NATURAL ICONS AND THREATS: AN APPROACH TO LANDSCAPE CONSERVATION PLANNING

Brendan Mackey[1]*, Peter Jacobs[2], Luciana Porfirio[3] and Sonia Hugh[4]

* Corresponding author: b.mackey@griffith.edu.au
[1]Griffith Climate Change Response Program, Griffith University, Queensland, Australia
[2]People in Nature
[3] CSIRO Oceans & Atmosphere, The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
[4] The Fenner School of Environment and Society, The Australian National University, Canberra, Australia

ABSTRACT

Park management in complex landscapes spanning jurisdictions is often limited by the lack of shared management priorities and a common spatial information system. Furthermore, current approaches may lead to a reductionist approach by focusing on a narrow range of park features in isolation from their landscape context. The natural icons and threats framework is proposed as a complementary approach that can provide a more holist perspective to managing biodiversity and nature conservation features and their threats across large and multi-jurisdictional natural landscapes. The first step is to engage managers and stakeholders in helping define natural icons, that is, widely recognized, significant and characteristic natural landscape features, and to identify threats to their condition. A GIS database of the icons and threats is developed that can be interrogated by park managers to identify conservation management priorities utilizing a decision support system. The 1.6 million hectare Australian Alps national parks network, comprising 11 protected areas spanning three States, was selected as a case study. The Multi-Criteria Analysis Shell for Spatial Decision Support tool was used to visualize and interrogate the spatial information. Critical and high priority areas for management intervention were identified and compared to current protected area agency programmes.

Key words: park management, multi-jurisdictions, decision support, whole-of-landscape planning

INTRODUCTION

The major focus of systematic conservation planning is biological conservation or biodiversity. For planning purposes, biodiversity is typically defined in terms of a selection of native species and broadly defined ecosystems, often using vegetation types as a surrogate, for which data are available (Felton et al., 2009). Increasingly, conservation planning is paying attention to ecological and evolutionary processes that sustain these elements of biodiversity including biological dispersal, habitat connectivity, wilderness quality and refugia (Klein et al., 2009). Furthermore, conservation policies now recognize the need for planners and managers to explicitly address threatening processes (Carwardine et al., 2012).

While systematic conservation planning has made a welcomed contribution to more cost-effective allocation of limited conservation resources, current approaches are limited. Most, if not all, approaches to systematic conservation planning are inevitably reductionist. Data limitations mean that the majority of the species, communities, and processes that comprise biodiversity cannot be factored into the optimization algorithms (Bottrill et al., 2011). A corollary is that current approaches are strongly positivist in that only those things that can be measured are considered to hold value. Not everything that society values about nature conservation, however, can be measured and subjected to optimization algorithms.

The computational reductionism and positivism imposed by systematic conservation planning also tends to alienate the public who relate more to landscape features. This is a practical problem as the public's political support is needed for conservation investments to be forthcoming and sustained over time. Current approaches can also alienate land managers whose

management units are defined at the landscape level and who must deal with conservation assets and threats in an integrated way (Worboys & Mackey, 2013). Finally, in a world of rapid global environmental change, including climate change and increasing land use pressures, conservation planners need to consider the fate of the common, abundant and characteristic biodiversity and natural features, in addition to the rare and threatened.

In response to these limitations, we propose here an approach to conservation planning based on a 'natural icons and threats framework'. This framework promotes a landscape level focus that can complement established systematic conservation planning approaches. We test our new framework with a case study of the multi-jurisdictional Australian Alps National Parks Network (Australian Alps, 2012), hereafter called the Alps Network. We compare the framework with the current approaches to landscape scale biodiversity decision-making used by the various government agencies responsible for managing this common landscape that spans three State jurisdictions.

THE NATURAL ICONS AND THREATS FRAMEWORK

The natural icons and threats framework facilitates a landscape-level strategic assessment of the values, threats and condition of a protected area. The framework facilitates stakeholder engagement in the planning and management process by focusing on the natural values of widely recognized landscape features and addressing their key threats. The framework promotes a more holistic appreciation of the conservation values of protected areas as the identified icons will integrate many elements of biodiversity and natural values that are more typically considered in isolation and often out of their landscape and geomorphological context. The approach also provides a way of identifying decision making around priority actions and resource allocation in a way that is transparent to stakeholders and practitioners alike. Applying the framework involves the following three steps.

- **Step One – Natural icons**

Identify a set of key stakeholders who have a direct and sustained interest in the natural values of the protected area and their long-term conservation. Stakeholders can include park managers, researchers, eco-tourism operators, environmental NGOs, and neighbouring residents. The stakeholders are interviewed to help identify the protected area's natural icons: significant natural landscape-level features that are widely recognized and that symbolize, epitomize, characterize or define the protected area. These natural icons are intended to be defined broadly and can include, for example, dominant vegetation communities or landforms. Each iconic feature will contain a diversity of component elements (species, communities, land units) each of which can independently possess their own conservation value.

The stakeholder-defined icons can be cross-validated with published information about the conservation values of the protected area. Typically however, while tourist and public educational materials may speak to iconic landscape features, formal research and management reports and literature may only focus on the component elements and particularly on listed threatened species and communities. Often, iconic landscape features may not be currently threatened but may be at risk from future threats such as climate change.

- **Step Two – Threats**

The second step is to identify the key threats to the nominated iconic landscape features. Examples of threatening processes include invasive plant and animal species, recreation and tourism activities, infrastructure development, climate change, and altered fire regimes. The threat is evaluated by its level of impact on the integrity (i.e. ecological condition) of the landscape feature. Threats to natural icons can be identified through a combination of literature review and stakeholder surveys. The latter is important because many protected areas lack the necessary monitoring systems to identify current threats at specific locations.

