does not depend on us. We are not the only experiment” (Chivian and Bernstein 2008, p. 163.) The challenge facing humankind is to step down from its anthropocentric pedestal to assume a more humble station among the Earth’s creations, and to live life in a way that honors and protects the larger web of life.

To assist in this educational process we now tie the concept of ecosystem services to an ecological model of health promotion (Dustin, Bricker, and Schwab 2010) to illustrate how organisms throughout nature work cooperatively to deliver provisioning, regulating, cultural, and supporting services. As Figure 1 shows, at the heart of a healthy planet is biodiversity. In its fullest expression, a biologically rich planet sustains itself through an intricate web of ecosystem services, of which our species, *homo sapiens*, is but one of countless service providers and consumers. The star and directional arrows all point toward interactions and interdependencies that serve as channels for ecosystem services to be delivered back and forth to sustain the web of life. To be truly healthy, the Earth’s ecosystems must be characterized by reciprocity based on an appreciation of the symbiotic nature of things. Just as amphibians, bears, nonhuman primates, gymnosperms, cone snails, sharks, and horseshoe crabs all play their parts in the give and take of things, so, too, must humans play their part. As Aldo Leopold (1949) reasoned, we must willingly assume our role as plain members and citizens of the larger community of life. This requires jet-

tioning the hubris that has characterized humankind over the ages and replacing it with a more humble perspective regarding our place in the vast scheme of things.

Health should be understood as a dynamic relationship that can best be conceived in broad ecological terms. Health, from an ecological perspective, is a measure of the wellness of the individual and the ecosystem considered together. The individual cannot be healthy independent of the condition of the larger ecosystem, and the larger ecosystem cannot be healthy independent of the condition of the individuals constituting it. Healthy individuals require healthy families, healthy families require healthy communities, healthy communities require healthy nations, healthy nations require a healthy planet, and so on. Health, at its core, is symbiotic in nature (Schwab, Dustin, and Bricker, 2009).

An ecological model of health promotion illustrates that human health and environmental health are part and parcel of the same thing. We cannot have one without the other. That is because humans are part of nature after all, and what is good for one is good for the other and what is bad for one is bad for the other. Amphibians, bears, nonhuman primates, gymnosperms, cone snails, sharks, and horseshoe crabs may not understand this, but humans can and must understand this if our grand experiment is to last. What distinguishes our species from the rest is self-awareness. We have the ability to step outside ourselves, reflect on our circumstances, and make changes when necessary. We have the capacity to mend the errors of our ways. That, if anything, is what separates us from our fellow mortals. Our ongoing challenge is to put our self-awareness to work in service of the larger web of life, plain and simple.

Wilderness and Everyday Life

Perhaps the biggest challenge we face in trying to get the world’s citizenry to appreciate the interconnections and interdependencies described in this paper is to help them see in a close-up and personal way how ecosystem services actually work, how things seemingly distant and far removed from our everyday lives are, in fact, connected to each of us in very direct and meaningful ways (Dustin 2003). This ‘vision’ problem is at the heart of the interpretive challenge. As Freeman Tilden observed in his first principle of interpretation, if the message we are trying to deliver does not resonate with something within the experience of the visitor, it will appear sterile (Tilden 1957). How then should we proceed?

In “*Thermus Aquaticus and You: Biodiversity, Human Health, and the Interpretive Challenge*” (Dustin, Schwab, and Bricker 2010), we tell the story of DNA testing through the eyes of exonerated prisoners, a potential circumstance to which almost everyone can relate, and then gradually fill in the back story with a series of scientific events that led to the DNA testing technique. The story takes us back to the establishment of Yellowstone National Park in 1872 and the protection of scalding geyser basins that were the source of *tak* polymerase, a heat resistant enzyme instrumental in DNA testing that was extracted from *Thermus Aquaticus*, a heretofore unknown bacterium that remained undiscovered until the late 1960s. Had Yellowstone not been set aside and protected as a national park by President Grant in 1872, who knows if the scientific discovery that led to DNA



Figure 1—Ecological model of health promotion.

testing would ever have been made. It is a poignant story about the benefits that can accrue to human beings when nature's biodiversity is safeguarded in the form of parks, open spaces, and wilderness areas.

We need more stories like this that overcome the challenges presented by time and space as obstacles to understanding ecosystem services. Our lives are continually affected by natural forces we can neither see nor hear, yet that perceptual problem is no excuse for denying their impact on the quality of our lives or the quality of all life on Earth. We are proximal beings affected by distal forces, and we must improve our vision so that we might better see these forces at work. This is the interpretive challenge that Chivian and Bernstein (2008) leave their readers with, and this is the challenge we must take up if we are to demonstrate the relevance of wilderness to everyday life.

In the end, reducing the perceptual distance between wilderness and day-to-day living is critical to the protection of the planet's biodiversity (Dustin 2003). We have to do a better job of showing how the ways in which we live our individual lives in urban conclaves impact wilderness and how the existence of faraway wilderness impacts our urban lives. In an age when people are rapidly distancing themselves from their biological moorings, reconnecting them with nature is increasingly important. Children who are exposed to nature grow into adults who care about nature (Chawla 1998), while children who are not exposed to nature grow into adults who are indifferent to nature (Louv 2005). Moreover, educational philosophies like "Leave No Trace" and "Minimum Impact," which are touted as responsible environmental orientations for conducting ourselves in pristine nature must be incorporated into our daily living habits such that we reduce our collective carbon footprint on the Earth and its store of limited nonrenewable natural resources in significant and lasting ways (Cachelin, Rose, Dustin, and Shooter 2011; Cachelin, Paisley, and Dustin 2009). Learning to live within our means and drawing less on the Earth's rapidly dwindling stock of ecosystem services has to be part of any long range plan for socially and environmentally responsible living, as well as finding self-fulfillment in social and interpersonal relationships, and in intellectual, emotional, and spiritual growth rather than in the consumption of finite material possessions (Dustin, McAvoy, Schultz, Bricker, Rose, and Schwab 2011).

Conclusion

As Sigurd Olson reminds us in *Reflections from the North Country*, the greatest achievement in our flight to the moon is "a picture of the earth, a living blue-green planet whirling in the dark, endless void of space, and the realization that this is home" (Olson 1977, p. 59). From space there are no political, cultural, or social boundaries. From space there are no ideological schisms. From space there is only one ecological reality within which we must learn to live our lives (Dustin 1991).

In this paper we have illustrated how the Earth's organisms depend on one another to sustain themselves. To behave as if human beings are somehow outside of or beyond this intricately woven web of life is wrong-headed. We are a part of, not apart from, nature, and we are obliged to abide by nature's laws. And while people might someday prefer to live

on other planets, for now the Earth is our only home, and we would do well to conserve its biological treasures accordingly.

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Sacred Hills of the Toda People of South India: A Plea for World Heritage Status

Tarun Chhabra

Abstract—The Todas worship scores of hilltops where they believe their principal deities or clan-specific local gods reside. It is thus considered sacrilege even to point towards such a deity peak with one's finger. It is also no coincidence at all that the area in and around the Toda sacred-landscape, where their major hill deities are believed to reside, has come to constitute in recent times, the core of the Nilgiri Biosphere Reserve. This is the very first biosphere reserve in all of India (1986). There is now an urgent need to have this region inscribed as a World Heritage site.

The Toda Dreamtime

The Todas (Fig. 1 and Fig. 2) have occupied the Nilgiri Hills since time immemorial. Toda society is divided into two endogamous divisions: Tawrrta(r)sh with ten extant exogamous patrilineal clans and Taihhfill(zh)y, with five. During their Dreamtime, it is said, gods and Todas lived alongside. Natural landmarks still exist that are associated with divine exploits, testimonies to their life stories



Figure 1—Dairyman-priest purifies newly rebuilt temple with sacred tehadr bark, a species (*Meliosma simplicifolia*) that no Toda layman may handle.

Tarun Chhabra, Dentist and Founder of Edhkwhehlynawd Botanical Refuge (EBR) and Toda Nalavaazhvu Sangam (Toda Welfare Society), Hospital Road, Ootacamund-643001, Nilgiris, South India. E-mail: kwattein@bsnl.in

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Figure 2—The winter sun sets over the twin peak of Kaa(r)sh-gol.

that Todas still remember. These gods and goddesses, after their time in human form, went on to occupy various hill summits where they are believed to reside even now. These are called *taihh-tehtt* or “deity-hills”. Their presence is so real and sacred that a Toda elder would not commit the sacrilege of using his finger to point out the location of a deity peak. He will rather point to the neighbouring hill and say: “The peak next to that”. Todas passing in the vicinity of a deity peak reverentially salute the summit by adopting the *koyemukht* posture, raising the right forearm with palm outstretched and having the left hand touch the right elbow, as they softly chant the *kwa(r)shm* or sacred name of the deity. Before taking up residence in nearby hills, deities like Goddess Taihhki(r)shy, created Toda buffaloes that were distinct for the dairy-temples attached to each patriclan, and those that were allotted for domestic purposes. She then created a particular category of sacred buffalo herd for each of the temple grades. She gave the *kwa(r)shm* or sacred words to all the sanctified areas, sites and buffaloes as well as to numerous species of flora and fauna. Finally, God Aihhn decided to establish the afterworld where Toda spirits, provided they had performed all their rites of passage, would journey and reside.

A typical Toda prayer consists of sacred chant words addressed to such mountain gods, along with other natural landmarks, like nearby peaks, slopes, valleys, ridges, shola thickets, specific sacred trees, rocks, swamps, meadows, pools and streams. There are *kwa(r)shm* also for the dairy-temple, buffalo pen, pen-posts, pen-post bars and other dairy-temple items. If we analyse Toda prayers, we find a corpus of sacred names for several hundred natural features; and if we attempt to map all the named features that have survived the ravages of the recent march of civilization, then we have one

important aspect of Toda sacred geography in place. Of the natural landmarks, hills are the most sacred entities and represent either a major, or a local deity. Consequently, any attempt to reconstruct traditional Toda cosmography must begin with deities who dwell in sacred peaks, who created the sacred buffaloes whose milk is processed in the dairy-temples, and the Toda ethos.

Toda Deity Hills

Todas recognise thirty-four sacred places as *taihh-tehtt*, “deity-hills” (although a few are associated natural landmark features such as, rocks, cliff-faces, etc.). In addition there are hills not included among the thirty-four *taihh-tehtt*, but which specific clans or hamlets regard as being just as sacred. Since all these are considered to be the abodes of the gods, they are treated with extreme reverence and are mentioned in prayers. Although deity and other sacred hills are central to Toda culture, there is no ceremonial activity associated with the preservation of their sanctity (apart from the chanting of their sacred names in prayers).

These natural features that are gods are sacred to all Toda clans. In many instances, a particular god is also the ruling deity of one or more specific clan. Thus for example, Kaa(r)sh-gol is a god for all Todas (Fig. 2), but is also the ruling deity of Kaa(r)sh clan. Some clans have a special relationship to more than one of the thirty-four *taihh-tehtt* listed above. For instance, Maihhdr clansmen look to Kawnttaihh (his hill near Avalanche, better known as Devar-Betta) as their ruling deity, but also revere Kwatteihhn, a former clansman who became a god, as a special clan deity. Kwatteihhn’s hill is located in the Attapadi Valley in neighbouring Kerala and commonly known as Malleswaran Mala (Lord Shiva’s mountain; 1664 m). Six other hills in Attapadi Valley are also associated with Kwatteihhn, and therefore sacred to Todas. Next to Kwatteihhn’s hill is that of his divine consort, Goddess Teihhkosh (1554m), adjacent to which is that of his inseparable friend, Errtn (1447m). Four other hills in the general neighbourhood are those of his other friends, Kalgyawdr, Pehnpehhroty, Eezzeihhm and Koll(zh)taan. Besides Kawnttaihh and the seven hills associated with Kwatteihhn, Maihhdr clan is closely linked with four other major deity hills and sites, viz. Aihhzaihh, Mōzaihh, Nee(r)shngo(r)shy and Tehhkaihhny, all of which are situated in the Upper Bhavani-Bison Swamp area.

Because Kwatteihhn was the last among Todas who became hill deities, his life story is remembered well and I shall outline how he came to reside in his special hill. Towards the end of his life, Kwatteihhn and friend, Errtn, were returning home with salt from Peihhht (in Mannarkad area). When they crossed river Pōlpahh, just below the Kurumba tribal village of Pawny (Tudiki), Kwatteihhn saw a hair entwined around his foot. On lifting it up, he was astonished to see that it had an unusual golden hue and was very long. He asked Errtn to wait while he went upstream in search of the person to whom this exquisite hair belonged. Errtn, who had a foreboding of what might happen, tried to dissuade Kwatteihhn, but he would not listen. The story then tells how Kwatteihhn soon came upon a group of divine females playing naked in a beautiful pool of water, with their capes placed on a nearby rock. When they spotted Kwatteihhn the females quickly gathered up their clothing and ran away. But one was left behind. Realising that the remaining figure was Goddess Teihhkosh, Kwatteihhn sat atop her clothing until she agreed to marry him. Finally, she acquiesced, although Kwatteihhn would soon have to pay the price for his audacity.

Later, as Kwatteihhn and Errtn continued their return journey to the Nilgiris, a *kaarrpill(zh)c* bird (*Saxicola caprata*) irritated Kwatteihhn by fluttering across his path. Errtn understood that this bird, harbinger of future events, was telling Kwatteihhn that his time in this world was up. Sure enough, next morning, Kwatteihhn was missing. All that remained to be seen was the deerskin on which he had slept, his silver ring and some froth. Legend has it that Kwatteihhn later took residence inside an outstandingly-peaked hill in Attapadi to the southwest of Nilgiris.

R.W. Burton (1940) describes the peak where Kwatteihhn resides as possessing a “remarkable pinnacle having a 400 ft. perpendicular scarp, which dominates the whole valley and can be seen stabbing the sky from [as far away as] Mettupalayam. It is said that no man has ever set foot on the top of the pinnacle ...” Burton’s observation that no man had set foot on the summit notwithstanding, this peak has long been the site of a Kurumba shrine dedicated to Lord Shiva and the destination of an annual pilgrimage. On the night of Mahashivaratri, Kurumbas select around twenty amongst themselves to pilgrimage to this peak. In recognition of the fact that this peak is also the abode of a Toda deity, they sometimes take Todas along and only the chosen few are permitted to ascend to the holy summit (Fig. 3).



Figure 3—Kwatteihhn Peak: a panoramic view just before the final ascent.

Kaa(r)sh-gol, the Origin of the Monsoon and Other Pilgrimages

Kaa(r)sh-gol (Nilgiri Peak) is one of the most important of the Todas' deity hills and the abode of a god of the same name. He is the ruling deity of Kaa(r)sh patriclan, which shares his name. This peak, a sheer massif, 2476 m, is in Toda thinking, intimately related to the onset of the Southwest Monsoon. Todas say that the first mists of this monsoon swirl around this hill—like people perambulating a temple building—before moving to the deity hill Kawnttaihh (Devar-Betta), where the mist similarly encircles the summit. Todas believe that, following this phenomenon, the monsoon rains will begin and that the mist will not leave these two peaks until the Southwest Monsoon peters out.

At Kawnttaihh hill, three conical projections may be seen on its rocky face. The Todas have a *kwa(r)shm* for each one, viz. *Keezhkymehn*, *Kwaw(r)shy-vōh* and *Tee(r)shymudry*. They say that these three conical projections store the mist, wind and rain respectively. They believe that, while he was eating some *kaihh(r)sh* fruit (*Syzygium densiflorum*), Kawnttaihh spat out the chewed on seeds that became the mist. As he spat out the seeds, the air expelled from his mouth became the fierce monsoon wind that ever since, has bombarded the Nilgiris. Finally, his spittle became the monsoon rain.

