



Editorial

Towards Mobilizing Knowledge for Effective Decision-Making in Parks and Protected Areas

Glen T. Hvenegaard ^{1,*} , Elizabeth A. Halpenny ²  and Jill N. H. Bueddefeld ²

¹ Department of Science, Augustana Campus, University of Alberta, Camrose, AB T4V 2R3, Canada

² Faculty of Kinesiology, Sport, and Recreation, University of Alberta, Edmonton, AB T6G 2H9, Canada; halpenny@ualberta.ca (E.A.H.); jlbueddef@ualberta.ca (J.N.H.B.)

* Correspondence: gth@ualberta.ca



Citation: Hvenegaard, G.T.; Halpenny, E.A.; Bueddefeld, J.N.H. Towards Mobilizing Knowledge for Effective Decision-Making in Parks and Protected Areas. *Land* **2021**, *10*, 254. <https://doi.org/10.3390/land10030254>

Received: 22 February 2021

Accepted: 26 February 2021

Published: 3 March 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

In November 2017, over 15,000 scientists issued a second letter to humanity that outlines how we are “jeopardizing our future” by failing to protect key ecological systems. Catastrophic climate change, our planet’s sixth major species extinction crisis, diminishing fresh water resources, deforestation, and a host of other “alarming trends” were highlighted [1]. Parks and protected areas are one of the most effective means for protecting ecological health [2]. However, parks have many other important roles. Parks and protected areas provide essential services and resources for a wide variety of purposes and groups, including nature conservation, visitor recreation, local economic opportunities, Indigenous cultures, human wellbeing, and the provision of ecosystems services such as flood mitigation and access to drinking water [3].

Park managers make difficult decisions to support their diverse mandates, and need up-to-date, relevant, and rigorous information. Evidence-based management is in vogue with politicians and practitioners; however, access to, and effective use of, current research provided by social scientists, natural scientists, local people, or Indigenous peoples, is an ongoing challenge [4–8]. One of the many difficulties that characterize parks and protected areas, whether governed publicly, privately, or through other forms, is chronic underfunding, which results in a lack sufficient resources to mobilize knowledge effectively. Globally, most park agencies have little capacity to produce in-house social science or natural science research, or to conduct meaningful knowledge exchange with Indigenous and local communities [9–11].

The majority of parks-related scientific effort has focused on the monitoring and management of natural systems and elements. However, the conservation of this natural heritage is intertwined with economic, social, and cultural interests, and thus knowledge from outside the natural science disciplines is needed as well to achieve effective park management. Unfortunately, the use of Indigenous- [12–14], local- [15–17] and social science- [18,19] sourced knowledge to inform park management remains limited.

Park-related knowledge mobilization challenges have been documented previously [20–22]. However, this dialogue has been focused largely on the (a) use of natural science research, and (b) achieving nature conservation rather than other park mandates such as social equity, recreation, and health promotion. Conservation organizations are realizing that equally important is an understanding of social forces that affect park management, and how parks in turn affect human outcomes. This is documented in early recommendations and strategies put forward by park researchers [23] and practitioners [24–27], and more recent overviews of the state of social science adoption in conservation efforts [4,8,18,19,28]. For instance, after a systematic consultation with its staff, the province of Alberta’s park agency, Alberta Parks, determined that 65% of agency priority research questions cannot be answered by natural science [29], but rather are human-dimensions focused. This is not unique to Alberta [18].

This special issue explores knowledge mobilization in parks and protected areas, including research that addresses successes and failures, barriers and enablers, diverse

theoretical frameworks, structural innovations, and more that support effective knowledge mobilization. Park agencies and other conservation organizations now realize that understanding how social forces affect, and are affected by, park management are as important as knowledge of natural systems. Realizing that park-related knowledge mobilization is needed for effective park management, and that human factors have been neglected, the goal of this special issue is to enhance the generation and use of knowledge, especially knowledge derived from social science and the humanities [30], local, and Indigenous sources, for parks and protected areas policy, planning, and management.

To begin with, Grove et al. [31] examine Frojám, Spain and Ladydown Moor, England, two pastoral landmarks in western Europe, to demonstrate the degradation of heritage sites over time. The authors describe biological cultural heritage and its importance to preserving landmarks which show the connections between historical societies and nature. The study looks at the value of long-term conservation of pastoral enclosures and the relationships between these structures and the surrounding environment.

Múnera-Roldán et al. [32] address the need for a multidimensional understanding of the relationship between temporal and spatial aspects of protected areas and how knowledge governance can aid in management of these spaces as climates change. With examples from Colombia and South Africa, the authors evaluate the influence of time on protected areas and note that as climate changes, so too must the management of the area. They also address how different kinds of knowledge and their governance can be utilized to increase decision-making efficiency. Lastly, the authors compare their suggested framework to existing strategies for adaptive management used in other parts of the world.

Needham et al. [33] explore how knowledge from trappers, hunters, loggers, and farmers can be utilized to identify wildlife locations and movements near the Chignecto Isthmus in eastern Canada. This information can be used in establishing effective corridors for populations of various types of wildlife as their habitats undergo changes from climate and other disturbances. The study aims to not only increase confidence in establishing effective corridors, but also enforce the connection between environmental issues and social issues. The authors aim to integrate local knowledge in order to strengthen collaboration and encourage a more unified conservation effort from Indigenous people, researchers, recreationalists, and industries.