- **Step Three – Decision support**

The third step requires developing spatial data layers that represent the geographic distribution of each of the iconic landscape features and the threats. For large protected areas that cross jurisdictions, this approach catalyses the development of common Geographic Information System (GIS) spatial data-packs. A GIS-based decision support tool is then used to map the icons and threats and explore their geographic overlap. This spatial information provides a basis for engaging with stakeholders and decision makers about management priorities.

We use the Multi-Criteria Analysis Shell for Spatial Decision Support (MCAS-S), (ABARES, 2014, Lesslie et al., 2008) to visualize and analyse the spatial data layers of the icons and threats. Usually, these spatial data layers will have to be first generated using a computationally sophisticated GIS such as Arc GIS (ESRI, 2011), drawing upon available data. MCAS-S is a decision support tool designed specifically for non-GIS users to easily explore spatial data and apply them to natural resource

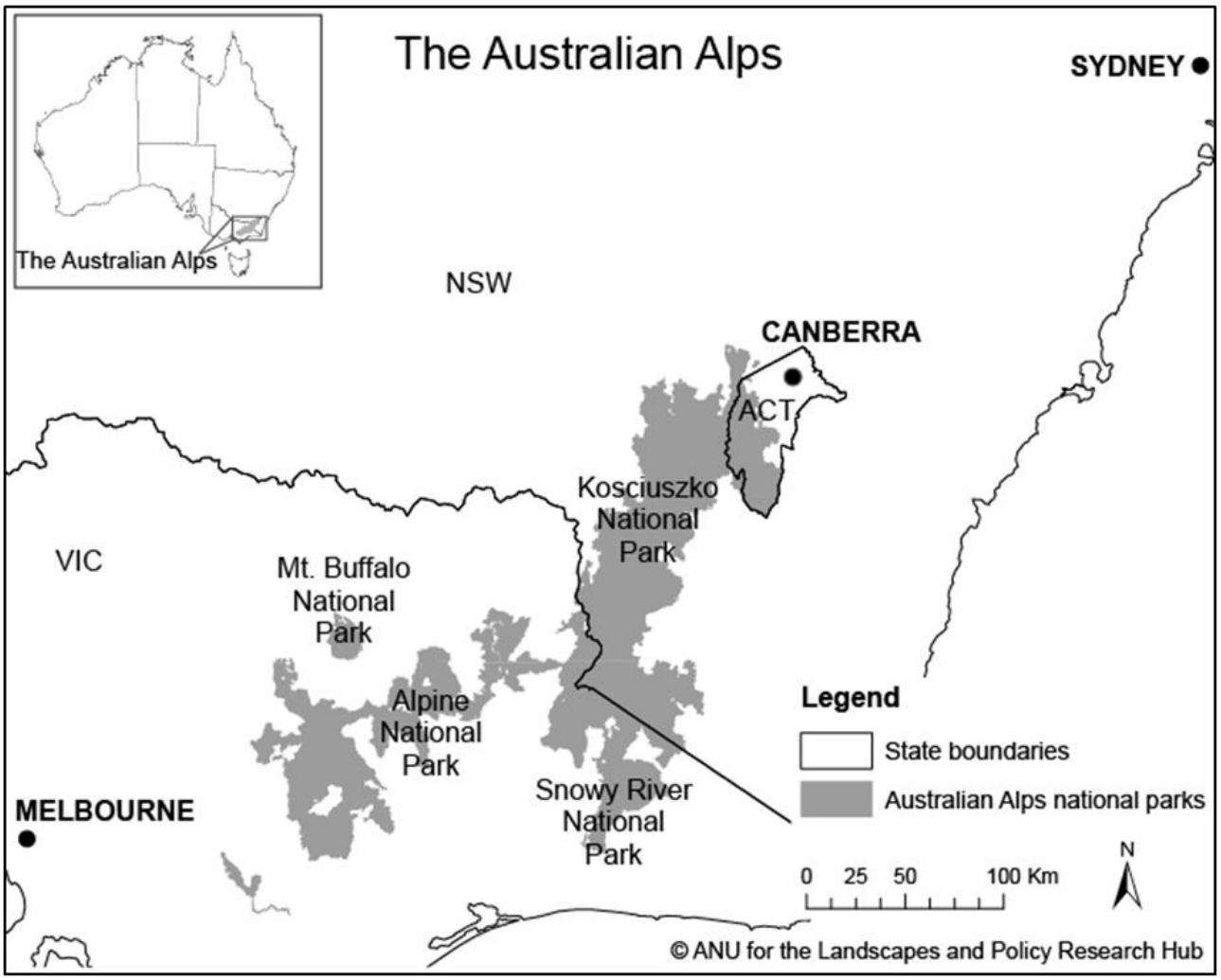


Figure 1: The national parks that comprise the Australian Alps Network

management and planning problems. MCAS-S has an intuitive and user-friendly interface that enables managers with a minimum of training to interrogate data layers and pose management questions for the landscape of interest. Using MCAS-S on laptop or desktop computers, managers and stakeholders can readily combine maps of the landscape icons and their threats with existing datasets to inform their coordinated, landscape-wide decisions.