Because Kaa(r)sh-gol peak is considered by Todas as not ascendable, and the other peak associated with the onset of the Southwest Monsoon, viz. Kawnttaihh happens to be the ruling deity for hamlets situated in the Kundah Range, Todas undertake an annual pilgrimage to this hilltop.

Once, when this writer was visiting the seasonal hamlet Kwehh(r)shy, he was able to participate in this pilgrimage. The priest had brought some milk in a bamboo vessel and, at the summit, poured this milk onto a flat rock, while all prayed and prostrated themselves. The pilgrims danced and chanted the *konn. ezht* song composition in the traditional manner. They prostrated themselves towards the distant hill where God Kwatteihhn resides. The pilgrims also executed the *koymukht* salutation and prayed in the direction of all major water, hill and other sacred sites located in this area and prayed for success of the impending monsoon. Along with the salt-giving rites, the pilgrimage to Kawnttaihh hill (Fig. 4) represents a Toda attempt to maintain the sanctity and health of their environment.

Another hill to which Todas pilgrimage during onset of the summer showers in April is Mount Paw(r)sh where they conduct an annual ceremony and pray to this hill's deity and that of the Pykara River that flows below, for blessings, ecological and general well-being.

Clan Deities and Their Hills

The ruling deity of Nawsh patriclan resides in Pwoo(r)shy hill located near the clan's chief hamlet. This is the abode of the pre-eminent Toda goddess, Taihhki(r)shy. Her husband P-heedhy resides in a prominent peak located in Mukurti area, named after him (Fig. 5). This is the second important hill for this clan; another is Kehrr-taihh, whose resident hillock is located in the vicinity of Nawsh hamlet, as is Mokhwehdr-tehnp, a grass-covered mound deity site.



Figure 4—The pilgrimage to Mt Kawnttaihh is an indirect method of ecosystem management.

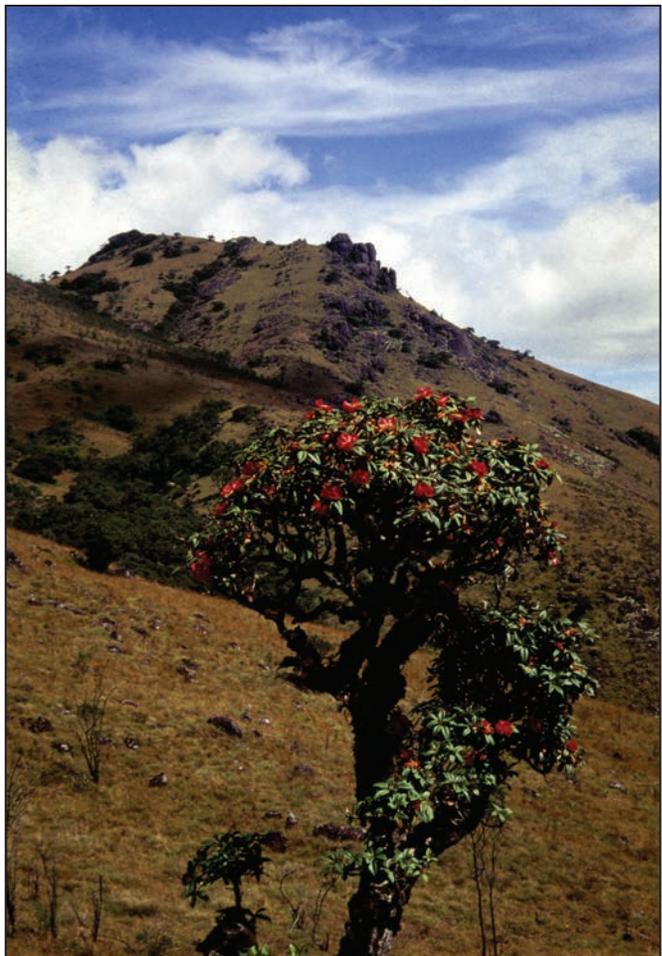


Figure 5—Deity hill P-heedhy dominates the Mukurti landscape.

Nehdry clan has Kawdr-daihh as its ruling deity, whose peak is located in Hullikal area of south-eastern Nilgiris. In order to resolve the predicament caused by Kwattaihh's intransigent behaviour, the gods once summoned a council at Mount Tehhkolmudry. Kwattaihh attended, but refused to heed the gods' censure, who then decided that one of them, Kawdr-daihh, would take Kwattaihh to a cliff and push him into the abyss below. Kawdr-daihh accomplished this feat, but Kwattaihh had a soft landing on a thicket and used a bamboo pole to vault back and hit his aggressor on the head, splitting it into three pieces. This is why, the legend tells us, even today Kawdr-daihh's peak has three projections. The female Goddess Nawtt.ee(r)shy is the ruling deity for Melgaa(r)sh clan; this imposing hill, named Mt Snowdon by the British, is located near Ooty Town. Another deity of Melgaa(r)sh clan is Kwattaihh, a clansman who later became a god (see above).

Korattaihh, is the ruling deity of two patrilineal divisions: Kaihhr-rawdr of Tawrrta(r)sh division, and Kaihhrdr of Taihhfill(zh)y division. This god's hill is located near the principal hamlets of both these clans. Korattaihh, another son of Goddess Taihhki(r)shy, is said to have emerged miraculously from her afterbirth that floated down Pykara River. Legend goes that the baby roamed around the temple complex of Awdr, located at the lower end of Pykara River. He began to play with the sacred calves and to touch various sacred dairy objects. God Kondhill(zh)y-daihh, residing in a peak in Mukurti area was alarmed at the child's behaviour. At this time, the nearby Kawtt.y deity hill, was higher than Kondhill(zh)y-daihh, and thus the latter could not always see the boy interfering with the sacred dairy operations in the distance. So it is said, Kondhill(zh)y-daihh took a buffalo pen-post and struck Kawtt.y peak, breaking it into three smaller summits. This reduced Kawtt.y's height, permitting Kondhill(zh)y-daihh to keep constant watch over this boy from a distance. Once, God Teihhfakh, who happened to be this boy's maternal uncle, was passing by. Seeing the boy, he set him on his lap and immediately recognised him as his sister's son. When the gods next met in council, they decided that Teihhfakh's nephew should henceforth occupy the peak that was to be named Korattaihh after him.

Pehrgawdr clan has the nearby female deity hill, Etyott.y-daihh (commonly known as Rangaswamy Betta, 1786m), as its presiding deity. This goddess is said to be the consort of Kawnttaihh, mentioned earlier. This patrilineal clan has a second major deity, Kwehdrehnn-ddaihh, whose hill (1490m) is located beyond the Nilgiri range, in what is now called Dimbum Ghat. This deity was a son of Goddess Taihhki(r)shy and a story relates how he once had an altercation with his mother, who, in an attempt to subdue him crushed some shoots of the *kwaagehl* plant (*Cyanotis* sp.) on a still visible rock and, preparing an infusion, poured it over the boy. This however only caused his neck to bend. For this reason, Todas say, the distant hill (visible from the Pehrgawdr area) has a curious bend close to its summit (Fig. 6).

The Tawrrawdr clan has Po(d)zeveh(r)shn and Peh(r)sheveh(r)shn as its ruling deities. These gods are two more of Goddess Taihhki(r)shy's sons, who reside in adjacent hills. Two other deities important to this patrilineal clan—mentioned in its prayers—also occupy adjacent hills Tehhvony and Kaadhmoof nearby.

The deity hills associated with Kehhwehdr clan are Kawtt.y, located in Mukurti area, and Taihhkhaa(r)sh (Wapshare Peak, 2275m), located near Kaa(r)sh-gol (Nilgiri Peak).

Locally-Sacred Hills

Besides the hills that are residences of ruling deities for various clans, there are others that are hamlet-specific. Whenever one hamlet is located away from the main patrilineal settlement area, it will usually have a deity hill nearby as its sacred site. For example, Melgaa(r)sh clan's seasonal hamlet of Nhyoollnn, is located in the Kundahs, the heartland of Maihhr clan. Consequently, Nhyoollnn hamlet's presiding deity is Kawnttaihh (see above). Mheen hamlet belongs to Kehhwehdr clan, but regards the nearby Nawtt.ee(r)shy hill and its resident god as its presiding deity rather than Kawtt.y and Taihhkhaa(r)sh that are the ruling deities of the entire clan.

It was on the slopes of deity hills Kawtt.y and Kawnttaihh that the dairyman-priest at the most-sacred tee institutions would ritually fire (with firesticks) the grasslands to herald the onset of the winter season. This also served an important purpose of direct management of the ecosystem, but has been proscribed by the Forest Department.

Besides these deity peaks, there are other hills that are exceptionally important to one patrilineal clan. Some of them are regarded on a par with the deity peaks themselves and represent the ruling deities of particular clans. For example, Taihhkavfy at the northern edge of the Upper Nilgiris is particularly sacred to Teihhfakh clan, while Tehhkolmudry on the north-eastern edge (where gods are believed to have held council in ancient times) is especially sacred to Kerrir clan. In both cases, the sacred hill is close to the clan's chief settlement.

Some Toda clans have no major ruling deity, but worship the local god of a nearby hill. There are also numerous minor hills that are sacred to one or more hamlet(s) located nearby (see Table 1 for an example) and are mentioned in the prayer of the associated hamlet(s).



Figure 6—Kwehdrehnn-ddaihh's summit has a "bent neck" appearance.

Table 1—Sacred Hills and their kwa(r)shm according to patriclan and hamlet associations (example of one hamlet given here).

Patriclan	Hamlet	Sacred Name of Hill	Associated Couplet (kwa(r)shm)
Kaa(r)sh	Kaa(r)sh	1)Peihhdhawll(z)	1)Kawllvehll(zh)/Peihhdhawll(zh)f//
		2) Oodhill(zh)nn	2)Oodhill(zh)nn/Ehchoodhill(zh)nn//
		3) Agaa(r)sh	3)Ta(r)shagaa(r)sh/ Ta(r)shaarrkwehhdr// Ta(r)shaarranboll(zh)y///

Finally, in discussing hills sacred to the Todas, we must not forget those located in Amunawdr, the Toda afterworld that is physically located in the far south-western Nilgiris. The most important of these are Taihh-mush-kullnn, the abode of Aihhn (Fig. 7), who rules this afterworld, and the hill into which both human and buffalo spirits are said to disappear into the afterworld.

Todas believe an entire sacred peak is the manifestation of its associated deity. Consequently, they do not build shrines on the summits of sacred hills, as is the custom of some other Nilgiri peoples. There are instances, however, where a single peak is sacred not only to the Todas, but also to some other people. It is for this reason that many of these hills are popularly known as Devar-Betta, literally “God’s hill”, in the Badaga language. We saw above how the hill that Todas know as Kwatteihhn is regarded by Kurumbas as being the abode of Lord Shiva and they have built a hilltop shrine there. Similarly, Kawnttaihh is a hill sacred both to Todas and Badagas and the latter have built a shrine at the summit. Finally, the hill that Todas call Etyott.y daihh, is sacred to three communities: Todas, Irulas and Badagas, and is better known as Rangaswamy Betta, since there is a temple dedicated to Lord Ranga, an aspect of the all-India deity Vishnu on its peak.



Figure 7—Taihh-mush-kullnn Peak, from where God Aihhn rules over the Toda afterworld.

Deity Hills and their Sanctity

Emphasising the belief that gods reside inside the hills, Todas relate stories of how they have heard sounds of resident gods entering his or her hill and closing the entrance behind them. At Kawllvoy, close to Pazhtaarr hamlet, one can actually see a door-like entrance on the cliff-face of this hill. Similarly, at Awllvoy, situated behind Krurmund Waterfall, a door-like feature can be seen in the rocks.

There are several stories concerning the power of a specific hill god. One well known recent story relates to the construction of the hydroelectric dam at Upper Bhavani. During the building process, workers started digging earth from the nearby deity hills, Aihhzaihh and Mōzaihh. This earth was to be used for the construction work. Some Toda elders, committed to their sacred hills, protested at this sacrilege, but their words were not heeded. After a while news came that, during the excavation, earth had caved in and killed some of the labourers. Subsequently, these hills were left untouched.

In the traditional Toda mind, any alteration in the ecosystem around a deity hill indicates a profound sickness of the environment. This may be due to the planting of exotics, or to actual destruction.

An Appeal for World Heritage Status

The information provided in the first section of this paper establishes the cultural criteria for the area under the Toda sacred hills and related ecosystems to be designated as a World Heritage (WH) site. As the biodiversity value of this area also overwhelmingly fulfils the natural criteria, it is proposed to be recognised as a “mixed” WH property.

Since a nearby portion of the Western Ghats (Anamalai Cluster) has recently been inscribed as a biodiversity WH site, the area in and around the complex of Toda sacred hills also has the similar “Outstanding Universal Value”, a key requirement for inscription of a property on the WH List.

Secondly, the ecosystems of the Toda sacred hills form the heartland of the Nilgiri Biosphere Reserve (NBR), the first such to be recognised by UNESCO under their Man and Biosphere Programme in India (1986). This was in recognition of the outstanding bio-cultural diversity of this area, for example, there are over 130 flowering plants endemic to a small area.

In addition, all the endangered mammals of this area like the Asian Elephant (with perhaps the most numbers in the world), Lion-Tailed Macaque, Nilgiri Tahr, Bengal Tiger, Wild Dog (Dhole) and Dusky-Striped Squirrel are found in the NBR. There are also several Important Bird Areas (IBAs) in and around the Toda sacred hills and they contain healthy populations of most of the sixteen endangered bird species of the Western Ghats (the Western Ghats have the second highest number of IBAs in the world, 29). One resident bird species, *Garrulax cachinnans* (Nilgiri Laughing-thrush), is restricted to a home range of less than 1000 sq. km. Although the Western Ghats as a whole is listed as an Endemic Bird Area (EBA; another important criterion for being listed as a WH site), it needs to be emphasised that there are species endemic to a very small area, located precisely where the sacred hills of the indigenous Toda people lie.

Besides, even among amphibians, there are a number of species endemic to the region where the Toda deities reside in their peaks. Many frog species are being discovered regularly, for example, *Raorchestes ravii*, in 2011 (yet to be assessed by IUCN). Among insects too, there are a number of endemics with a very restricted range, like the Nilgiri Clouded Yellow (*Colias nilagiriensis*) butterfly.

The sacred landscape of the Todas constitutes the heart of the Western Ghats Global Biodiversity hotspot. The NBR is also a part of the Global 200 priority eco-regions and an International Centre of Plant Diversity (CPD). Moreover, it is classified as a Key Biodiversity Area (KBA) as well as a global Alliance for Zero Extinction (AZE) site. All these are taken into consideration while determining potential natural WH status.

At the ecosystem level, the highland shola-grassland climax ecosystem of the Western Ghats (especially in and around the Mukurti National Park where most of the Toda sacred hills are located) is recognised as globally unique. The stunted evergreen, montane shola forests that lie in the moist hollows between extensive grass-covered hills,

are referred to as “living fossils”, as they are thought to be relics of ancient and far more extensive forests dating back to the time of the undivided mega continent, Gondwanaland.