Bloom and Deur [34] examine the Yosemite Ethnographic Database in the USA, and its role in helping identify culturally significant landmarks, traditions, and flora and fauna. The database serves as a tool that park planners can utilize to understand the knowledge and perspectives of Indigenous peoples regarding the cultural value of the park. Security of the database is a concern as some information is sensitive and not meant to be shared with the public, even with other Indigenous groups, and as such, the authors recommend proper encryption and limited access of the database to those with granted clearance.

An analysis of knowledge mobilization for the purpose of effective decision-making in the oil sands in Alberta, Canada is supplied by Hood [35]. The paper examines the industry's ecological and social impacts observed along the Athabasca River. The author notes that integration of knowledge from various sources is essential but more so that the information must be accessible in order to be successful. Restriction of data, documents, and models makes knowledge mobilization difficult. Knowledge mobilization is critical to address complex and rapid land-use changes that impact the environment and communities.

Murray et al. [36] examine knowledge mobilization and collaborative practices within the British Columbia parks agency (Canada), with a focus on the effectiveness of research on decision-making processes. The most important information sources were internal to the agency, but respondents who collaborated with outside groups rated external information sources more positively. Practitioners consider research important and would like to see more collaboration with scientists.

Atkinson [37] examined the challenges and opportunities of using Indigenous knowledge in the National Park Service's efforts to manage threatened caribou herds in Alaska's

western Arctic. The study outlines a method of mobilizing Indigenous knowledge. Potential benefits include improved educational materials, better understanding of the resource, and a greater chance of adherence to regulations informed by Indigenous knowledge.

Blye et al. [38] studied how the Beaver Hills Biosphere in Alberta, Canada mobilizes knowledge, the effectiveness of that mobilization, challenges faced, and the attitudes towards diverse sources of knowledge. The authors found that not all knowledge was equally accessible, understood, or valued. Effective knowledge mobilization is complex, often takes a long time to develop, and needs to be diverse in format, types of knowledge producers, and cultural perspectives. The study expresses the importance of maintaining an “open system” when it comes to partnerships, and community integration should be included in discussions about management and conservation.

Milligan et al. [39] examines efforts to improve the ecological and recreational quality of the Franks Tract State Recreation Area in California, USA based on iterative participatory mapping and web-based public surveys. The authors analyzed the complex process of negotiating multiple realities and perspectives through reciprocal iterative change, concluding that shifts in stakeholder preferences can occur through iterative revision of design concepts that address a broad range of stakeholder values and concerns.

Carruthers Den Hoed et al. [40] explore how knowledge and information are used in decision-making processes about managing human-wildlife interactions, based on a case study of grizzly bear management practices in the Kananaskis Valley of Alberta, Canada. The authors evaluate how knowledge was mobilized in the decision-making process and how that process changed over time. Findings suggest that the role of managers toward knowledge mobilization shifted—some managers acted as barriers to knowledge mobilization while others were enablers of research. Despite the barriers and complexity of bear management in the area, the innovative and collaborative approach to decision-making in the parks demonstrates the importance of information diversity.

Last, Hallstrom and Hvenegaard [41] outline how Alberta Parks facilitated a Social Science Working Group to develop a Social Science Framework to support evidence-informed decision-making within the provincial system of protected areas. The framework links data-specific needs with existing and emerging policy and research priorities, with a focus on inter-organizational collaboration. The authors also provide a history, theoretical background, and potential benefits and liabilities of this approach.

The articles in this special issue demonstrate how park and protected areas are using an evidence-based approach to manage these ecologically integral places. The diversity of approaches and challenges discussed in this special issue offer insight into the practical application and barriers to knowledge mobilization in managing parks and protected areas around the world. This special issue attempts to recognize more holistic approaches of evidence-based management that mobilizes knowledge from a wide variety of sources: natural and social sciences and local and Indigenous knowledges. In an era of increasing urgency to address “alarming” environmental issues and wicked problems (Ripple et al., 2017), the recognition of multiple ways of knowing and doing will be integral in effective decision-making and equitable planning and management strategies.