CASE STUDY: AUSTRALIAN ALPS PROTECTED AREA NETWORK

The Alps Network was chosen as a case study to investigate the application of the icons and threats framework and explore the benefits of establishing a shared information base and common decision support system for, among other things, identifying whole-of-Alps Network management priorities. The study enabled us to test the utility of the framework in providing a pathway to a shared understanding of natural values and threats between the management agencies and supporting coordinated decision making in the complex Alps Network landscape. We addressed two questions that are relevant to park managers responsible for determining the critical and high priority areas for invasive species programmes across the Alps Network:

1. Which natural icons are currently free from invasive species threats and where, i.e., the refugia locations, arguably most important to protect from future invasions; and
2. Which natural icons are under threat from invasive species and where?

- **Alps Network overview**

The Alps Network comprises 11 protected areas spanning 1.6 million hectares across the States of Victoria and New South Wales and the Australian Capital Territory (Figure 1 & Appendix 1 of the supplementary material available online [1]). Each of the three State/Territory government agencies respectively manages the park areas within its jurisdiction, in accordance with State based legislation. Interagency cooperation is promoted through the Australian Alps Co-operative Management Program (Australian Alps, 2012). There is, however, no whole-of-Alps Network management plan, central warehouse for environmental information and records or decision

Table 1: Brief description of the natural icons of the Australian Alps Network

Natural Icon	Brief Description
Alpine Peaks	The Alpine Peaks are the distinctive lofty treeless peaks and high ridges prominent in the landscape, characterized by steep slopes positioned above the tree line.
Treeless High Plains and Frost Hollows	The high plains are expansive and treeless flat to undulating features at higher elevations, snow covered in winter and spring. The undulating nature of the topography leads to associated frost hollows where cold air drains, leading to conditions too cold for tree growth.
Alpine Wetlands	The Alpine Wetlands describe the bogs and Peatlands that occur in high altitude wetlands and waterways at the tops of the extensive water catchments.
Snow Gum Woodlands	Snow Gums cover extensive areas at the highest elevations that trees can grow and embody much of what people recognize as typifying the Alps landscape.
Tall Wet Forests	The Tall Wet Forests are dominated by Alpine Ash (*Eucalyptus delegatensis*) and Mountain Ash (*E. regnans*) canopy species
Rainshadow Woodlands	The Rainshadow Woodlands are a distinctive landscape feature occurring in the upper Snowy River Valley
Heritage Rivers	The mighty river systems draining to both sides of the Great Dividing Range. The best known is the Snowy River, rich in folklore as it feeds water from the summit of Mount Kosciuszko to the ocean.

support system. Strategic assessment of values and threats is limited by the three different environmental management systems and datasets. Management plans for the individual parks take a varied approach to identifying and categorizing values and there is no strategic assessment of focal values.

- **Identifying the Natural Icons**

The Alps Network contains hundreds of listed communities, species and notable features dispersed across the landscape and recognized in several pieces of State and Commonwealth legislation. There are also important values held highly by the community that may not be found on formal lists. The Australian Alps National Landscape Destination Management Plan identifies additional social values, many related to legends and the human spirit and their relationship with the dramatic topography and snow of the high mountain landscape, its unique flora and fauna adapted to the harsh conditions, its Snow Gums (*Eucalyptus pauciflora*), wildflowers and mighty rivers (AANL, 2010). The task of identifying the key natural icon values therefore combined landscape ecology with community-held values.

We compiled a preliminary list of natural icon values, drawing upon expert knowledge of the landscape. A survey was designed and implemented on the online survey facility 'SurveyMonkey.com' (Massat et al., 2009). The survey group of 46 were mostly Alps Network protected area agency staff with a smaller number of Alps specialists from outside of the protected area agencies, selected for a variety of expertise to provide a wide range of knowledge.

The survey questions asked them to (1) consider whether they agreed or not with each of the preliminary listed natural icon features, (2) rank their importance and (3) record features they saw as icons but were absent from the preliminary list.

We obtained 27 responses, 10 from ecologists/scientists, nine from park managers/rangers, two from recreational users, one consultant and five others. Based on the responses, the following seven natural iconic features were chosen to characterize the Alps Network: (1) Alpine Peaks; (2) Treeless High Plains and Frost Hollows; (3) Alpine Wetlands; (4) Snow Gum Woodlands; (5) Tall Wet Forests; (6) Rainshadow Woodlands and (7) Heritage Rivers (see Table 1 & Appendix 2 (a) of the supplementary material available online [1]).

The preliminary list of natural icons was largely endorsed with the highest agreement being around the Alpine Peaks, Treeless High Plains and Frost Hollows, and Alpine Wetlands. The single species, Mountain Pygmy Possum (Burramys spp.) and Corroboree Frog (Pseudophryne spp.) were less supported and were therefore not included here, enabling a focus on the endorsed landscape scale features. Geographic features such as glacial lakes, karst areas and boulder fields, and vegetation communities of snow patch, feldmark and old growth forest were also identified as icons by some survey respondents. While these biological and geographic features are of documented conservation significance for the Alps Network, for the purposes of this study they are encompassed by the identified broader landscape scale natural icons and can be incorporated as components in their descriptions.

Alpine Peaks icon, Mt Kosciuszko Main Range, Kosciuszko National Park © K McCallum

- **Identifying the Threats**

The Alps Network has been and continues to be subjected to a range of pressures and threats to the good health and condition of its biodiversity and ecosystems. The Alps Network in toto is sufficiently large to absorb small scale perturbations without serious impacts. However, there are emerging threats which operate, or threaten to operate, at larger scales with the potential for significant negative impacts for biodiversity. Notable large-scale threats include feral horse impacts on wetlands (Nimmo & Miller, 2007) and changed fire regimes from climate change (DEWHA, 2009). Furthermore, the natural resilience of ecosystems can be enhanced by reducing the impact of manageable threats so ecosystems are able to absorb and recover from these threats (Parks Victoria, 2014a).