From the points mentioned in this paper, it is apparent that the region in and around Toda sacred hills meets both cultural as well as the two primary biodiversity criteria: (ix) as they are clothed with globally unique ecosystems that exhibit high endemism at species and higher taxonomic levels and (x) as they host scores of locally endemic species and their habitats, thus meeting the requirements for it to be inscribed as a mixed WH site.

A study by the IUCN World Heritage Programme in 2013, lists the Western Ghats as the most irreplaceable WH site for threatened amphibian, bird and mammal species in the world. This study also categorically recommends that the existing WH site in the Western Ghats may merit extension, by accommodating contiguous or close by areas, through serial approaches, to better reflect the exceptional species values in the larger areas surrounding them.

Concluding Remark

The above-mentioned serial approach can be used to add the area in and around Toda sacred hills to the existing Western Ghats WH site as a mixed (cultural and biodiversity criteria) property and protecting it accordingly.

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Wildfire in the Valley of the Wild Roses

Linda Moon Stumpff

Abstract—Santa Clara Indian Pueblo lands are adjacent to the Jemez National Forest, Bandelier National Monument and Valles Caldera National Preserve. This paper explores Pueblo vulnerability and resilience after repeated and devastating fires in this century as a result of drought and climate change. Santa Clara Pueblo holds a rich store of traditional knowledge about the fire-prone ecosystems that contributes to restoration efforts after this series of high-severity fires in the Jemez Mountains. Forested lands and wilderness shrines are lost, Santa Clara Creek and watershed suffers from erosion and much of the Pueblo's protected lands burned along with Pueblo archeological and cultural sites on public lands. Long ago, the Pueblo created a three zone management system that preserved the upper wild lands as a sacred source of water, protected the middle creek as an ancestral home, and created a homeland supported by sustainable agriculture in the Rio Grande Valley. Deep interviews and discussions with key tribal and western scientists provided sources for this paper that explores how Western Science and Pueblo Wisdom converge in emerging interactions around re-wilding, restoration and protection of the Pueblo model.

The Pueblo of Santa Clara

Santa Clara Canyon, formed by Santa Clara Creek, is a deep ravine lined with spruce, pinon and aspen for over eight miles pouring at last into the Rio Grande. The Jemez Range surrounds it on the east and the snowpack at the higher elevations feeds into a vast system of tributaries, underground waters and springs. It is the source of water for Santa Clara Pueblo: the headwaters form a cultural shrine. The Pueblo of Santa Clara, called, Kha P'o Owinge, the Valley of the Wild Roses, in the Tewa language, is a place where culture and water in all of its forms are intertwined in time. Integral to the heritage and to spiritual connections, the use of clear water from the wild watershed source in the upper region remains vital to ceremony and to practice. The upper watershed is regarded as a shrine, the middle section holds the knowledge of ancestral dwellings and ways, and the lower component provides a homeland for sustainable agriculture.

Linda Moon Stumpff is a faculty member in Tribal Governance and the Master of Environmental Studies Programs at The Evergreen State College, Olympia WA. E-mail: stumpffL@evergreen.edu

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Fish and deer were plentiful along the clear waters of the creek, and a protected old growth forest thrived in the upper watershed. Spruce, aspen and ponderosa thrived along with plants important to ceremonial life. Medicinal plants grew there. Further down the Canyon lay the ancestral Puye Cliff Dwellings, inhabited until 1600. Santa Clara Pueblo itself sits at the bottom in the rich valley today, with Santa Clara Creek skirting the Pueblo's Plaza on its way to the nearby Rio Grande River. With the upper Canyon surrounded by federally protected land including wilderness, preserves, and other protected areas in federal hands, and the Pueblo in control of 47,000 acres of the Canyon, it would seem a serene and sustainable future was in place.

Snowball on Fire—Ice to Flames and Floods

This case study focuses on Santa Clara Pueblo, but the impacts from the loss of the natural fire regime in fire-prone forest ecosystem are a landscape level problem. Frequent fires were part of the previous regime in the Jemez Mountains that encircle the Pueblo lands to the East. Fire in wild areas can have beneficial effects extending to other areas: it can help to clear out fuel buildup and balance the natural regime. (Arno, et al 1999, Pyne 1995, Noss et al 2006, Miller, 2013) The benefits can vary depending on the terrain, size and severity of the fire. The Santa Clara case points to the need to take an interdisciplinary approach in all phases of fire planning and response. The forests of the Southwest United States are not comparable to the great boreal or temperate rainforests of the North. In the Southwest, ponderosa and spruce forests usually exist on the isolated peaks and mountain ranges—The String of Turquoise—that feeds the watersheds critical to all life. An adequate snowpack and gradual melt in the dry springtime provide the water for most life forms. In recent years drought and lack of frequent low-intensity fires combined with past practices like logging and grazing to bring about the result of unhealthy, disease-prone forests. These densely packed forests cut off sunlight from the forest floor, arresting the development of grasses, shrubs berries and insects that are foundations of the forest food chain. As temperatures warm up, fires of increasing size and intensity are the result. Historically, prescribed fire and un-suppressed natural ignition fires were frequent in the Jemez Mountains and Puebloan thinning practices for agriculture opened up areas. (Margolis, Swetnam, Allen 2013) As Pyne has noted “Much of the natural world that preservationists seek to protect co-evolved with anthropogenic fire. To remove that fire regime may be catastrophic...” (Pyne, 1995) In the case of the Jemez Mountains, very little land is allocated to wilderness. It is possible that if wilderness areas were expanded with specific legislation that dealt with restoring

the natural fire regime through carefully planned prescribed fire, that risk might be reduced.

The recent fires originated outside Santa Clara Pueblo lands and they were all sparked by human activity. Conditions on public lands combined with climate change and increased human habitation and activity led to the incendiary conditions where fires ran up the steep canyon terrain and created high risks for firefighters. Not only are the fires larger and faster—Las Conchas moved at an acre per minute in its early stages—but the areas burned again just a few years before by the Cerro Grande fire. The after-fires meant the re-burning of a fire-burned area to create a massive scar with damaged and unstable soils.

The Cerro Grande Fire in 2000 burned 12,000 acres of forest on Santa Clara Pueblo lands. In 2011, the Las Conchas Fire was worse: it burned over the old fire scar and entered the Santa Clara watershed again. This time the Pueblo lost 16,600 acres of forested tribal lands and 80% of the watershed was impacted in this 150,000 acre fire. The Dome Wilderness on Forest Service lands burned twice. The Thompson Fire in 2013 burned in the Valle Caldera National Preserve, only 20 miles south of Santa Pueblo lands. The floods that followed the fire-ravaged lands in summer ripped away trees, destroyed cultural areas, and filled the riparian areas and fishponds with mud.

The Importance of Traditional Knowledge

The Canyon and all of its beings, including the Santa Clara People, hold a rich storehouse of phenological knowledge necessary to conduct sustainable agriculture and conserve wild areas as shrines. A ceremonial calendar connects people with the land, the wilderness sources of water and life and the harvest and planting cycles. Over the years the Pueblos drew from their treasure house of knowledge, for taking care of the forests, for dry land farming and later for indigenous irrigation systems. This existence was, and remains, based on access to clean water sources that emerge from federally protected lands and wilderness and tribally protected areas.

The knowledge they hold—traditional knowledge—is knowledge in motion across time, passed through the centuries by a community of people. Dr. David Warren, an intellectual leader from Santa Clara Pueblo, speaks of where it comes from and the intergenerational reach of the Santa Clara model:

“I think it would be well for us to remember whatever was defined by the earliest people here in defining the universe. The area we live in is a little crucible. It is bounded and it is shaped, and it is defined by the physical mountain ranges. I think it is within that crucible that for 10,000 years, perhaps even longer, people had learned to live on the margin of many, many kinds of limitations...in the human and material resources that define a land that has got very little water.” (Loeffler 2008 p.83-84)

He suggests that knowledge is found in the visible artifacts of the past that are understood through cultural transcription through hundreds of generations—through the story of the Cliff Dwellings, the pottery, the symbols, and the language. (Loeffler, 2008)

Joe Baca, Intergovernmental Coordinator for the Pueblo, eloquently described three components that support traditional knowledge forming the basis of Santa Clara identity that should not change. (Baca 2013)

1. The language—language carries the traditional ideas and concepts, the oral history, the vehicle for continuance of traditional ecological knowledge. Kha P'o Owinge means Valley of the Wild Roses implying the beauty of the existence of extensive riparian areas.
2. The arts of the Pueblo: famous for its pottery, the Santa Clarans use a variety of symbols like Avanyu (the water serpent and protector) that carry cultural meaning. The practice of pottery-making uses native clays, handwork and the firing process uses dried manure not fossil fuel.
3. The ceremonial life and ceremonial calendar along with wisdom of the elders. Dances mark events in the ceremonial calendar, renew the bonds with the land, the waters and the forest. The elders and the kiva leaders still control the decisions of elected tribal leaders.

All three of these components connect the people with the wilderness headwaters of Santa Clara Canyon and the waters of the Rio Grande in a model for living with wild places. The waters that issue from the shrine high in the Canyon support sustainable agriculture and the life ways of the Pueblo. Of particular importance is the ceremonial calendar “in which, each event is associated with traditional seasonal tasks, also reflects the Tewas' view of time” and the importance of seasonal transitions. (Sweet, 2004, p.30)

Resilience and Traditional Knowledge in the Post-Fire Situation

The commitment to retaining cultural identity and an ancient relationship to the waters, lands and life systems while preparing for an uncertain future is the essence of resilience. Repeatedly, voices from the Pueblo spoke out that they would remain, that they would continue to be the stewards and that their way of life is inextricably linked to protecting the watershed.

Floods follow severe fires in the summer monsoon season. Another impact of the changing climate emerges with more intense monsoon rains that are further apart leading to flooding and erosion. Faced with the triple threat of damage to cultural sites, wilderness shrines, and their way of life from a nine-foot wall of water rushing down the Canyon during monsoons and unstable soils, Governor Dasheno concisely stated the problem:

“We are devastated by the vast damage to our once beautiful Santa Clara Canyon and P'o pii Khanu, states Walter Dasheno. “This is our only homeland, the place we have been entrusted with since time immemorial. Never again in our lifetime will we see our Santa Clara Canyon, as we have known it. It will take generations for our community and lands to recover from this fire.” (NMCF 2011)

The Pueblo works closely in partnership with the New Mexico Community Foundation to meet the immediate needs of families and begin the restoration work on their wilderness

shrine. They involve children and youth in replanting trees so that they will remember. But response to the Pueblo's needs has been slow and trust needs to be built with surrounding agencies. There is a great need to incorporate traditional knowledge and cultural concerns at all levels of planning, fire response, and post-fire restoration.

They face many barriers to re-wilding. Although FEMA monies are available, they can only be used to restore past infrastructure. (Baca, 2013) This means that needs for infrastructure change that would better protect the watershed cannot be improved with traditional knowledge. Since the Reagan administration, significant sources of emergency funding for Tribes come through the State. The Governor must work with the Regional Forester and then release the funds. (Baca, 2013) In any state, these are two of the busiest people and bringing them together and up to speed on what the funds were for creates long delays. Santa Clara Pueblo still waited for several years for the funds for projects that were delayed before the fires. Better coordination between state, federal, tribal and local governments is needed if wildlands and watersheds are to be protected: the state legislature in New Mexico passed a resolution calling for just that.

BAER (Burned Area Emergency Response) implementation teams can pose additional problems. Run by the Bureau of Indian Affairs (BIA) for reservation lands, there exists a tendency toward uniform prescriptions for one-size fits all practices that exclude traditional knowledge and that often present environmentally and culturally inappropriate solutions. The desire to adhere to practices in line with traditional principles, even in new situations, creates conflict with fire restoration efforts. After a fire in the Southwest, part of the restoration effort includes activities to prevent flooding after the loss of trees and vegetation to hold the soil. At Santa Clara, in keeping with traditional practices and principles of using materials within the watershed, they requested the use of wood mulch to help accomplish this task. Instead, the restoration that was done through the BIA used straw. Unfortunately, straw can contain invasive seeds that can change the watershed carrying the potential to bring plants that compete with native species. Also, straw is a lighter material than wood, and is less likely to hold in major rain events.

A second example comes out of the BAER implementation team insistence on tributary treatments utilizing sandbags and cable-rails, since rock check-dams failed after the 2011 fire. However, these new technologies may not work well in this environment and may have negative aesthetic, cultural and ecosystem impacts. In fact, extensive use of sandbags may not only be ineffective, but may have deleterious effects on pristine conditions and water features by releasing large amounts of sand into the watershed when the bags eventually deteriorate. This represents a failure to understand the waters of the Canyon within the traditional category of "fast water" (Loeffler, 2012 p.44) that must be treated differently than slow waters such as the Rio Grande.

Michael Aune describes another alternative: the installation of hundreds, perhaps thousands of smaller rainwater (flooding) retention basins toward the top of the mountains to slow the speed of the flow before it picks up steam and becomes a destructive flash flood. The benefits of more hand-built earth and rock retention basins toward the top include holding water, including snowmelt, for longer periods of time

to allow it to soak into the ground at the higher elevations. This minimizes the stress on trees, though it doesn't eliminate it, due to prolonged drought. (Greenfire Sept 2013 p. 33). The benefits are many: water seeping slowly through the basins feeds the underground aquifers and provides water for wildlife. It could be accomplished mimicking pre-historic systems using native materials in low-profile structures that meld with the landscape. Once before Pueblo peoples employed handmade rock and earthen dams, utilizing traditional knowledge, technology and materials found within the watershed.

The fourth element is partnership. A recent debate in the state legislature focused on the need to include watersheds and fire dangers on National Forests in state planning, passing two resolutions requesting the Forest Service, the Bureau of Land Management and the Core of Engineers and Bureau of Reclamation to participate in integrated watershed planning and to identify and implement hazardous fuel reduction on Forest Service properties. (Aune, July 2013) Prescribed burning comes with risks in this dry, drought plagued era, but traditional knowledge about prescribed fire can assist in implementing low-intensity burns in specific areas. Santa Clara Pueblo has reached out to universities to partner with them in creating a restoration plan for their severely damaged forest shrine, but so far none have responded. There is a need for more opportunities for tribal employees to obtain forestry restoration training and forestry degrees locally so they can remain at home and begin the work with the "two-eyed vision of their traditional knowledge and western science.

All of these blockages can be removed through partnerships and the resilience of traditional wisdom held in the three components that should not change for Santa Clara Pueblo.

Kokopelli, Research and the Question of Intervention

Kokopelli is the great symbol of the creative spirit that connects with dynamic energy, productivity and fertility in the Southwest. (Cajete, 2013) He carries seeds on his back and a flute in his hands. He symbolically represents traditional knowledge and the spirit of innovation. He offers us guideposts for limited and respectful intervention when conditions become extreme and out-of-whack in the fire-prone ecosystems of the Southwest.