We decided to focus on identifying the most important threats in the Alps Network associated with invasive species as these are the key threat abatement works currently under the control of and being carried out by managers. As with the natural icons, a list of the key threatening invasive species was derived based on a qualitative survey of selected stakeholders using the online survey facility 'SurveyMonkey.com' (Massat et al., 2009).

We compiled a preliminary list of key (threatening) invasive species based on expert knowledge and current protected area agency programmes. The survey was sent to a similar stakeholder group as for the natural icons survey. In the survey they were asked to consider whether they agreed or not with the preliminary list of key invasive species as key threats, to prioritize their importance, and identify important unlisted invasive species. The survey responses were benchmarked against the Parks Victoria State of the Parks Report (Parks Victoria, 2014b) that sought similar information.

Based on the 28 survey responses received, and confirmed through the benchmarking, the following nine invasive species were considered the most significant threat to the biodiversity of the Alps Network, generally in order of importance: (1) Feral Horses; (2) Hawkweeds; (3) Brooms; (4) Deer; (5) Oxeye Daisy; (6) Blackberries; (7) Willows; (8) Pigs; and (9) Foxes; (see Appendices 2 (b) & 3 of supplementary material available online [1]).

The preliminary list of invasive species threats was largely endorsed in the survey results with a strong view that feral horses and hawkweeds are the most important threats to key values. Other invasive species identified by survey respondents as threats are all locally important

Feral Horses are a key threat to several natural icons © James Shannon

but were not considered to be of landscape-scale impact. However, they may be added to the list of key threats in the future.

- **Developing the spatial data layers**

Having identified the set of icons and threats, the next step required development of spatial data layers that represent their distribution across the Alps Network.

As there is no GIS database held in common across the three jurisdictions, component data had to be first accessed from various sources for each icon and threat, and combined to provide a whole-of-Alps Network coverage. These spatial analyses were undertaken in ARC GIS and R software (R Core Team, 2012) and output layers prepared in MCAS-S format. Other ancillary datasets were also developed and incorporated into the MCAS-S data-pack. The most significant of these new datasets was a map of the vegetation cover. The data sources for each of the natural icons and invasive species are summarized in Appendices 4 and 5 of the supplementary material available online [1].

- **Supporting data**

Vegetation map: A fundamental dataset for biodiversity conservation relevant to many of the icons and threats is a map of native vegetation cover showing the composition and structure of major plant communities for the Alps Network. While vegetation maps and reports that capture the bioregion's distinctive plant communities have been produced by jurisdictions, no common vegetation classification system or map existed at that scale for the Alps Network. The national-scale native vegetation layer generalizes community types to the point where Alps-specific categories are not recognized (NVIS, 2007). To fill this gap, a common vegetation classification was developed to generate a new digital vegetation map for the Alps Network utilizing existing mapped data and other sources of published information from the three jurisdictions. Data sources, methods and the details of the common classification and map are provided in Mackey et al. (2015).

Catchment Condition: A catchment condition index and map (Worboys & Good, 2011) was used to provide a dataset that described the degree to which water sub-catchments have been ecologically degraded by contemporary land use impacts including fire and invasive species and likely trends in these conditions.

Other: A range of other datasets for standard geographic mapping features and information were also included in the data-pack. These included place names, populated places, primary roads, ski resorts, State boundaries, walking tracks and water-bodies (Geoscience Australia, 2014).

- **Presenting and integrating the data**

Analyses were undertaken to address the two questions posed above by using MCAS-S to combine selected spatial data layers using a computationally simple raster map calculation whereby each pixel was flagged as having a threat or icon present if that pixel was so identified in each primary data layer. The grid resolution of the MCAS-S data layers was 250m. Map algebra was then used to overlay the combined data layers to calculate the area of the Alps Network that was an 'icon free from threats' and the area that was an 'icon under threat'.

Table 2: Spatial statistics from MCAS-S analysis of natural icons and threats for the Alps Network

Natural Icon	Total area (Km^2)	% Area under threat from one or more invasive species *	% Area not under threat from invasive species
Alpine Peaks	153	45	55
Treeless High Plains and Frost Hollows	1,190	82	18
Alpine Wetlands	96	89	11
Snow Gum Woodlands	1,687	99	1
Tall Wet Forests	1,598	68	32
Rainshadow Woodlands	1,210	69	31
Heritage Rivers	336	71	29
Whole Alps Network	16,573		

* Subject to variable accuracy and confidence levels of available agency data. Some data represent treatment records and others presence, some polygonal and others buffered point data.

- **Comparison with current park management programmes**

We also undertook a qualitative comparison of current approaches to invasive management in the Alps Network with the priorities identified by the MCAS-S analysis based upon the natural icons and threats framework approach. For this comparison we drew upon publicly available documents, focusing on the Alpine National Park in Victoria for a more detailed comparison.

RESULTS

Spatial statistics are detailed in Table 2 of the MCAS-S analysis undertaken to reveal natural icon areas free from or subject to threats. The data layers used in this analysis and the map overlay calculations are illustrated in Appendix 6 of the supplementary material available online [1].

- **Identification of management priorities for invasive species programmes**

Priorities for invasive species management intervention were identified by using the stakeholder interviews to weight those icons under single or multiple threats from invasive species. This analysis identified geographic areas that should be given special consideration by managers when determining conservation management plans and resource allocations for programme implementation.

We proposed that areas of natural icons currently not under threat from invasive species should be considered a 'critical priority' for protection to ensure they maintain the integrity of their natural values (Figure 2). These areas require on-going surveillance and early intervention to prevent new threats from becoming established.

We also proposed that the next priority for management intervention ('high priority') should be those icons under the most serious threat. The Alpine Peaks, Alpine Wetlands and Treeless High Plains and Frost Hollows natural icons were considered by the stakeholders surveyed to be the highest priorities for biodiversity and this is somewhat supported by the protected area management plans. The worst threats to these icons were identified as feral horses, hawkweeds, willows and Oxeye daisy. Analysis of these multiple priority icons and multiple threats using MCAS-S identified high priority areas for management intervention (Figure 2,overleaf).

- **Comparison with current approaches**

The three management plans that cover most of the Alps Network present different approaches to the identification and prioritization of landscape features and focal targets, and therefore the outcomes vary considerably. The approaches taken by the Alps Network park agencies are summarized in Appendix 7 of the supplementary material available online [1].

In Victoria, the entire area is classified into five broad 'natural ecosystems' (Parks Victoria, 2014a). While the condition, values and threats to those natural ecosystems are identified, the features are not given any focus in terms of their role in contributing to the characteristic and significant natural values of the landscape. For example, the 'Alps' natural ecosystem encompasses most of the highly valued natural features of the alpine landscape in one category.

In New South Wales, the characteristic natural values of the Alps are identified through description of seven key elements, a number of vegetation features of international and regional significance and identification of three areas of 'Outstanding Natural and Cultural Significance' (Department of Environment and Conservation, 2006). The relationship between these features is unclear in terms of identifying priority landscape focal features.

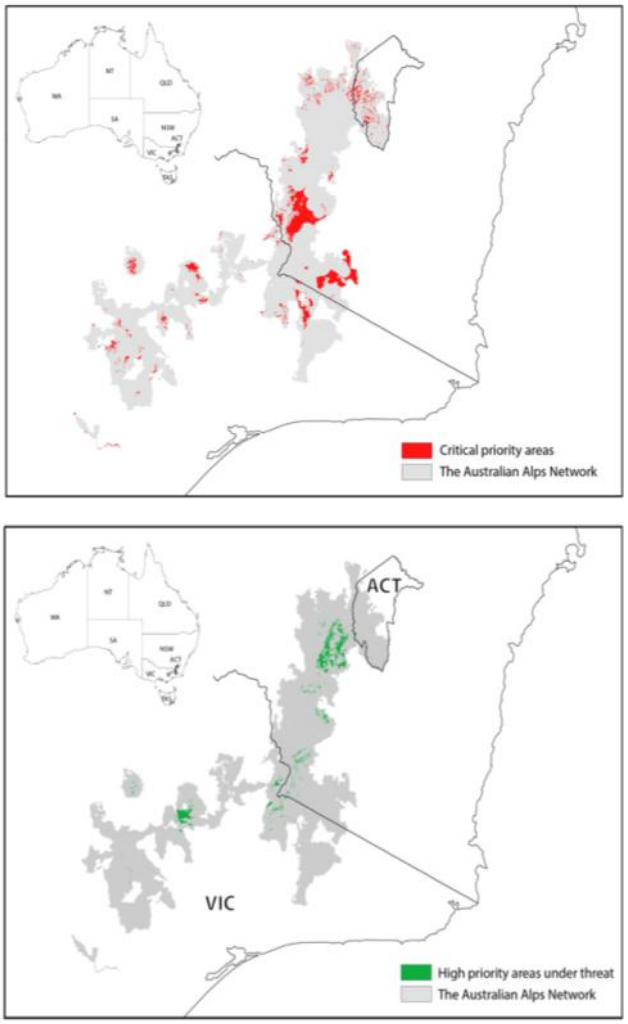


Figure 2: Top – *critical priority areas*, i.e., areas of natural icons currently not under threat from invasive species in the Alps Network; Bottom – *high priority areas*, i.e., areas of natural icons under the most serious threat from invasive species in the Alps Network

In the ACT, three vegetation features in Namadgi National Park have been identified as requiring special protection and management, and particular threats are identified (ACT Government, 2010).

It is difficult to find a shared position amongst the Alps Network agencies to identifying vegetation, landscape features or focus areas across the Alps Network. The three jurisdictions determine invasive species priorities through the development of various weed and pest strategies and invasive species programmes. However, the approach to the identification of natural assets in those strategies varies somewhat and the regional strategies are in the context of State and regional priorities rather than the perspective of protected area landscapes across the Alps Network. The outcome, however, in terms of the target invasive species across the Alps Network is generally common, with feral horses, pigs, deer, rabbits, foxes, goats, willows, hawkweed, Oxeye daisy, blackberry and Scotch broom consistently being priority target species, among others on a local scale.

To compare the results from the MCAS-S analysis, based on the natural icons and threats framework, with a current invasive species management programme in the Alps Network, we focused on Victoria's Alpine National Park Intensive Management Program (AIM) as it is a recent invasive species strategic initiative with data readily available (Parks Victoria, 2015).