More will be needed to establish effective partnerships with state, federal and local agencies in order to bring traditional knowledge into the planning processes for fire and post-fire actions. It has been noted that the "difference between agencies, ecosystems, wilderness size and political factors make it difficult to generate consistent policy for the greater wilderness preservation system. This leads to inconsistency in how policy is translated into action." (Lawhon 2011 p. 177) Beyond these concerns, there is great need to extend this coordination and enhance understanding of special tribal areas that carry wilderness values as culturally defined by Tribes. The full implementation of the Forest Service's Sacred Sites Policy will be an important support. The United Nations Declaration on the Right of Indigenous Peoples calls for more work like this to be done. Further, the Council on Environmental Quality could set standards

for incorporating traditional knowledge into the planning process. Secretarial Order 3206 defines the responsibility of agencies to solicit traditional knowledge in important actions like Recovery Plans for endangered species. (Secretarial Order, 1997) Fire planning under the extreme threats now facing the Southwestern forests should do no less. Protocols for working together need to be in place and regular round-table meetings for joint planning established not only for officials, but for the environmental, emergency and fire management personnel from all the parties. Voices from the Pueblo remind us all that we are responsible for protecting and healing wild places: “While we are devoting all the resources we can to the protection and healing of our land, we can’t do it alone,” says Pueblo Governor Dasheno.” (NMCF 2012)

Even in catastrophe, the spirit of Kokopelli may lead us. Through research and traditional knowledge, combined with continued cultural remembrance of seasonal cultural activities and tasks, we may find pathways to protect larger areas in the Jemez that help restore the natural fire regime and the regenerative power of its wild areas.

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Appendix

Santa Clara Pueblo Partners With New Mexico Community Foundation to Establish Santa Clara Pueblo Fund

Fund to Provide Assistance in Fire Rehabilitation and Flooding Mitigation Efforts for People and Places of Santa Clara Pueblo

Santa Fe, N.M.-Santa Clara Pueblo, in partnership with the New Mexico Community Foundation (NMCF), announces the creation of the Santa Clara Pueblo Fund to support the current and long-term costs of fire rehabilitation and flooding mitigation efforts in Santa Clara Canyon after the devastating loss of thousands of acres during the Las Conchas fire in northern New Mexico.

The pueblo is actively engaged in flash flooding mitigation. The Santa Clara Creek is being lined with sand bags, concrete barriers, and other measures to protect homes, tribal buildings, irrigation systems, wastewater lagoons and farmland. The Santa Clara Pueblo Fund will also provide assistance with food, water, shovels, and other urgent necessities for pueblo residents and volunteers.

Santa Clara Pueblo lost more than 16,600 acres-or 80 percent-of tribal forested lands in the Las Conchas fire, and 95 percent of the pueblo watershed has been impacted. Thousands of acres of ancestral lands outside the reservation have also burned. With the start of the summer monsoon season, pueblo officials fear further destruction due to possible flooding and additional damage to pueblo water sources and their impact on local homes, buildings, irrigation systems, farms and wildlife.

An advised fund of NMCF, the Santa Clara Pueblo Fund will provide a central source for public contributions that will be used for short-term fire and flood suppression efforts and long-term rehabilitation, stabilization and repair efforts in Santa Clara Canyon. The fund is intended to help the pueblo address both the known and unforeseeable impacts from the Las Conchas fire now and in the future. One hundred percent of all donations to the fund will go directly to the pueblo relief effort.

“The New Mexico Community Foundation is proud to partner with Santa Clara Pueblo to provide immediate and long range financial assistance to pueblo residents and landscapes during this tragic time,” says Jenny Parks, NMCF President and CEO, noting that NMCF has already directed \$10,000 in fire relief funding to Santa Clara Pueblo since the start of the Las Conchas fire. “The impact of the Las Conchas fire to the quality of life and cultural traditions at the pueblo is heartbreaking. We encourage all New Mexicans and those

who love New Mexico to contribute to this fund and help our pueblo neighbors.”

“We are devastated by the vast damage to our once beautiful Santa Clara Canyon and P’o pii Khanu, the headwaters of our Santa Clara Creek,” adds Santa Clara Pueblo Governor Walter Dasheno. “This is our only homeland, the place we have been entrusted with since time immemorial. Never again in our lifetime will we see our Santa Clara Canyon as we have known it. It will take generations for our community and lands to recover from this fire. We thank the New Mexico Community Foundation for its efforts on our behalf as well as all those who have already sent their prayers and financial assistance.”

The economic, emotional and cultural impact of the Las Conchas fire is crippling for the people and places of Santa Clara, a Tewa-speaking pueblo located in the fertile Rio Grande Valley of northern New Mexico. The pueblo’s sacred Santa Clara Canyon has long been its major cultural attraction, a deep tree-lined retreat with several mountain ranges, fishing lakes, and hunting and cultural areas that are held dear to the Santa Clara people.

Now, however, smoke and safety concerns from the fire have led to the closure of the popular Puye Cliff Dwellings and a loss of tourist dollars due to a decline in pueblo arts and crafts sales and in visits to the tribe’s nearby hotel and casino. The threat to the health and safety of pueblo residents is of ongoing concern amid the destabilization of pueblo lands, including falling boulders, downed trees and displaced debris.

According to the pueblo, although community residents are resilient, there is a presence of anxiety, stress, depression and sadness about the loss of forested areas and the threat of flooding. Tribal behavioral health personnel and partners are addressing this and other human considerations that can lead to loss in productivity and livelihood for pueblo residents.

Currently, Santa Clara fire crews have been working alongside local, state and federal emergency teams to fight the fire, while pueblo residents and volunteers are helping to fill sand bags and install barriers to protect the community from possible flooding.

“While we are devoting all the resources we can to the protection and healing of our land, we can’t do it alone,” says Pueblo Governor Dasheno.

For more information on the Santa Clara Pueblo Fund, please contact Libby Madden, NMCF Director of Development, at 505-270-9624 or emadden@nmcf.org.

To make a gift to the Santa Clara Pueblo Fund, please visit <http://www.nmcf.org/> or contact the New Mexico Community Foundation Albuquerque office at 505-820-6860.

For other inquires to the Pueblo of Santa Clara, please contact Joe Baca, Intergovernmental Liaison and Public Relations Director, at 505-929-7061 or jpbaca@santaclarapueblo.org.

Valuing People in the Landscape: Re-thinking Conservation Approaches

Peter Taylor

Abstract—When Australian Governments committed to building a National Reserve System (NRS) for Australia in 1991 they didn't anticipate that some of the most important conservation gains were to be made on Indigenous owned land. An innovative Federal Government policy decision in 1996 to support Indigenous landowners to establish Indigenous Protected Areas (IPA) on their land provided a breakthrough in national conservation efforts. This policy and ensuing program was established ensuring that Indigenous communities held full control of decision making, including participation, how much of their land they wished to declare and how best to manage their land. IPAs now constitute more than 35% of Australia's reserve system (some 60 IPAs covering around 48 million hectares; 118.5 million ac). The IPA concept specifically recognizes and values Indigenous knowledge and explicitly combines western science to create a unique and culturally empowering model of conservation and land management. In addition, and most importantly, IPAs provide one of the few pathways for building a sustainable economic future based around Indigenous culture. This paper will provide an overview of this unique co-production and raise some of the challenges facing this concept. It will also highlight a number of the key ingredients that make them successful.

Introduction

Since white settlement in 1788, the Australian landscape has undergone a radical transformation that has seen massive biodiversity loss from fire, land clearing, the ravages of invasive species and poor land management practices. The extent and rate of biodiversity decline has prompted a slow but growing awareness of how we think about sustainable living and the role of conservation. In particular, the last three decades have seen the rapid expansion of Australia's National Reserve System (NRS). This extraordinary and globally significant collaboration by all Australian governments, non-government organizations (NGOs), Indigenous and private landholders and the scientific community has seen a great deal of innovation in the way conservation obligations have been pursued.

Peter Taylor is an Environmental Consultant, 49 Hawker Street, Torrens, Australian Capital Territory 2607, Australia; E-mail: tayloripeter@gmail.com

In: Watson, Alan; Carver, Stephen; Krenova, Zdenka; McBride, Brooke, comps. 2015. Science and stewardship to protect and sustain wilderness values: Tenth World Wilderness Congress symposium; 2013, 4-10 October; Salamanca, Spain. Proceedings RMRS-P-74. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 208 p.

When Australian governments committed to building a NRS for Australia in 1992 they didn't anticipate that some of the most important conservation gains were to be made on Indigenous owned land. An Australian Government policy decision in 1996 to support Indigenous landowners to establish Indigenous Protected Areas (IPA) on their land provided a breakthrough in national conservation efforts on private land. This policy (consistent with IUCN guidelines on protected area establishment and management) and the ensuing program ensured that Indigenous communities held full control of decision making, including participation, how much of their land they wished to declare and how best to manage their land.

IPAs now constitute more than 35% of Australia's reserve system (some 60 IPAs covering around 48 million hectares; 118.5 million ac). The IPA concept specifically recognizes and values Indigenous knowledge while utilizing western science to create a unique and culturally empowering model of conservation management. In addition, and most importantly, IPAs provide one of the few pathways for communities to pursue their long term economic and cultural development aspirations—through land and sea work.

This paper will provide an overview of this unique co-production model and raises some of the challenges facing this concept in the coming years.

Background

The evolution of the IPA concept has been complex, one where Indigenous communities and the Australian Government have worked together and adapted tactics and programs for more than 30 years. Crucial to this process has been the Australian Government's increasing recognition of the importance of the relationship between healthy country and healthy people (including cultural integrity). Indigenous control of decision making, planning and utilization of traditional knowledge has provided the basis for engagement by many communities. One of the starting points for Government recognition of this unique collaboration was generated by conflict over a proposed uranium mine in Northern Australia (east of Darwin in the Alligator Rivers region), which also had significant conservation and cultural values. An historic settlement was achieved in 1982 when a vast area of this land was handed back to Traditional Owners and then leased to the Australian Government to administer as the jointly managed Kakadu National Park (Figure 1). An area was excised out of the park for Uranium mining.

The Australian Government and some state governments have applied the jointly managed national park model in various locations across Australia. While an important model providing employment and joint decision making, the model

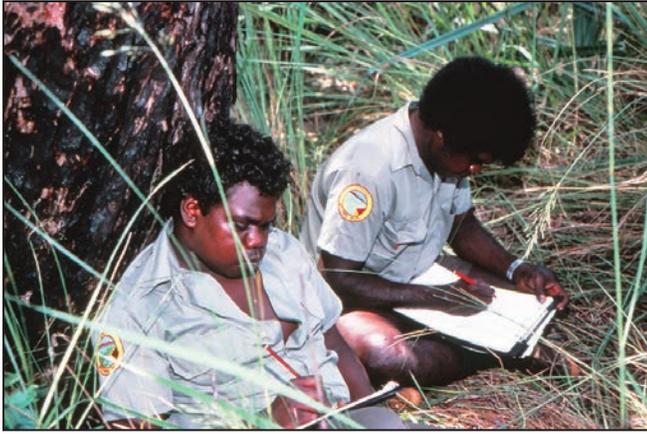


Figure 1—Indigenous Trainees, Kakadu NP

often generates tensions between Indigenous aspirations and government expectations. Some Traditional Owners claim that the model limits Indigenous options on what they can do with their land and that decision-making isn't always equal (Figure 2).

In an effort to expand opportunities for Indigenous engagement in land management, the Australian Government, in 1988, initiated the Contract Employment Program for Aboriginals in Natural and Cultural Resource Management (CEPANCRM). This provided incentives for state governments to contract Indigenous labor in existing national parks and other conservation estates where Indigenous people had cultural ties.

The Indigenous joint management and CEPANCRM initiatives were important developments for Indigenous groups through the 1980's and 1990's. These cemented a natural bond between conservation and Indigenous natural and cultural interests. Missing from this work however was Indigenous control and support for managing natural and cultural resources on country they already owned or occupied. Pressure mounted on governments to provide support to communities who wished to care for their own country.



Figure 2—Handback of Uluru NP 1985

The concept of IPAs emerged from three needs during the 1980's and 1990's:

1. Australian Government policy and programs were inadequately addressing Indigenous aspirations especially in areas where they occupied or owned their land.
2. Growing international and national recognition of Indigenous rights in conservation and sustainable development.
3. A pragmatic recognition that many areas of remote Australia owned and occupied by Indigenous Australians also coincided with priorities for inclusion in Australia's NRS.

As Indigenous land title had been hard fought for over many decades (through various Land Rights and Native Title struggles around Australia), Indigenous communities were highly unlikely to relinquish or share their title with government for conservation purposes. A different but innovative model was required.

The term 'Indigenous interests' is used herein to refer to Indigenous groups, organizations or individuals that have or would assert rights and interests over a particular area of land or sea. These might include one or all of the Indigenous Traditional Owners or Native Title holders (or claimants), Indigenous communities or families, Indigenous corporations or associations, or representative organizations such as land councils (Rose 2011).

In response to these needs the Australian Government undertook extensive negotiations and consultations with Indigenous interests and established the IPA program, which was launched in 1997-98. It provided a mechanism to increase the representativeness of the National Reserve System through the inclusion of Indigenous land. Indigenous groups interested in developing an IPA over their land would seek funding support from the Australian Government to undertake community consultation and the development of a plan of management covering the areas of land they wished to declare as an IPA. Governments are then invited to recognize IPAs as part of the National Reserve System. While they are not covered by any formal legal framework, like other conservation reserves in Australia, IPAs are consistent with the IUCN's definition of a protected area, being managed for conservation by 'legal or other effective means' (Dudley 2008). Crucially, the Plans of Management for IPAs designate IUCN management categories, thus enabling Australian governments to appropriately recognize their contribution to the National Reserve System (Figure 3).

While the voluntary declaration of IPAs means that they are not constrained by land tenure and legislative complexities, some have criticized this as a weakness where IPAs might be 'un-declared' by communities at any time. The counter view is the security communities derive by owning a management/governance framework for their land that provides tangible economic cultural and social benefits. Legislatively established protected areas can be and are un-gazetted in Australia, further diminishing the criticism about the security of IPAs (Rose 2012).



Figure 3—Declaration of Sthn Tanami IPA 2012

In addition to the growth and success of the IPA program, the Australian Government initiated the development of the Working on Country (WoC) Indigenous Ranger Program in 2007, providing flexible employment options for Indigenous rangers across a variety of land tenure arrangements – not just Indigenous owned land. Specifically, WoC recognizes Indigenous people’s strong relationship and obligations to country and to have this land and sea management work recognized in the form of paid employment (DSEWPaC 2013). The WoC program is being utilized on a number of IPAs as well as in numerous other tenure contexts and often supports the transfer of Indigenous cultural knowledge between elders and younger people. A recent review of the WoC program and its relationship to the IPA program summarized the findings by saying:

‘These programs [WoC and IPAs] have clearly impacted on individual lives and communities in ways that other Indigenous programs have not. Ranger employment, appropriate training and the establishment of IPAs have been transformative events for the individuals and communities involved, reinforcing for me the significance of caring for country as a propitious niche for many Indigenous people in contemporary Australia’ (Smyth 2012).

Indigenous Protected Areas and Working on Country Today

The demand from Indigenous landowners to develop and declare IPAs over their land has exceeded government expectations and represents the most significant growth in Australia’s National Reserve System. As already mentioned, 35% of Australia’s National Reserve System (covering around 134 million hectares; 331 million ac) are declared IPAs (60) covering some 48 million hectares (118.5 million ac) of land (figure 4). There are some 24 IPA consultation projects currently in development covering a further estimated 30 million hectares (74 million ac) of country, should these be declared (Figure 5).

There are many IPAs in Australia that incorporate an interface between the land and the sea (Figure 6). The cultural importance attached to these coastal areas culturally is no different to that of the land. A number of communities have been actively managing their marine environments and seeking to declare sea-country IPAs over marine areas they have attachment to. The Australian Government has been working in recent years with a number of coastal IPA groups to develop a policy context for the establishment of sea-country IPAs. This has resulted in the recent recognition by both the Australian and Northern Territory Governments of a sea country IPA managed by Dhimurru Land Management Aboriginal Corporation and its partners adjacent to the Arnhem Land coast. (see <http://www.dhimurru.com.au/sea-country-ipa-management-plan-launch.html>)

A Sea Country Indigenous Protected Area provides a framework for Indigenous communities to collaboratively manage sea country with other groups who actively use the marine environment. A number of remote communities have been contracting their services to fisheries, police and Quarantine services for surveillance and management purposes. These arrangements have fostered strong and positive working relationships between the cultural aspirations of communities and those of other marine stakeholders.