The current foci of the AIM Program are: (a) weed control in alpine peatlands; (b) feral horse control in the Alpine Wetlands and Treeless High Plains and Frost Hollows and Snow Gum Woodlands of the Bogong High Plains and Eastern Alps; (c) riparian weed control on Heritage and other rivers; (d) willow and hawkweed control in the Alpine wetlands and Treeless High Plains and Frost Hollows of the Bogong High Plains; (e) feral goat eradication in the Rainshadow Woodlands; (f) deer control trials in the Bogong and Wonnangatta areas; (g) English and Cape broom in the Mitta and Wonnangatta Valleys; and (h) gorse eradication in small infestations. We compared these foci with our analysis that identified 'critical' and 'high' priority areas (Figure 2) and the results are shown in Figure 3.

The comparison indicates that:

1. The AIM Program has an emphasis on the high priority areas and identifies protection of Alpine Wetlands and Treeless High Plains and Frost Hollows from the impacts of feral horses, willows, hawkweeds and Oxeye daisy;
2. The AIM Program has no apparent emphasis on the critical priority areas, i.e., the Alpine peaks, Alpine Wetlands and Treeless High Plains and Frost Hollows that are currently free from threats; and
3. The AIM Program emphasizes areas not determined as high or critical priority areas but that do generally align with the protection of other natural icons including riparian weed control, feral goat eradication in Rainshadow Woodlands, English broom control in riparian and lower forest areas, along with deer control trials and localized gorse eradication.

DISCUSSION AND CONCLUSION

The Alps Network is a complex of 11 protected areas, managed by three protected area agencies with co-operative management facilitated through the Australian Alps national parks Co-operative Management Program. We found that while this programme seeks to manage the area as one park with complimentary plans, there is

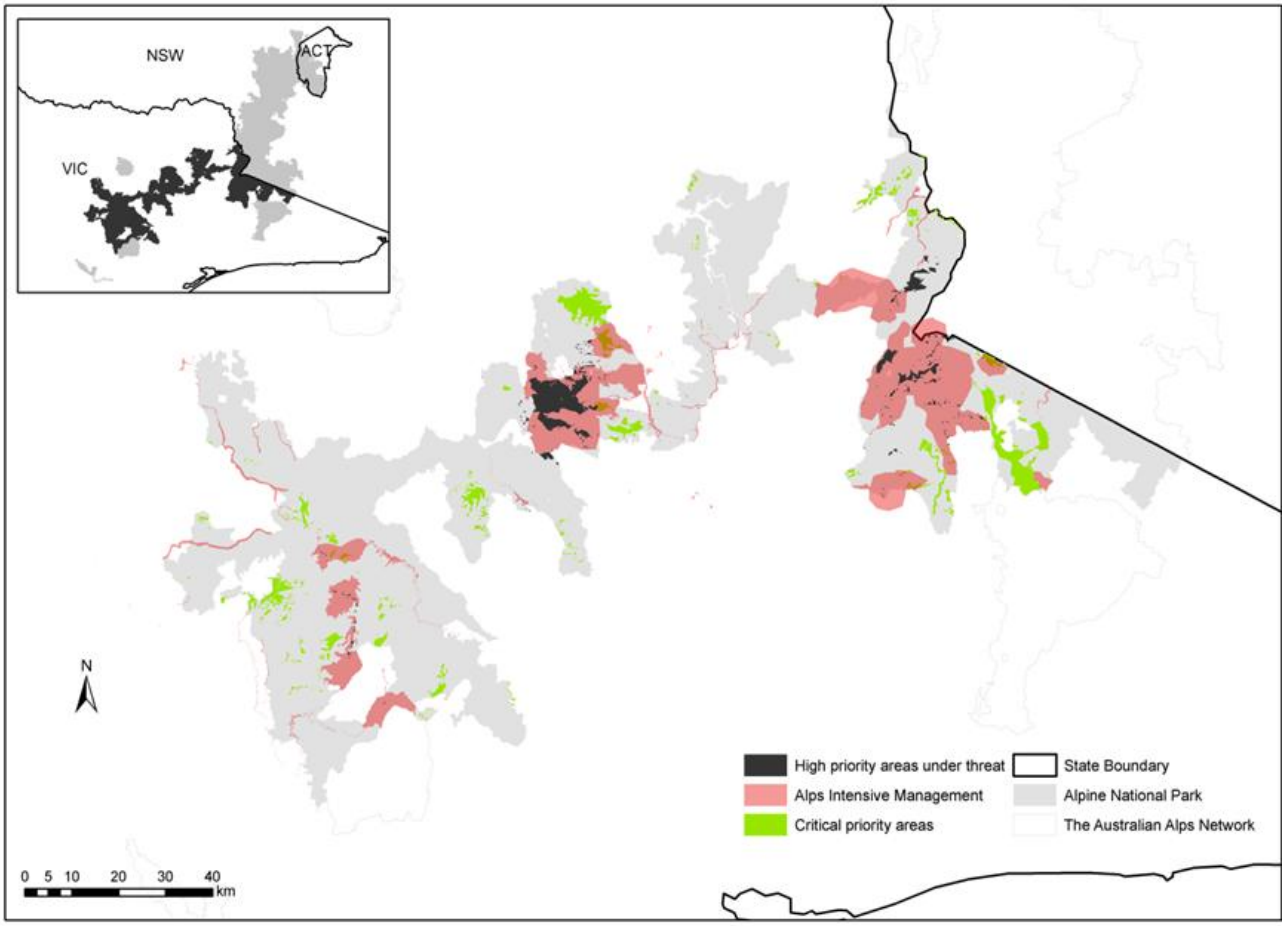
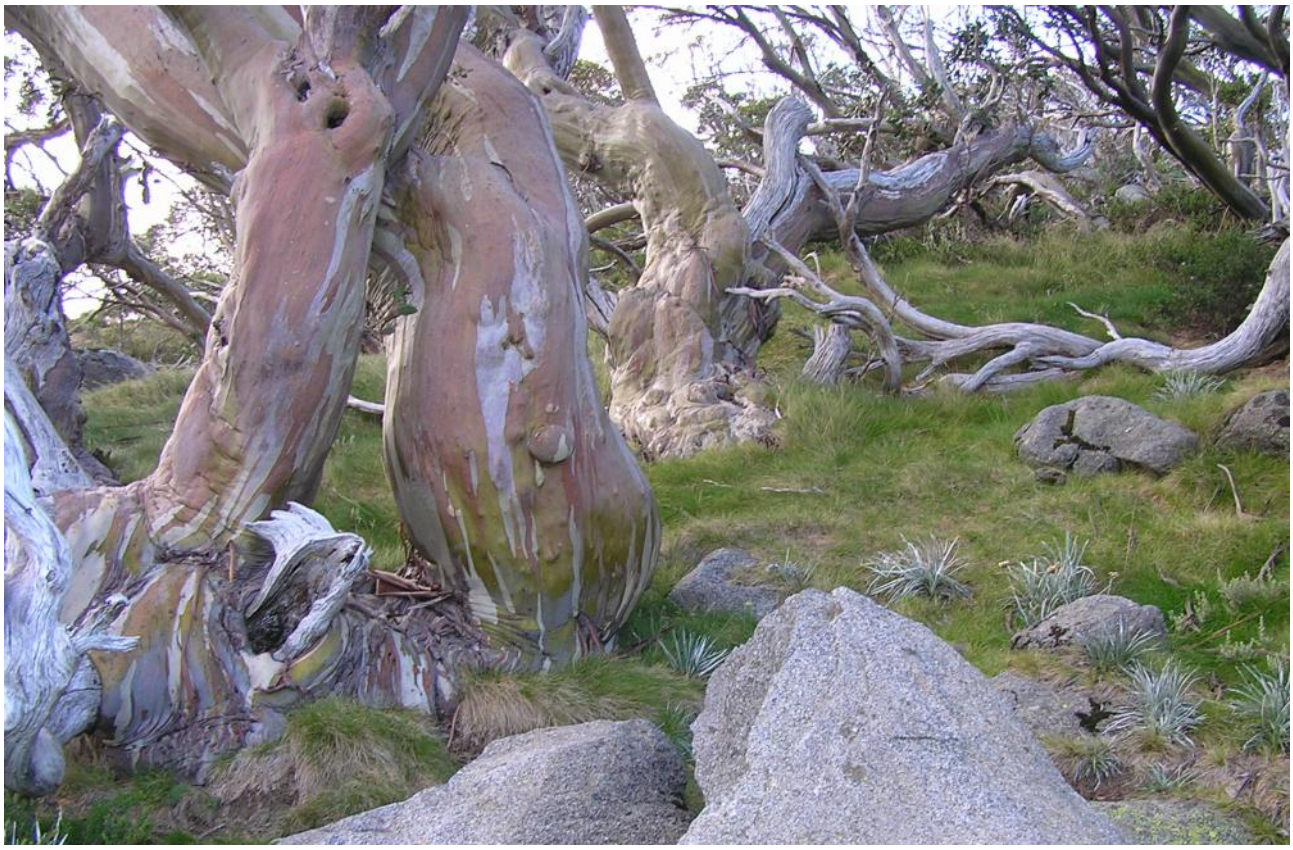