Sea Country IPAs work by bringing all stakeholders together to use and manage marine resources through a collaborative framework that will deliver conservation and sustainable use outcomes (DSEWPaC 2013). Because IPAs are not delivered through a legislative framework, they do not have the power to override existing laws/activities such as commercial fisheries and recreational fishing. The development of a sea country IPA therefore relies on all of the users of the sea country agreeing to work together and to only exercise their rights to use sea country in a manner that is consistent with the overall management framework of the IPA.

The Future

The success of both the IPA and WoC programs has firmly cemented the importance of Indigenous engagement in conservation management in remote Australia. Similarly, the co-benefits accruing from these programs in the form of socio-economic and cultural development are of profound significance to Indigenous communities.

The current Australian Government has recognized this co-production by:

- Committing a further \$78 million over the next five years to support the ongoing management of existing IPAs and the finalization and declaration of the 24 IPA consultation projects.
- Committing \$320 million toward job certainty for the Working on Country Indigenous Rangers to build on the current work to protect and conserve the environment and strengthen land and sea management. In announcing this commitment the Federal Environment Minister outlined the goal to employ up to 730 Indigenous rangers by 2015, a growth of 630 rangers since 2007 (Burke, 2013).



Figure 5—Declaration of Kaanju-Ngaachi IPA 2008

IPA Case Study

Dhimurru Indigenous Protected Area



Gulf of Carpentaria | Declared in November 2000

The land will exist forever. It must be protected so that it will remain the same, so that it can be seen in the same way that the elders saw it in the past. Our vision and hope is that Yolngu will continue to use the land for all the generations to come.

Dhimurru Indigenous Protected Area (IPA) was declared in November 2000. It covers over 92,000 hectares of coastline and hinterland country on the western edge of the Gulf of Carpentaria, forms part of the wider traditional lands of the Yolngu people.



All photos courtesy of Dhimurru Land Management Aboriginal Corporation (Left) Turtle measuring, Jane Dermer. (Right) Turtle population monitoring. (Bottom) Ranger guided walk, Phil Wise.

Sandy beaches, rocky coastal islands, spreading mangroves and ancient dune systems are found along Dhimurru's coasts. Inland, the Guwatjurmurr (Giddy River) flows through cascades and rockpools, before meandering through the coastal plain. Dhimurru's lands are held for the Traditional Owners by the Arnhem Land Aboriginal Land Trust, and their interests are represented by the Northern Land Council. The IPA is run by the Dhimurru Land Management Aboriginal Corporation, which was created in 1992 to deal with increasing numbers of visitors and growth in the local township of Nhulunbuy. They work with the Traditional Owners, who direct land management and approve access to their lands via a permit system. The Corporation looks after the day to day running of the IPA, making sure things are done in a way that reflects Yolngu cultural values.

Figure 6—IPA Case Study

Many Traditional Owners work as rangers on the IPA, monitoring and protecting the wildlife. Part of their job is surveying turtle and crocodile numbers to make sure the populations are healthy. Another key role is the removal of marine debris washed up on beaches. Every year the rangers remove tonnes of discarded fishing nets known as ghost nets, rescuing turtles and other marine life entangled and injured in the plastic mesh.

The effectiveness of this work was recognised in 2001 by a Banksia Award - Australia's prestigious environmental award scheme - in the Marine and Coastal category. This was awarded to Dhimurru for a marine project they worked on with WWF-Australia, Conservation Volunteers Australia and Northern Territory Fisheries.

Local schoolchildren, including students from Nhulunbuy and Yirrkala Primary Schools, go on interpretive walks with rangers to learn about their work, cultural traditions and how they protect the environment. The rangers also assist Australian Quarantine and Inspection Services with ship inspections (to guard against introduced species), and talk to visitors about the IPA.

IPA funding helps manage visitor pressures on popular areas by maintaining campsites and controlling access to fragile dune and beach zones which were being damaged by vehicles, causing erosion and destroying wildlife habitats. Dhimurru IPA is managed in line with the following International Union for Conservation of Nature category:

Category V - Protected Landscape/Seascape: Protected Area managed mainly for landscape/seascape conservation and recreation.

This Case Study was prepared by the Department of Environment, Water, Sustainability, Population and Communities in collaboration with the Dhimurru Aboriginal Corporation. It was viewed and copied with permission from the Departments website (www.environment.gov.au) on 20 July 2013.

In the late 1980's when mainstream Australian Government policy took its first foray into the Indigenous land management field through programs like CEPANCRM it was motivated primarily by bolstering Indigenous employment opportunities. Few government officials foreshadowed the burgeoning co-productions that were to emerge - providing a socio-cultural and economic future for so many communities. These substantial outcomes have been achieved through a small amount of funding designed to engage Indigenous people to undertake conservation work.

In 2011 the Australian National Audit Office reviewed the IPA Program and noted in particular the Australian Government's adoption of a model of shared interest or co-production. For a small amount of seed funding the IPA Program engages Indigenous landowners to support their customary responsibility to care for their country consistent with national and international guidelines (ANAO 2011). For many communities the value of these programs is intrinsically cultural where healthy and productive country (especially native food species) is fundamental to community well being. In addition, jobs on country value and incorporate traditional knowledge while utilizing Western science (Rose 2012). More recently, researchers are recognizing the growing importance these programs are having on knowledge transfer, health, general community cohesion and well-being (Hunt et al. 2009) (Figure 7).

In the last decade, many Indigenous organizations, communities and enterprises have been turning their efforts to long-term sustainable economic futures – independent from government welfare support. In regional and remote Australia, it is often the IPAs, WoC and other land and sea work that has galvanized communities in to a level of confidence and optimism about their future. Pride and recognition for the 'marketability' of traditional knowledge and expertise in keeping country healthy is emerging as a central theme for optimism in Indigenous economic development. This is being manifested through innovative 'healthy-country' and business planning. As a consequence there are increasing numbers of communities and organizations at the forefront of developing and implementing a range of Indigenous enterprises, unique to remote areas, servicing land and



Figure 7—Healthy Country Planning 2011

sea management needs on Indigenous owned land, public reserves, pastoral lands as well as government and mining companies. As already stated, much of the work includes invaluable biodiversity conservation works, fire management and invasive pest work where local traditional knowledge of country is vital. With Australia's carbon pricing scheme now in place, some Northern Australian Indigenous groups have been exploring the development of managed savanna burning initiatives under the Government's Carbon Farming Initiative. The first of these to be approved under the scheme is Fish River, a property bought for the protection of cultural and environmental values. The Indigenous leadership and lessons learned in establishing this initiative is assisting Northern Australian Indigenous landholders to pursue similar income generating schemes (ILC 2013) (Figure 8)

As confidence and opportunity grow, Indigenous organizations are becoming more creative in adapting support available to them in order to design and establish sustainable futures that are unique to their land and sea aspirations. A strong feature of the IPA and WoC programs is their ability to enable these adaptations to occur. This makes for a wide range of projects all unique in how they might be implemented. One good example is the Mandingalbay Yidinji IPA near Cairns in far north Queensland. This unique IPA covers a range of conservation tenures including national park, forest reserve and a local government reserve. The area co-exists with a Native Title determination by the Australian Federal Court. Bruce Rose (2012) explains that the IPA also incorporates an environmental reserve where Native Title was extinguished by an earlier tenure and part of a Queensland marine park where exclusive Native Title has been recognized above the high tide mark.

Many of the Indigenous organizations and communities engaged in land and sea work are increasingly establishing partnerships with a wide range of public and private supporters. In many cases public funding, like the IPA and WoC programs, have provided the catalyst for Indigenous groups to actively seek additional involvement of others for their land and sea management aspirations. This has seen a significant increase in involvement of the private sector—whether it be for the provision of services or funding to help Indigenous groups to plan and manage their own land and

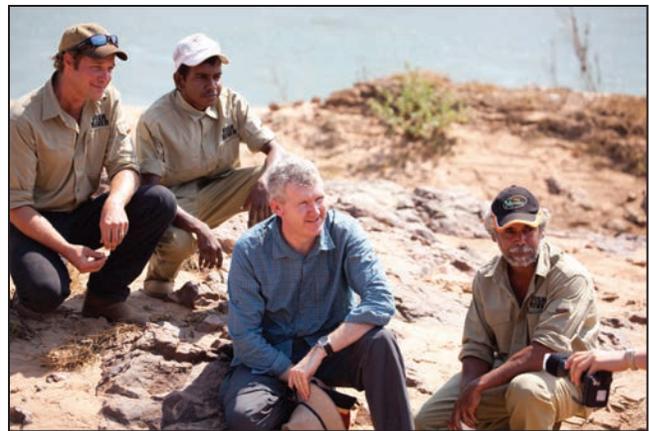


Figure 8—Launch of the Fish River Project 2011, Federal Environmental Minister

sea. The array of partners is wide-ranging and uniquely tailored to different groups needs. Typically, the private sector groups involved include:

- Mining companies
- Volunteer professionals
- Individual philanthropists
- Conservation organizations (in the form of direct support and through philanthropic contributions)
- Volunteer groups and organizations
- Natural Resource Management Groups

The success of these programs has reinforced that if we are to effectively care and protect our natural and cultural resources in remote Australia, then people living in these landscapes are central to this process. The growth and adaptation of the land and sea work outlined in this paper have increased pressure on government and private sector resources. There is now an urgent argument for some rethinking between Indigenous Australians, Government and the private sector on how best to continue to support this work and ensure that the increasing demand can be accommodated.

The Challenges

As indicated, private groups and the philanthropic sector are increasingly interested in investing in Indigenous land and sea work. The fact that IPA and WoC initiatives are underwritten by Australian Government policy and funding support provides some security to these private investors. In addition, the IPA and WoC programs enjoy strong bi-partisan political support from the Australia's main political parties.

The ability for Indigenous groups to genuinely drive their long-term aspirations now depends in part on the extent to which government and the private sector can work together with these groups to support them. As this paper is being written no new IPAs can be funded through the IPA program to consult for, plan and establish IPAs due to resourcing limitations. This constraint provides an important trigger for dialogue between Indigenous interests, government and the private sector to explore solutions. In anticipation of such dialogue, a number of central challenges will need to be addressed:

1. Policy framework: There are now numerous Indigenous land and sea initiatives spotted around Australia that are striving to establish long term sustainable mechanisms to ensure their viability. These are being supported through a range of inspiring enterprises, and funding partnerships with both government and the private sector. It is these demonstrations that now need to be utilized for the benefit of emerging groups who might learn from these projects. Importantly, the champions from these projects will be central to assisting in re-configuring the national policy context for this work. The leadership for this will need to come from both government and Indigenous leaders.

2. Private sector engagement: Some conservation NGO's supporting Indigenous land and sea work have been criticized for pursuing narrow, single sector, conservation interests ahead of the wider socio-cultural and economic aspirations of Indigenous groups that form an integral part of their sustainable futures. In some instances considerable

conflict and damage to Indigenous aspirations has resulted. Less experienced Indigenous organizations can be vulnerable to these well meaning but potentially dangerous overtures. By contrast, many of the larger mining companies have embarked on strategic partnerships with Indigenous groups as part of their social responsibility programs that are negotiated strictly in accordance with Indigenous interests.

3. Governance support: Indigenous communities attract considerable negative press over issues such as family and community dysfunction, alcohol abuse, violence and poor school attendance. Those communities in the process of liberating themselves from decades of dysfunction and dependence on government welfare need to establish strong leadership and governance structures as part of their liberation. Establishing such structures won't always come naturally for many remote Indigenous communities, especially where western constructs are being used. Future policy and program support for Indigenous land and sea management programs will need to build in innovative and culturally appropriate support systems to ensure communities have the best chance of succeeding.

4. Models of long-term viability: While the success of the IPA and WoC programs are undisputed the challenge will be determining sustainable financing models to ensure Indigenous people are enabled to fulfill their land and sea management aspirations. While some NGO's, in collaboration with the corporate sector are investigating Trust or Endowment models in particular regions, these examples are unlikely to be scaled up to support all groups. Some IPAs will be successful in generating funding through selling services and running enterprises. A good many will always be dependent on external support for their viability. A creative mix of models will need to be explored. Fortunately there are several Indigenous groups who are already well advanced in developing a viable and sustainable future for themselves. These successful models provide important demonstration benchmarks for assisting others as they explore their viability options.

Conclusion

Indigenous Australians see healthy country as an intrinsic virtue for healthy culture and society. The Australian Government now recognizes the importance of this special relationship between country and people, notably through the Indigenous Protected Area and the Working on Country model. More work is needed to secure this extraordinarily important model to help ensure that Indigenous aspirations can be met alongside effective management of Australia's remote regions. We know what the essential ingredients are that make IPAs and WoC successful. Some of these ingredients in the Australian context include:

- A commitment to the Universal Declaration of Human Rights recognizing the inherent dignity and equal and inalienable rights of Indigenous people.
- A genuine partnership between funders and the Indigenous groups in the design, development and implementation of programs and policies

- Indigenous control of their participation, decision making, planning and implementation of programs on their land
- Recognition that Indigenous knowledge and cultural ties to land are fundamental to Indigenous engagement in programs
- Flexible and adaptive approaches to the design and development of programs and policy – recognizing that no two Indigenous groups will have the same aspirations.
- Communities being capable of establishing a strong vision and governance framework for implementing their aspirations

The significant missing link in all of this however is a leadership model that embraces community interests, government and the private sector. Should there be a ‘coming together’ of such a leadership model then perhaps we might see an unparalleled partnership of policy and funding possibilities. It could even be possible to extend the IPA-WoC thinking to embrace other privately held land across Australia. The pressures of global economic uncertainties, diminishing resources for environment programs, the impacts of climate change and the un-paralleled resource exploration interests in Australia make the timing critical for this new thinking. This will require great humility by all parties.

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“Completely Empowering”: A Qualitative Study of the Impact of Technology on the Wilderness Experience in New Zealand

John D. Shultis

Abstract—Recent academic literature has expressed concern over the potential impact of the increasing types and levels of electronic (largely communication-related) technology brought by visitors into the wilderness. A key issue has been perceived changes in risk-taking behavior by wilderness and backcountry users. Despite these concerns, extremely limited empirical assessment of the potential impact of technology such as cell phones, global positioning systems and personal locator beacons on wilderness users and the wilderness experience has been undertaken. Do users share the same unease about the use of these technologies as wilderness researchers and managers? This study uses a qualitative approach to assess New Zealand outdoor recreationists’ perceptions of how these and other forms of technology influence their wilderness experiences. Four themes were generated from the data collected through semi-structured interviews. The results show that users’ feelings about their use of new recreation equipment is directly opposed to the concerns expressed in the literature: the technology embedded within all types of recreation equipment are almost completely empowering and positive for users, principally by providing increased comfort, safety and access.

Introduction

The complex relationship between modern technology and wilderness has intensified in the 21st century. One topic that has emerged over the last 10 years is the potential impact of various new technologies on the wilderness experience. Many electronic communication devices can now be easily carried into the wilderness, and some commentators suggest the use or mere presence of these types of technologies has already changed the essence of the wilderness experience and wilderness management (Ewert and Shultis, 1999; Stankey, 2000; Shultis, 2001).