Figure 3: Comparison of the current principal invasive species programme in Victoria's Alpine National Park (Alps Intensive Management) with areas of natural icons and threats modelled as being of critical and high priority

no common multi-jurisdictional approach to identifying landscape scale conservation and heritage values, and threats to those values, and no central repository for environmental data.

We developed a new framework that provides a consistent approach to classifying and displaying landscape-level features and threats across the Australian Alps landscape, addressing the limitations of the separate management arrangements by promoting more effective cross-jurisdictional management arrangements. Using available data and the results of qualitative surveys of stakeholders, seven natural icons and nine major threats to these iconic features were identified in the Alps Network. These data were analyzed using the decision–support tool MCAS-S (Multi-Criteria Analysis Shell for Spatial Decision Support) to determine priority areas for resource allocation. Additional information was collated into an Alps-wide data-pack that can be used for further analysis including an Alps-wide vegetation classification and map. Classifying the Alps Network into seven natural icons and nine key threats common to all jurisdictions provided a significant improvement to the current situation where management authorities used different methods to strategically identify and describe values and threats across the landscape. The natural icons identified here were shown to incorporate the range and variation of values described by the multiple agencies.

To compare the outputs and priorities of this decision support framework with a current invasive species programme, we used the AIM invasive species Program in the Alpine National Park in Victoria for a more detailed evaluation. We found that the high priority areas we identified were also emphasized in the AIM Program. This alignment suggests that the natural icons and threats framework effectively encompasses significant features at a smaller scale, such as threatened species. The AIM Program also addressed key threats to other natural icons albeit of a lower priority. The key limitation identified was the lack of emphasis in the AIM Program on what we identified as critical priority areas, which recognize the importance of maintaining the integrity of threat-free natural icons and the role they serve as potential refugia into the future. Our comparison suggests that the natural icons and threats framework and MCAS-S analysis are aligned with current Alps



Snow Gum Woodlands icon, Kosciuszko National Park © Gillian Anderson

Network agency management priorities while helping to identify otherwise overlooked important whole-of-landscape characteristics.