John Shultis is an Associate Professor in the Ecosystem Science and Management Program, University of Northern BC, 3333 University Way, Prince George, BC Canada V2N 4Z9; email john.shultis@unbc.ca

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The invisibility of some technologies is maintained in the more recent explorations of the dangers of technology for wilderness. Certain technologies, such as cell phones, global positioning systems (GPS) units, and personal locator beacons, are often noted as having serious, negative impacts for wilderness and wilderness managers (e.g., Roggenbuck, 2000; Borrie, 2000, Stankey, 2000; Dickson, 2004), while other technologies (e.g., new lightweight fabrics and metals for equipment such as clothing, tents, stoves, ice axes, etc.) seem to be ignored by critics.

This study attempts to explore whether the use of an increasing amount of technology by wilderness users influences the nature of the wilderness experience, and if so, how and why? To develop a better understanding of the relationship between wilderness users and their use of technology and the perceived impact of these technologies on their wilderness experiences, an interpretive approach to data collection and analysis was undertaken. Thematic analysis was used to assess data generated from semi-structured interviews of backcountry recreationists in New Zealand. After the related literature on these subjects are reviewed, the themes generated from this data are used to assess outdoor recreationists’ conceptualization of the relationship between technology and nature, and their thoughts on if and how their wilderness experiences are impacted by the technology they bring into the backcountry.

Literature Review

The complexity of our relationship with technology, especially in a wilderness setting, led Freimund and Borrie (1998, p. 22) to lament that

There is a lack of clear direction about how to manage information and communication in or about wilderness. . . . In essence, our crystal ball is becoming increasingly cloudy. Therefore, how should we assess the relative appropriateness of varied technologies in and about wilderness? How can we determine what is good technology and what is bad for wilderness?

Currently there is very limited empirical data assessing the impact of technology on the wilderness experience. The vast majority of literature on this issue — from wilderness researchers primarily based in the United States — has largely been based on personal anecdotes, and typically follow the traditional, realist conceptualization of the wilderness as an antithesis of technology (Shultis, 2012). Normally, a negative, deterministic perspective on certain forms of technology used in wilderness is demonstrated (i.e., researchers believe that

negative impacts automatically and systematically derive from the increased use of new, primarily communication-based technology in wilderness) (e.g., Hollenhorst, 1995; Borrie and Freimund, 1997; Borrie, 2000, Stankey, 2000; Dickson, 2004).

Pohl (1998, p. 156) expressed a common, key concern when she warned that "Our wilderness experiences run the risk of becoming more like virtual wilderness when technological devices do the work for us. They separate us from our environment and create a false sense of accomplishment". Or, as McIntyre queried, "Is it likely that today's wilderness user, cocooned in fibrepile and goretex, on a brief (1 or 2 day) trip into the wilderness, feels oneness, humility, and immersion" (1998, p. 179) – that is, the key attributes associated with a traditional wilderness experience? Wiley (1995) suggests that the concerns expressed in the existing literature could be reflected in four primary concerns:

1. Risk versus security – what is the relationship between the use of technology and perceived risk in natural settings? Does technology change the amount or type of risks taken by recreationists?
2. Solitude versus connectivity – can increasing levels and types of technology used in wilderness maintain or extinguish the solitude that 'traditional' wilderness was supposed to provide? Can one be 'connected' (e.g., To the internet or e-mail) in wilderness and still have solitude?
3. Mediation versus direct experience – does technology allow recreationists to 'skip' the direct experiences (both positive and negative) that some consider necessary to create safe recreational experiences?
4. Knowledge versus the unknown – how does technology influence the known and unknown during a wilderness experience? If, for example, specific information on weather conditions can always be accessed, does this lead to a different type of recreational experience?

These questions have often been repeated in the literature, but have gone unanswered by empirical research. Only very recently have a very small number of empirical studies, though often exploratory or unpublished, started to assess these and related topics. Pope and Martin (2011), in one of the few empirical, peer reviewed studies on the topic (see also Martin and Pope, 2012), assessed attitudes towards technology among 235 wilderness users in California; they deemed 55% of the sample exhibited 'pro-technology' and 45% 'anti-technology' attitudes. The former group felt that technology increased one's safety in wilderness, and were more likely than the 'anti-technology' group to use technology to request a rescue, take chances that could increase risk if they had technology with them, and believe that technology can successfully substitute for skill, experience, and knowledge" (p. 23). They also identified themselves as more likely to take risks than those in the anti-technology camp. The anti-technology group "felt quite strongly that technology cannot substitute for skill, experience, and knowledge, were very unlikely to take chances that could increase risk just because they had technology with them, and did not agree

that technology reduced dangers and made them feel safer in the wilderness" (p. 23).

An unpublished PhD in New Zealand also helps illuminate the relationship between wilderness use and technology in New Zealand. Wray (2009) studied the meaning of wilderness and the wilderness experience among experienced wilderness users in the Fiordland region of New Zealand, and suggested the increasing use of technology as the fourth major threat to the recreational use of New Zealand's wilderness (after increasing use, numbers of tourists and commercialization). Wray notes "The deliberate actions taken by some study participants to avoid using new technologies demonstrate their commitment to the wilderness ideal, and also highlight the cultural and historic values associated with wilderness in New Zealand (i.e. nostalgia for a past way of life)" (2009, p. 262). However, she also notes that "Despite the apparent aversion to technology in wilderness, almost all respondents in this study used some form of modern equipment to aid them in their wilderness trip – whether it was clothing, travel gear, communication devices or motorized transport" (p. 262-263), which reflects the conflicted relationship our culture has with wilderness: we use technology to escape technology.

Methods

Given the complexity of the broader relationship between society and technology, the lack of empirical data on the specific impacts of technology on backcountry recreationists, and the likelihood of the importance of contextual factors in the perception of these potential impacts of recreationists, the interpretive perspective offered by a qualitative approach to data collection and analysis was chosen for this study. As the objective of this research, like all qualitative research, is to gain a deeper understanding of the topic rather than predict specific attitudes or behaviors in a representative sample, non-probabilistic sampling methods of convenience and snowball sampling were followed. Potential interviewees were contacted in three New Zealand cities through the tramping (i.e., backpacking) clubs throughout New Zealand. Tramping clubs in New Zealand have long served critical roles in introducing New Zealanders to 'the bush' (i.e., natural environments) and include a range of wilderness users, from beginner to expert. After briefly noting my research project either by monthly club meetings (if possible) or e-mail (if no meeting were scheduled during time spent in the area), several potential contacts were identified, and if interviewed, additional potential contacts were then identified by respondents. Interviews continued until data saturation was reached. In this study, 12 in-depth (60-90 minute) interviews were completed before I determined that sufficient data had been collected (i.e., no significant, new data emerged from the interviews). Interviews were taped and transcribed soon after the interviews were completed. All interviews and analysis were undertaken by the author to maximize the truthworthiness and reliability of the data collection and analysis. To ensure respondents' confidentiality and anonymity, pseudonyms are used throughout this paper.

Data Analysis

Consistent with the epistemological stance of interpretive inquiry and semi-structured interviews, data analysis was an iterative process, where coding and the identification of themes occurred throughout the interview and analysis phases of the research. As the data was gathered, the author began identifying codes that arose from the data, and through reflexive assessment. After all interviews were completed, coding continued until several common themes emerged; final coding and themes shifted to a more theoretical level of analysis, based on a continuous review of the relevant literature and existing conceptual perspectives from a multidisciplinary perspective.

Results

A wide range of recreationists were interviewed in an attempt to include an inclusive selection of socio-demographic variables and experiences. As noted in Table 1, a range of both young and older, beginner and expert, male and female backcountry recreationists were included in the thematic analysis, although the respondents tended to be more experienced backcountry recreationists; this was probably a reflection of each respondent being a tramping club member.

Four themes were identified and will be further explored:

1. recreation technology is embedded, often invisible and contextual;
2. only the positive impacts of technology on the backcountry experience were identified, with increased comfort, safety and access being the main benefits;
3. 'imagining' with new technology/equipment occurred; and
4. only others over-rely on or have too much technology.

a) Technology is Embedded, Invisible and Contextual

When first queried, respondents associated the term 'technology' with primarily electronic items such as computers. Respondents did not at first associate the term 'technology'

with backcountry recreation equipment. However, when specifically asked what outdoor recreation equipment they felt was technology, most noted that through continuous engineering and mass manufacturing of recreation equipment, several specific pieces of equipment could be identified as technology: again, electronic equipment such as cell phones and GPS units were most often mentioned, as were new fabrics (e.g., Goretex™). Climbing gear such as ice axes, crampons, and carabiners were mentioned more than 'basic' tramping gear (by both trampers and climbers), but a wide range of equipment were identified as technology after prompting (e.g., footwear, packs, clothing). The identification of contemporary equipment being considered technology was often associated with noting the relatively simple equipment used in the 'old days'.

When asked what recreation equipment they would consider NOT to be technology, an interesting trend emerged, one that suggests the hidden, embedded and contextual nature of technology in contemporary society. The respondents usually paused to consider the question, then after giving it some thought acknowledged that all equipment was technology. This statement was often combined with a sense of surprise at this newfound conceptualization of technology and its relationship to recreation equipment:

"Now that you put it that way, it's a difficult one. I mean, if you look at, say, a pack, for example, I mean some of the technology seems maybe to be simpler like a carry bag or pack or a bicycle, but they are all technical things....So I guess it is all technology when you look at it" (Cyril).

"When you get a chance to think about it, and you know what's happened over the last how many years, you think, well, it is technology, isn't it: everything is technology" (Heidi).

All respondents finally concluded that in many different ways, all recreation equipment was a form of technology: therefore, for the remainder of the paper, these two terms will be considered equivalent. The incremental nature of changes to recreation equipment, and the desire of visitors to use new equipment were often noted as having obscured the technological aspect of recreation equipment.

Table 1—Characteristics of Interviewees

Name (alias)	Age	Main Backcountry Activity	Average Number of Nights ^a	Number of Years Experience ^b	Self-Reported Experience Level
'Bob'	21	Climbing	25	4	intermediate
'Cyril'	59	Cycling	21	41	expert
'Debbie'	55	Tramping	8	37	intermediate
'Evan'	58	Tramping/climbing	25	40	expert
'Flo'	38	Tramping/climbing	20	25	intermediate
'George'	62	Tramping	40	34	expert
'Heidi'	35	Climbing	12	5	beginner
'Ida'	42	Tramping	100	20	expert
'Jay'	48	Tramping	100	28	expert
'Ken'	30	Tramping/climbing	45	12	expert
'Larry'	74	Tramping	5	20	intermediate
'Martin'	38	Tramping	15	18	intermediate

^a Average number of nights spent in backcountry over the last two years, not including day trips.

^b Numbers of years spent pursuing backcountry recreation independently as an adult (i.e., from 18 years of age).

b) Only Positive Impacts of Technology on the Backcountry Experience were Identified, with Increased Comfort, Safety, and Access Being the Main Benefits

The goals that interviewees set for their backcountry trips reflected the 'traditional' motivations identified in the literature (e.g., enjoy nature, relaxation, escape, and achievement/challenge). When asked how technology helped meet these goals, respondents focused on the increased comfort, safety and reliability of modern technology. The same benefits were expressed when recreationists were asked how technology affected their backcountry experience itself later in the interview. The decreased weight of new equipment and its impact on increased comfort and access to natural areas were particularly emphasized:

"I think that's the big thing, in that the gear [i.e., equipment] helps because it means that you are comfortable (Bob).

"I think technology is also an incredible – it's not just necessarily comfort, it's also the safety aspect, increased the safety for instance because of new technology: jackets, sleeping bags, insulating packs, whatever you like... It's more than just warmth, it's actual survival that's being increased by technology" (Evan).

"I just feel that it's completely empowering. I see nothing negative in it" (Ida)

"Well, it allows – it definitely allows us to do a lot of activities safer...and easier, from the sense that a lot of the changes have been the equipment is now lighter that it used to be, particularly when it is wet" (Ken).

The development and use of new technology was also seen to be inevitable: for example, Heidi suggested that "it's just the way of the world. You can't say that technology is wrong, because everything is technology, isn't it? It has to move forward: if it didn't move forward, we'd all be caught in a time warp".

By making backcountry easier, safer and more comfortable in all types of weather, several people suggested that equipment made them more likely to take trips. Another aspect of feeling safer and more comfortable commonly expressed involved being able to take more risks while in the backcountry:

"I think there's no doubt that people are able to do some of the things that we couldn't have done some years ago, because they do have gear, they can survive in all these [conditions] – they can push the limits" (Cyril).

"You will be more inclined to wander and not worry about, you know, you'd just be bolder because you'd know where you are and so you would be able to navigate more skillfully" (Ida)

"It enhances the experience because it means that you can witness without feeling any sense of threat much more dramatic conditions. ... You can do things with confidence... you can stand there and laugh at the wind and all the rest of it and you can be completely secure" (Jay).

All respondents could quickly and clearly identify these benefits of technology. Most could also identify potential

ways in which technology could block the goals they set for backcountry recreation or have negative implications for their backcountry experiences. Some suggested that technology "increases the potential for conflict between different types of [users] as well as increasing the overall numbers" of recreationists (Evan); similarly, George noted technology "makes it easier for lots of other people to go into the hills and that takes away from the 'being alone' factor". However, few interviewees identified how their use of technology impacted their own experiences; normally, others' use of technology was noted as blocking their goals. Recreation conflicts between trampers and mountain bikes were noted numerous times, but particular attention was placed on the conflict created by noise (e.g., aircraft, cell phones, mountain radios and personal music players). The 'un-naturalness' of these noises in the backcountry seemed to be the property that affected most respondents: it affected the ability of recreationists to escape civilization and achieve solitude. For Jay, a cell phone "brought the real world too much into where we were"; Debbie noted that "going out in the mountains is to be away from technology... when you have increasing technology like these new electronics it sort of defeats the purpose".

Recreationists could be bothered by various noise issues, but seemed to have healthy coping strategies to enable them to continue to enjoy the trip. In addition, the short-term use of cell phones, mountain radios or aircraft for safety-related reasons (e.g., rescue, obtaining weather forecasts, making pick-up arrangements) was always supported, but their 'non-essential' use (e.g., chatting with friends or checking in at the office) was universally considered to be inappropriate.

Older/more experienced recreationists tended to believe that younger/less experienced users enjoyed accumulating equipment for its own sake, and felt the need to have more equipment. While older/experienced users focused on light weight (i.e., comfort), brought less equipment with them, and took different types and levels of equipment based on the goals of the trip, they felt that younger/less experienced visitors often brought too much equipment in the backcountry:

"As you get more experienced you have a much better idea of what equipment, exactly what you really need. I think when you are very inexperienced, you tend to take away too much probably, but inessential things, coffee makers and all that sort of crap, electric razors for God's sake" (George)

"You can buy things for the sake of having them.... There are some, they become fanatical on everything that is new that is out" (Larry).