The qualitative approach used here for identifying icons and threats opens up the potential to engage with a wide range of stakeholders and practitioners to identify and share understanding of natural values, condition and threats across a bioregional landscape. We showed that it is relatively easy to use existing datasets from various sources and develop a common set of spatial datasets that span jurisdictions.

We stress that our aim is not to replace current systematic conservation planning approaches. For example, this approach may be particularly useful in identifying focal targets and threats for application of the Conservation Action Planning methodology (TNC, 2007). The concept of natural icons is complementary to the necessary attention given to endangered species, providing a focus on landscape features that is readily grasped by the public and decision makers. Furthermore, natural values and threats know no borders and a landscape-wide, cross-jurisdictional approach to their management is required. The framework implemented in MCAS-S provides a readily operational decision support tool that provides land managers with a common platform for strategic analysis and planning.

The natural icons and threats framework provides a pathway for identifying cross-jurisdictional park management decision-making around priority actions and resource allocation. The framework promotes an understanding of shared conservation values and harmonization of management strategies and tactics in a way that is transparent to stakeholders and practitioners alike.

FOOTNOTE

[1] To access the supplementary material, go to <https://terranova.org.au/> and search for <alps icons and threats>

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ABOUT THE AUTHORS

Brendan Mackey is Director of the Griffith Climate Change Response Program at Griffith University, Queensland, Australia. His research is currently focused on the interactions between climate change, biodiversity and land use, and approaches to helping improve environment and conservation regulatory and management frameworks.

Peter Jacobs worked for nearly 40 years with Parks Victoria and previous park management agencies in Victoria, finishing his public service in 2013 as Chief Ranger for the Alps in Victoria, Australia. Peter is now working with People in Nature as a Protected Area specialist consultant. His work is focused on Protected Area planning, knowledge management and project management.

Luciana Porfirio is currently an OCE postdoctoral fellow with CSIRO Oceans and Atmosphere. She is designing, developing, and testing land use change models. Prior to CSIRO, Luciana was a postdoctoral fellow in the Landscapes and Policy hub, as part of the National Environmental Research Program based at the Australian National University.

Sonia Hugh is a GIS analyst with extensive experience in spatial and temporal ecological modelling at multiple-scales from continent to catchment. Sonia worked for the Landscape and Policy Hub's Bioregional Futures team applying a range of tools and techniques to study characteristics of landscape ecosystems and the patterns of diversity under scenarios of natural and human induced change.

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RESUMEN

La gestión de parques que abarcan varias jurisdicciones a menudo se ve limitada por la falta de prioridades en materia de gestión compartida y un sistema de información espacial común. Por otra parte, las técnicas actuales de manejo de parques pueden llevar a un enfoque reduccionista, centrándose en las características específicas de los parques sin tener en cuenta su contexto regional. El marco de íconos y amenazas naturales se propone como un enfoque complementario que puede proporcionar una perspectiva más integral para el manejo de los componentes de conservación de la biodiversidad y sus amenazas. El método propuesto en este estudio facilita el manejo de parques a escala regional y ofrece herramientas para el manejo de parques ubicados en múltiples jurisdicciones. El primer paso consiste en involucrar a administradores e interesados directos en la definición de los íconos naturales, es decir, las características ampliamente reconocidas y significativas del paisaje natural. Así también a la identificación de las amenazas a los íconos. Con este fin, se desarrolla una base de datos, en formato de sistema de información geográfico (SIG), de los íconos y las amenazas. La base de datos SIG puede ser consultada por los administradores de los parques para identificar las prioridades en la gestión de la conservación. Como caso de estudio se seleccionó la red de parques nacionales de 1,6 millones de hectáreas de los Alpes australianos, que comprende 11 áreas protegidas y que abarca tres estados. Se utilizó un software llamado MCASS para el análisis de la base de datos SIG y como herramienta de apoyo a las decisiones espaciales. Se identificaron áreas de gran prioridad para la intervención administrativa y se compararon con los programas actuales de las agencias responsables de las áreas protegidas.

RÉSUMÉ

La gestion de parcs qui s'étendent sur plusieurs juridictions est souvent limitée par le manque d'alignement dans les priorités et par l'absence de système d'informations partagé. En outre, les méthodes actuelles peuvent mener à une approche réductrice en mettant l'accent sur un petit nombre de caractéristiques n'englobant pas la totalité du contexte paysager. Une approche complémentaire est proposée, basée sur les ressources emblématiques et les menaces naturelles, afin de fournir une perspective plus holistique, tant de la gestion de la biodiversité et de la conservation de la nature, que des menaces auxquelles sont confrontés les grands paysages naturels pluri-juridictionnels. La première étape consiste à demander aux gestionnaires et aux partie-prenantes de déterminer les ressources naturelles emblématiques du paysage, c'est-à-dire celles qui sont largement reconnues, importantes et caractéristiques, puis d'identifier les menaces qui pèsent sur elles. Ensuite une base de données (SIG) est générée, recensant ces ressources emblématiques et menaces potentielles, consultable par les gestionnaires de parc pour identifier leurs priorités de gestion grâce à un outil d'aide à la décision. Nous avons sélectionné pour une étude de cas, le réseau de parcs nationaux des Alpes australiennes, avec ses 1.6 millions d'hectares comprenant 11 aires protégées s'étendant sur trois états. Un système d'analyse multicritères d'aide à la prise de décisions spatiales a été utilisé pour visualiser et interroger les données spatiales. Les domaines d'intervention critiques pour action prioritaire ont ainsi été identifiés et comparés aux programmes actuels des agences des aires protégées.