While there were a limited number of young/less experienced visitors in the sample, they often shyly admitted to being 'gear freaks' (i.e., people who enjoy researching, buying and using new equipment) and acknowledged the lure of using new tools in the backcountry. Heidi, a younger climber, supports the suggestion that status may play a part, as she noted "it's more of a status thing, it's like men with cars... I mean you don't really have to have it but it's good to have it". Jay also admitted he "had to restrain myself from bragging about it [i.e., having new equipment] to people..., but sometimes I weaken", and Larry noted that "one upmanship" definitely existed among outdoor recreationists.

c) 'Imagining' with New Technology/ Equipment Occurred

An issue not previously noted in the literature relates to the consumption of recreation equipment. By looking at new equipment at retail stores and reading about the specifications and characteristics of these items in magazines, recreationists were able to 'imagine' new experiences and adventures that these pieces of equipment might enable. Debbie referred to it as "dreaming", about

what you could do and getting enthusiasm. You then start and think of what you've got and what trips you could do, and what'll be nice, and keep fit again, and get back out and make the time to do more trips and gives you ideas, motivates you to actually think about getting out there.

Ida suggested "It's probably the only window shopping I do enjoy ... probably because I know about it and I've got a strong interest in it and it will empower me so much, you know. Having a decent down jacket, you know, will keep you so warm". Jay put it this way:

In my mind I'm running over all the places where I would be using it in the conditions and so it's sort of a rehearsal thing, it's like a mental rehearsal and you look at – I'd look at a stove and when I am looking at it, I'm not just seeing the stove, I'm sort of like imagining where I would be and thinking about using it and thinking what I'm seeing on this new stove, how it would measure up, so I am living it in my mind".

Not all people enjoyed shopping for equipment. Flo, for example, simply stated, "I hate shopping", and would only get new equipment when necessary. Some older respondents again suggested that younger people bought too much equipment, suggesting it was "partly advertising, it's partly keeping up with your mates I guess, and, I don't know, people just like spending money" (George). Cyril thought "they're buying all this stuff and they don't think they can do it unless they have all that stuff and it's actually not true".

The value of other people modeling new equipment was also noted by several people; by seeing what new technology other people were using, they could make decisions about whether this equipment would be useful for them. Similarly, looking at new equipment while window shopping allowed people to "keep up to date" with what was available at retail outlets (Ken). Martin suggested that

I think you are influenced a bit by the equipment that other people have, I think almost invariably you compare [it] with your equipment and what they may have and just weigh up the pros and cons. Because I think probably everyone is looking to improve their overall equipment ... within the constraints they may have budget-wise.

Most noted that this 'imagining' related to the increased comfort, safety and lightness the new technology would offer, although the impact of new technology of altering risk taking was also mentioned.

d) Only Others Over-Rely On or Have Too Much Technology

When asked if they ever relied too much on their technology while in the backcountry, no one admitted to personally over-relying, but most noted that 'other people' could rely

too much on technology. George did admit that "We all pile into our cars and drive about 500 kilometers to go on a walk for a week, we rely on that technology very much", and that dehydrated food packages created "a lot of litter". But most suggested that while they recognized they relied on technology, they did not 'over-rely' on it, mainly due to the level of experience they had in assessing the conditions and what equipment they needed to successfully and safely complete a trip:

"I think your knowledge of the mountains and knowledge of survival and that sort of thing should make it possible for you to make a decision about how much you are actually going to need all that technology to make it a good experience, but you can overdo it. ...[S]ome people need more and why they have all that stuff ...it gives them a sense of security but in actual fact what they need is experience and knowledge" (Cyril)

"I think it [technology] can make you too dependent on technology...Yeah, they are using them [GPS] all the time and they kind of need to have that security in a way, so they don't trust their judgment from experience to actually sort of get them out of trouble" (Debbie)

Some felt that other people, less experienced backcountry users, could rely on technology too much, as they didn't have the experience necessary to cope with conditions that might arise if the technology failed or conditions became worse:

"I can see people going out into areas that perhaps they shouldn't because they have got their GPS, which basically tells them where they are, and they don't have these skills to help them cope with that particular type of country.... basically, I think people can abuse it and probably do abuse it" (Flo)

Discussion and Conclusion

For most respondents, recreation equipment was typically not normally originally associated with the term 'technology', and the continuous advancement of technology obscured the highly technological nature of many aspects of 'traditional' recreation equipment (e.g., tents, sleeping bags, clothing, stoves, etc.). Electronic equipment such as cell phones and GPS units seemed to be more 'visible' as technology: both the academic and popular gaze is focused on a limited type of technology used in the wilderness. After being asked what equipment was not technology, respondents acknowledged that all their outdoor recreation equipment had some technological element, and there after equated the terms 'technology' and 'recreation equipment'.

As previously noted, wilderness researchers tend to focus on the negative aspects of increasing use of technology in the wilderness, especially its potential impacts on risk perceptions and risk taking. However, respondents in this study almost completely focused on the positive aspects of technology use, particularly increased comfort (with lightweight materials, warmth and dryness the most important factors), safety and the ability to enable or simplify access and visitation. While users admitted it was theoretically possible for the proliferation of technology to have negative impacts on the wilderness experience (e.g., recreation conflicts), and could often identify example of when this happened (largely due to 'unnatural' noise being introduced), in practice the ability

of recent technological advances in recreation equipment to make wilderness users feel more comfortable, safer and less physically demanding was considered to have almost revolutionary, positive impacts on the wilderness experience. For example, older users noted that lightweight materials and new equipment (e.g., walking poles) allowed them to continue visiting the backcountry despite decreasing health and strength. All users felt new technology allowed them to expand their limits and provide new challenges while maintaining safety and security in the wilderness.

Respondents did not directly elucidate the possible conundrum of using technology in order to escape the technological world, although some seemed aware of its existence. Winner (1986, p. 5) has suggested a "technological somnambulism" exists in Western society that blocks any meaningful examination of the unforeseen impacts of technology on our daily lives, and this seemed to be occurring in the wilderness as well. In addition, the consumption (purchasing) of new recreational equipment provided a very meaningful ability for users to imagine how the new equipment could provide even greater opportunities for new challenges and experiences as well as greater comfort and safety in and access to recreational areas. The process of "imagining" has never been identified in the literature and deserves additional study.

The seemingly irresistible allure of technology seemed to be in part determined by its ability to provide these new challenges and greater abilities while allowing for a more comfortable, safer experience. Respondents actively examined new equipment in stores and magazines and scanned other recreationists in the field for new potential gear.

Respondents were loath to suggest that any limitations should be placed upon the use of technology in wilderness areas, with the possible exception of when the purpose of use caused considerable recreation conflicts. These potential conflicts seemed to occur when the use of certain equipment – again, especially communication-related equipment – was not undertaken for reasons related to increased comfort, safety or access. The use of a cellphone to simply chat with a friend was considered inappropriate, but calling to confirm pick up times, check in or call for help was appropriate. This makes the potential management of technology much more difficult for park and resource managers, as it may not be the technology itself which causes conflicts, but rather its intended purpose.

In summary, Pohl (1998, p. 156) expressed the concern that "Our wilderness experiences run the risk of becoming more like virtual wilderness when technological devices do the work for us. They separate us from our environment and create a false sense of accomplishment". The respondents in this study had a very different perspective. Respondents were passionate about how technological advances in recreation equipment allowed them to be more comfortable, feel safer and gain easier access to and within the wilderness. While there was an acknowledgment that too much technology could potentially block some of the goals they set for their experiences, this was not of great concern, as they felt they had the experience and knowledge to avoid over-relying on technology, had coping strategies to deal with conflicts, and decided on a trip by trip basis what technology they brought into the wilderness. The primacy of comfort is also interesting, with this concept being almost totally ignored in the literature (but see Dimmock, 2009).

Both the positive and negative aspects of technology in changing risk perceptions and risk taking deserve further study. However, these respondents suggest that the ability of technology to increase comfort and safety and encourage wilderness use may prove to be at least equal to the dangers of technology espoused in the existing literature.

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Can Metaphysical Values Protect Mountain Wildlands from Development Damage?

Lawrence S. Hamilton and Jeneda Benally

Abstract—This paper addresses the question of whether spiritual, religious or cultural values held by humans for some wild mountain areas can protect these special places from developments that impair both these values and wild nature. The answer is sometimes yes, sometimes no, and sometimes a minimization of damage. Examples of each of these scenarios are briefly given, along with a more detailed current battle between the sacred and the profane in the case of the San Francisco Peaks in Arizona, USA. Some recommendations are given that help to strengthen the case when intangible values of reverence, cultural tradition, worship and iconic significance come up against destruction or impairment of nature in mountains.

Introduction

It is indeed gratifying to see these WILD Congresses bringing into their fora the spiritual and cultural values of wild places. While these special places may be forests, groves, caves, springs, wells or water-bodies, we want to deal only with mountains as wild places with sacred or iconic value. While there are many physical definitions of what constitutes a mountain, (e.g. Kapos et al. 2000), the “Oh, WOW!” emotional reaction upon viewing one from the lowlands is an important definer, —an intangible criterion. Mountains have inspired humans since first ancestral contact with them. Sometimes this has been awe or fear, and sometimes it has been religious significance. The names conjure up deep feelings among both traditional peoples and moderns: Olympus, Everest, Chimborazo, Elbrus, Tongariro, Ti’a Shan, Nanda Devi, Matterhorn, Fuji, Mountains of the Moon, Shasta. See *Sacred Mountains of the World* (Bernbaum 1990) for many others. Are these very special wild places, these mountains, revered by so many millions of people safe from harmful development that supposedly furthers progress? Not by a long shot! Metaphysical values usually do help. Let us look at a few of the many cases.

Lawrence S. Hamilton is Emeritus Professor of Forest Conservation, Cornell University, and Senior Advisor to IUCN’s World Commission on Protected Areas, 342 Bittersweet Lane, Charlotte VT, 05445, U.S.A., e-mail silverfox@gmavt.net .Jeneda Benally is of the Dine’ (Navajo) Nation and Founder of the Save the Peaks Coalition, P.O. Box 1492, Flagstaff, AZ, 86002, U.S.A. e-mail jeneda@blackfire.net

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Some Battles Won and Lost



Mount Olympus (Greece)

To the early Greeks, their loftiest peak, Mount Olympus, one of the most famous mountains in the world, was the primary home of the 12 Gods, clustered around the mighty Zeus. The power to inspire and create awe has persisted through the ages to modern times, and indeed the fame and mythical value of Olympus has spread throughout the world. It was declared a National Park in 1938 with a core area of 4,000 hectares of the summit and east side, and a wider area around the mountain as Peripheral Zone of the National Park so that adverse development would not impact core values. In 1981 the area became a Biosphere Reserve. It now covers some 238,410 hectares. The mythical sanctity of the mountain is reinforced by the presence of 5 monasteries on the lower slopes.

In 1989 a proposal for a major ski center and road arose for this east side in the Core Zone, to complement an existing ski center on the north slope. Mountain Wilderness—Greece, Nature and Ecology magazine, and World Wildlife Fund – Greece brought pressure on the government to oppose a ski center development, with road, on the east side of the mountain, and marshaled both national protest and global protest from the multitudes who regard this as a world icon (Kostas Tspiras, Pers. Comm). It is widely believed that this outpouring of opposition resulted in halting the proposal. A new Presidential Decree for the Olympus National Park was formulated. Public opposition, the bad economic situation in Greece, plus unreliable snow from climate warming have probably protected Olympus for the foreseeable future, and saved the wild, undeveloped east side of the mountain.

Local mayors however have not given up the battle for economic touristic development. Suddenly in 2012, in the middle of the economic crisis, the same proposal again came

on stage, by the same people, who in 1989, did not succeed to implement their project. Hopefully this will be aborted also. Affording secular protection as a National Park and Biosphere Reserve is not always sufficient to conserve wild land, but it surely helps.



Mount Kailash Tibet, China)

Is there hope, and a case to be made for mountain wilderness being protected by metaphysical values, when even the planet's most sacred mountain, Mount Kailash can be threatened by a road and by climbing? This mountain is held sacred by all Buddhists, Hindus, Jains, Sikhs and Bons (around 2 billion people) (Bernbaum 1990, updated by personal communication with author). The ultimate in merit is a pilgrimage to the mountain (very arduous itself) and then a circumambulation around it (52 km/32 mi). In an effort to boost tourism, in 2003 the Chinese Government supported the building of an airport at Nyan, only 155 miles from Kailash, a road to the site, and a road around the mountain for vehicles. The civil society protest from around the world about desecration of this special place of sacred pilgrimage apparently has stopped the road for the present.

Nor have climbers' boots been on the mountain. The celebrated Reinhold Messner proposed summiting Kailash in 1985, but self-aborted when the sanctity was strongly pointed out. In 2001 there arose a proposal by a Spanish expedition to be the first to summit Mount Kailash. Opposition by Buddhists, including the Dalai Lama, and most formal mountaineering organizations, led to a cancellation of these plans, and it is not clear whether or not a climbing permit was issued by the Chinese. Threats will continue no doubt, but surely this most sacred of all mountains is secure from development? It is not currently in any type of formal protected area, but designating it would surely be helpful. The Chinese government, in a touchy Tibet situation, does not seem to be making moves in this direction. However there is a recent China-Nepal-India agreement that includes this mountain and a nearby sacred Lake Manasarova in a Kailash Sacred Landscape Conservation and Development Initiative (ICIMOD 2012). It may afford greater secular protection. It may even merit World Heritage status, even greater protection?



Mount Sinai (Egypt)

Mount Sinai in Egypt is the site where Moses encountered God and received the Ten Commandments. It is sacred to Jews, to Islam and to Christianity, and a site of pilgrimage,—some 30,000 per year. There are wild areas near the summit, containing over 400 species of plants, 27 of them endemics, and ibex roam the slopes, protected by the sacredness of the mountain, even among the Bedouin who graze livestock. (See Mansourian 2005a). Notwithstanding religious values, in 1990 the Egyptian government proposed a tourism development of hotels, villas and shopping/services center and a cable car to avoid the arduous 2.5 hour climb to the summit where a restaurant would be built. It was estimated that tourism numbers might rise to 565,000 per year. Goodbye wild nature! Public outcry over the “Disneyfication” of the holy site led to the cancellation of this economic development scheme, with protests arising from Jews, Christians and Muslims. In 2002 it was designated as a World Heritage Site (for cultural values but protecting associated wild lands). A win for metaphysical values!



Cairngorms (Scotland, UK)

To many a present-day Scot, the Cairngorms are a wild domain held in awe and delight. It was officially designated a National Park only in 2003. In 2008 a proposal for a funicular to the summit, and a restaurant, became part of the regional economic development package. In spite of strong protest from the Scottish and British rambling and mountaineering community (and many other mountain lovers) both were built. But, in a compromise, the restaurant and the funicular access to it has been sited 100 rugged vertical meters below the summit (Malcolm Payne, pers. comm.). Visitors coming in by funicular are limited to a small fenced enclosure to prevent them from wandering into the rough terrain and high elevation wild area. This effectively safeguards the alpine tundra summit area and wilderness from throngs of tourists. Those hiking up from the base car park, under Scotland's "freedom to roam" policy, are able to trek into the summit areas if they wish. (Steve Carver, pers. Comm.). Sometimes compromise is the only solution possible for our special places, but it takes the passion of persons who have been smitten by the awesome experience of the mountain to fight for conservation.



Adam's Peak or Sri Pada (Sri Lanka)

Peak Wilderness Sanctuary in Sri Lanka is also known as Adam's Peak and Sri Pada, — the latter two names reflecting something of the spiritual nature of the mountain. Many Christians and Muslims believe that this is the site where the Eden-expelled Adam landed on Earth. He was obliged to stand on one foot for a thousand years, and this ordeal left a sacred (Sri) footprint (Pada) on a large summit boulder (now protected by a wooden shelter). Buddhists believe that this print was left by the Buddha, and Hindus that of Lord Shiva (Mansourian 2005b). At 2243m/7359 ft, this striking pyramidal mountain has for thousands of years been a rugged pilgrimage site.

First declared a Wildlife Sanctuary in 1940, the area is considered Sri Lanka's most untrammelled protected area (aside from the pilgrimage route), with intact forest cover ranging from lowland rainforest to high elevation cloud forest. It is an important source of water and a sanctuary for wildlife. The wilderness together with the adjacent Horton Plains

Nature Reserve hosts all 21 of the native bird endemics of the country, and is one of the Biodiversity "Hotspots". Rich in the forest resource, in gemstones, and at lower elevations a potential for farming and for exotic tree plantations, it seems to be a clear case that the spiritual values, plus subsequent designation as a Wilderness Sanctuary (and inclusion in the 2010 Central Highlands of Sri Lanka World Heritage Site) has minimized damage from resource development (especially gemstones and tourism).



Tongariro (New Zealand)

Tongariro National Park in New Zealand consists of three sacred mountain peaks: Ruapehu, Ngaurohoe and Tongariro. It was and is still revered and feared (active volcano) by the Maori people, — a place of "tapu". It is ancestor and source of "mana" to the regional tribes. Following the Maori/British Wars and subsequent new land laws favoring acquisition by colonists, with attendant logging and clearing of forest, concern arose over the fate of this place of power and sanctity. There had already been problems with "foreigners" wanting to climb these peaks, and even the Governor of New Zealand was prevented from summiting by the "tapu". Facing a dilemma, in 1887, the Paramount Chief, Te Heuheu Tukino IV, on behalf of his people, gave the land to the Crown (Queen Victoria) to protect forever. It thereby became New Zealand's first National Park (Potton 1995).

While limited recreational use (hiking, skiing and nature studies) are permitted by the management agency, no other adverse development is allowed. And special interior sacred places are given total protection. In 1990 it was inscribed on the World Heritage List as a Natural Site, and three years later it was also listed for its Cultural values. The conserved area now covers some 78,815 hectares (194,270 acres). It would be a breach of trust and law, and a violation of World Heritage standards to expand the ski area or to permit mining.

This solution to preventing loss of wild nature and spirituality worked because the land at the time was controlled by the Maori People, and now a vast majority of "new" New Zealanders also cherish and support this Protected Area and take pride in its designation as a World Heritage Site.



Uluru-Kata Tjuta (Australia)

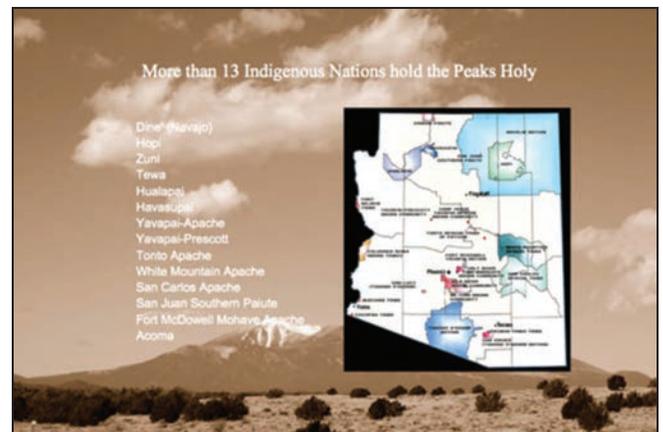
Uluru-Kata Tjuta National Park is a classic case of conflict between indigenous spiritual values (especially to the local aboriginal Anangu community) and tourism promoted by a colonizing culture (Anonymous 2008). Mount Uluru (named Ayers Rock by European explorers and then by Australians) is an amazing red monolith that became a favorite photographic and climbing site for tourists. It and Mount Olga (Tjuta) together were named as a National Park in 1958 (133,500 hectares/330,000 acres) and tourism began in earnest. Greater governmental recognition of cultural values led to restitution of ownership to the Anganu in 1985. It was leased back to the government for management purposes, with understanding that cultural values were to be respected, and Anganu are on the Management Board. It then received listing as a World Heritage Site in 1987. A Cultural Center was built the following year to interpret the great cultural significance and to ask tourists not to climb the mountain. In spite of an agreement to close the mountain to climbing when climbers dropped to below 20 percent of Park visitors (and this has happened as of July 2013), Parks Australia has not closed off climbing. Years of petitioning finally did result in the traditional owners receiving their sacred site back, but all problems have not been resolved just by having a secular protection designation.



San Francisco Peaks rise from a semi-arid plateau

A More Detailed Case: San Francisco Peaks

Rising from the usually dry, high plateau of the American Southwest, three volcanic peaks of around 3,360 meters thrust skyward just north of the City of Flagstaff, Arizona. Their sharpness of outline in the clear air gives them a supernatural appearance and enables them to be seen from great distances. This complex, the San Francisco Peaks, is sacred to most of the Native American peoples of this region, being significant to 22 Tribes, and holy to 13 Tribes, including the Navajo (Dine’), Hopi, Havasupai, Hualapai, Zuni, Acoma, White Mountain Apache and Yavapai-Apache. To the Navajo, the Peaks are the sacred mountain of the west, a key boundary marker, abode of the Holy People, and place where ceremonial and medicinal plants are collected. Its name is a direct reflection of the spiritual radiance, translating to “Shining on Top.” To the Hopi, their “Place of Snow on the Very Top” is the home of the Kachina spirits who bring vital rains to the dry-farmed source of food, and corn used for prayer. To other Tribal Nations the Holy Massif has qualities of spiritual nourishment, providing a rare source of medicinal and ceremonial plants, and is central to cultural survival.

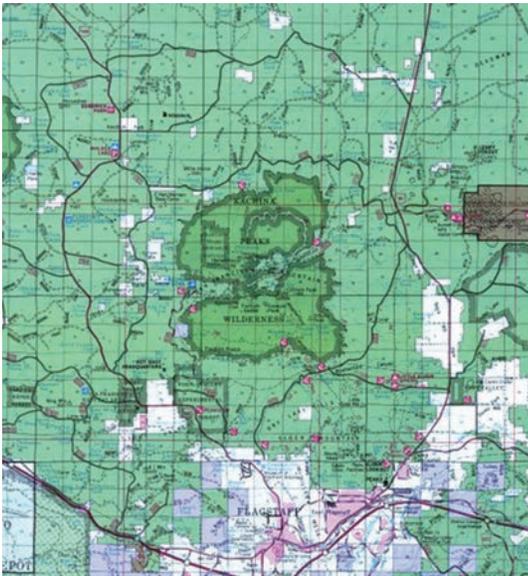


The Peaks are sacred to 13 Native American Tribes



View of the Peaks from Flagstaff shopping center through a car window. (the sacred and the profane?)

Not only are “The Peaks” valued for their spiritual nature, but the mountain “captures” water in the form of both rain and snow due to the orographic effect, and nourishes surrounding farm and ranching lands with streams, springs and groundwater aquifers. The nearby city of Flagstaff is totally dependent on this mountain water. Both plant and animal biological diversity are high. The Peaks are an oasis in the surrounding lands of semi-desert and pinyon pine-juniper woodland and savanna, as they bear closed forests of aspens and conifers, with associated flora and fauna. It is indeed a special place in a vast natural landscape and spiritscape.



Location of San Francisco Peaks within the Coconino National Forest

The San Francisco Peaks are part of the Coconino National Forest that is administered by the U.S. Forest Service. Over the years, under a policy of “multiple use”, the Peaks have received a small, rustic ski development (Arizona Snowbowl), a pumice mine (White Vulcan Mine), some timber harvesting and general outdoor recreation. In spite of protest and a lawsuit by Mr. and Mrs. Wilson, the Navajo Medicine Mens’ Association and the Hopi Tribe, the ski area was expanded in 1983 to include more trails, four lifts, parking and a lodge. The courts ruled that this did not impede the religious rights guaranteed by the 1978 American Indian Religious Freedom Act, even though it offended Native American beliefs. The situation seemed improved by the Forest Service designation of 7,570 hectares (18,690 acres) of the mountain forest as a Kachina Wilderness Zone in 1984. The Tribes also pressed the agency to designate The Peaks as a Traditional Cultural Property, but no action has been taken. In 2000, the Native Americans and environmentalists won a victory over proposed expansion of the pumice mine, on the basis of sacrilege to the holy mountain. The mine was closed in 2002 and the U.S. Department of Interior bought out the mining rights, closing and restoring the site.

Late in 2002, however, another threat to the sanctity of the Peaks arose with another proposed major expansion



Snow capture for water supplies, but an opportunity for winter sports.

of the Snowbowl, which had been suffering from declining snow cover and hence profits (only 4 days of skiing in 2001-2002). To counter unreliable snowfall, it was proposed to use Flagstaff’s reclaimed wastewater to make artificial snow. To the Tribes this would be an extremely sacrilegious action. Thirteen Tribes united in a “Save The Peaks Coalition” and were joined by several environmental NGOs, especially the Sierra Club.

In April 2005 the Forest Service announced its “finding” in favor of the expansion proposal, in spite of two years of negotiation with and petitions from the Coalition. The Navajo Nation and the Sierra Club in August 2005 brought a legal court appeal against the Forest Service decision. In January 2006, an Arizona District Court denied the appeal, apparently feeling that the economic interest of Arizona Snowbowl Resorts was more of a priority than the beliefs of hundreds of thousands of Native Americans. This decision was appealed to a Circuit Court of Appeals in San Francisco in September 2006. In March 2007, this higher court reversed the lower court’s ruling in favor of the Navajo Nation. But, in 2008 the 9th Circuit Court of Appeals revisited and reversed the decision, upholding the lower court’s ruling in favor of the ski resort. The U.S. Supreme Court denied the appeal to hear the case.

In 2009, The Save the Peaks Coalition and 9 plaintiffs filed a lawsuit against the U.S. Forest Service on the basis that the reclaimed wastewater was not tested for endocrine disruptors. This case was lost in the lower court and in the 9th Circuit Court of Appeals by the Plaintiffs, allowing the ski resort to use the proven endocrine-laden wastewater to be made into artificial snow. In spring of 2013 the Arizona Court of Appeals overturned a 2011 ruling by a former Coconino County Superior Court judge allowing the Hopi Tribe to challenge the city’s water contract with Snowbowl. In winter of 2012/2013 the Arizona Snowbowl became the world’s first ski area to have artificial snow made completely of municipal sewage effluent. (Official signs are posted which caution: “Do Not Eat the Snow”).

The battle continues seemingly without end. A good analysis of the various legal rulings up to 2009 is given by Hutt (2009), along with some other cases where Native American

Cultural Sites went through the courts. And Stumpff (2013) has an excellent, very detailed account and analysis of the issues and court battles that have been carried out over the years, and are still in process, to decide who speaks for the San Francisco Peaks.

In the USA, between 1887 and 1934 some 36,423,000 hectares (90 million acres) in the American West was taken from Native Americans by the U.S. Government, --98 percent of their land base (Gregg and Cooper 2010). Probably 75 percent of their sacred sites are no longer under their control. In the USA, there is some protection for sacred sites under the Religious Freedom Restoration Act, but the last judgment of the court in the case of The Peaks was that “the diminishment of spiritual fulfillment, —serious though it may be— is not a “substantial burden” on the free exercise of religion” (9th Circuit Court En Banc Panel of Judges, 2008). Nor is the American Indian Freedom Act a blanket for protection of large landscape features. There is also a Registry of Traditional Cultural Properties (TCP), emanating from the National Registry of Historic Places. The process of registration is fairly lengthy and complex, especially in regard to boundary delineation. Also the registration has a “magnet effect” to visitors and other users, presenting problems of maintaining the sacrality of revered sites. The San Francisco Peaks have not been designated a TCP in spite of proposals to the Forest Service secular custodians. In the San Francisco Peaks, the secular and profane has so far triumphed over the sacred. The battle is not over!

Recommendations

Can sacred or high cultural values protect mountains from having their wildlands destroyed by development? As one can see from the array of case studies the answer is not simple. Win some; lose some. Even governmental designation of some of these as Protected Areas of some kind, has not added an effective extra secular mantle. But sites with metaphysical values have often enormous biodiversity and wilderness values also. IUCN, in particular with the Rigoberta Mencha Tum Foundation has initiated a project called “Conservation of Biodiversity-Rich Sacred Natural Sites of Indigenous Peoples.” It focuses on five sub-regions: Meso America, South America, East Africa, West Africa and South Asia. (Oviedo and Jeaneraud 2007). In developed countries there are well organized Conservation NGOs that can bring civil society pressures on decision-makers to at least bring intangible values into the decision process. This is often quite effectively organized and carried out for favorite scenic and recreational places such as Yosemite and Mont Blanc, but less so when sacred values of indigenous peoples are involved. What suggestions can be made? A partial list follows:

- Designation as a secular, formal Protected Area by the Government. The special spiritual significance provides opportunity for designation as a Cultural Landscape Preserve (IUCN Category V). Perú has recently designated a Vilcanato Spiritual Park, having an official label of a Community Conservation Area. Because such special sites are mountainous, they usually have high biodiversity and scenic values, that often qualify them for National Park (Category II) status, or as a Natural Monument (Category III), or even a National Heritage

Area. Such recognition and labels erect barriers to harmful development, and slow down the permitting process, allowing opposition to get organized.

- However, once established as a Protected Area, recreational values of mountains may result in conflicts, as is seen in several case studies. Appropriate zoning that protects sacred places or provides exclusive access should be part of the management plan, whatever the Category of protection. This may include pilgrimage management devices.
- If managed by an agency that is not the belief-system people themselves, proper and consultation-based interpretation of cultural values must be the scenario.
- Since special cultural skills are needed in managing the land and associated resources, management staff should be selected from local people and they should be given special training, involving the Elder Traditionalists.
- An excellent set of guidelines for planning and managing mountain Protected Areas with high cultural values can be found in Hamilton and McMillan (2004).
- A set of general guidelines are provided in “Sacred Natural Sites: Guidelines for Protected Site Managers” (Wild and McLeod 2008).
- The ultimate in secular protection by governments is by designation as a World Heritage Site, if the area meets the standards set by UNESCO. Designation as a Biosphere Reserve also brings an international (UNESCO) layer of conservation.

Listing these special places in some kind of a register (UNESCO? IUCN? National Government?). Too often the claim for the sanctity of a site comes after a development is well into the planning stage and even into the action stage. Having them already listed creates an “official” barrier that has to be at least recognized by the damaging development. The major impediment to this is the secrecy aspect of the site, whose custodians fear the loss of significance if “outsiders,” who do not share the same values, know of them. They may abuse this knowledge, exploiting it as the sacred place becomes spectacle or a tourist magnet (e.g. Uluru). Registering also implies some loss of control to sites that have been protected for years by indigenous group spiritual leaders. We believe however that such listing becomes ever more imperative as younger indigenous people or younger adherents to nature-based spirituality drift from tradition and become less passionate about them. Moreover, virtual reality of wild protected places via computer is becoming more the experience of these special places, and this erodes the passion and belief in sacred sites on the ground.

An examination of the linkage between places of high spiritual/cultural value and nature conservation, in a research report by World Wide Fund for Nature, Equilibrium, and Alliance for Religions and Conservation (Dudley et al. 2005) concluded: “The limited quantitative evidence that does exist suggests that sites protected by faiths for their spiritual values can indeed perform a valuable function in protecting wild nature”. Since many of these sites are wild lands, all mountain wilderness lovers must be aware of their metaphysical nature and value to some faiths or traditional cultures, and not only refrain from damaging behavior, but be supportive of any efforts to protect them from “sacrilegious” development.

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