Funding: This research was funded by the Social Sciences and Humanities Research Council of Canada, Alberta Environment and Parks Innovation Fund, and the University of Alberta.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Acknowledgments: We wish to thank all of the authors, submitters, reviewers, editors, and support staff that helped create this collection of papers. We also thank C. Cook help with editing.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Ripple, W.; Wolf, C.; Newsome, T.; Galetti, M.; Alamgir, M.; Crist, E.; Mahmoud, M.I.; Laurance, W. World Scientist's warning to humanity: A second notice. *Bioscience* **2017**, *67*, 1026–1028. [\[CrossRef\]](#)
2. Worboys, G.L. 'Introduction'. In *Protected Area Governance and Management*; Worboys, G.L., Lockwood, M., Kothari, A., Feary, S., Pulsford, I., Eds.; ANU Press: Canberra, AU, Australia, 2015; pp. 1–8.
3. Dearden, P.; Rollins, R.; Needham, M. *Parks and Protected Areas in Canada: Planning and Management*, 4th ed.; Oxford University Press: Toronto, ON, Canada, 2016.
4. Bennett, N.J.; Roth, R. *The Conservation Social Sciences: What, How and Why*; University of British Columbia, Canadian Wildlife Federation and Institute for Resources, Environment and Sustainability: Vancouver, BC, Canada, 2015.
5. Cvitanovic, C.; Hobday, A.J.; van Kerkhoff, L.; Wilson, S.K.; Dobbs, K.; Marshall, N.A. Improving knowledge exchange among scientists and decision-makers to facilitate the adaptive governance of marine resources: A review of knowledge and research needs. *Ocean Coast. Manag.* **2015**, *112*, 25–35. [\[CrossRef\]](#)
6. Cvitanovic, C.; McDonald, J.; Hobday, A.J. From science to action: Principles for undertaking environmental research that enables knowledge exchange and evidence-based decision-making. *J. Environ. Manag.* **2016**, *183*, 864–874. [\[CrossRef\]](#)
7. Cvitanovic, C.; Cunningham, R.; Dowd, A.M.; Howden, S.M.; Putten, E.I. Using social network analysis to monitor and assess the effectiveness of knowledge brokers at connecting scientists and decision-makers: An Australian case study. *Environ. Policy Gov.* **2017**, *27*, 256–269. [\[CrossRef\]](#)
8. Nguyen, V.M.; Young, N.; Cooke, S.J. A roadmap for knowledge exchange and mobilization research in conservation and natural resource management. *Conserv. Biol.* **2017**, *31*, 789–798. [\[CrossRef\]](#)
9. Fisher, J.R.; Montambault, J.; Burford, K.P.; Gopalakrishna, T.; Masuda, Y.J.; Reddy, S.M.; Torphy, K.; Salcedo, A.I. Knowledge diffusion within a large conservation organization and beyond. *PLoS ONE* **2018**, *13*, e0193716. [\[CrossRef\]](#)
10. Lemieux, C.J.; Groulx, M.W.; Bocking, S.; Beechey, T.J. Evidence-based decision-making in Canada's protected areas organizations: Implications for management effectiveness. *Facets* **2007**, *3*, 392–414. [\[CrossRef\]](#)
11. Lemieux, C.; Halpenny, E.; Swerdfager, T.; He, M.; Gould, A.J.; Carruthers Den Hoed, D.; Bueddefeld, J.; Hvenegaard, G.; Joubert, B.; Rollins, R. 'Free Fallin'? The decline of evidence-based conservation in Canada. *Facets* **2021**, in press.
12. Berkes, F.; Colding, J.; Folke, C. Rediscovery of traditional ecological knowledge as adaptive management. *Ecol. Appl.* **2000**, *10*, 1251–1262. [\[CrossRef\]](#)
13. Ens, E.J.; Pert, P.; Clarke, P.A.; Budden, M.; Clubb, L.; Doran, B.; Douras, C.; Gaikwad, J.; Gott, B.; Leonard, S.; et al. Indigenous biocultural knowledge in ecosystem science and management: Review and insight from Australia. *Biol. Conserv.* **2015**, *181*, 133–149. [\[CrossRef\]](#)
14. Houde, N. The six faces of traditional ecological knowledge: Challenges and opportunities for Canadian co-management arrangements. *Ecol. Soc.* **2007**, *12*, 34. [\[CrossRef\]](#)
15. Charnley, S.; Fischer, A.P.; Jones, E.T. Integrating traditional and local ecological knowledge into forest biodiversity conservation in the Pacific Northwest. *Forest Ecol. Manag.* **2007**, *246*, 14–28. [\[CrossRef\]](#)
16. Failing, L.; Gregory, R.; Harstone, M. Integrating science and local knowledge in environmental risk management: A decision-focused approach. *Ecol. Econ.* **2007**, *64*, 47–60. [\[CrossRef\]](#)
17. Raymond, C.M.; Fazey, I.; Reed, M.S.; Stringer, L.C.; Robinson, G.M.; Evely, A.C. Integrating local and scientific knowledge for environmental management. *J. Environ. Manag.* **2010**, *91*, 1766–1777. [\[CrossRef\]](#)
18. Bennett, N.J.; Roth, R.; Klain, S.C.; Chan, K.; Clark, D.A.; Cullman, G.; Epstein, G.; Nelson, M.P.; Stedman, R.; Teel, T.L.; et al. Mainstreaming the social sciences in conservation. *Conserv. Biol.* **2016**, *31*, 56–66. [\[CrossRef\]](#)
19. Gruby, R.L.; Gray, N.J.; Campbell, L.M.; Acton, L. Toward a social science research agenda for large marine protected areas. *Conserv. Lett.* **2015**, *9*, 153–163. [\[CrossRef\]](#)
20. Fazey, I.; Evely, A.C.; Reed, M.S.; Stringer, L.C.; Kruijsen, J.; White, P.C.; Newsham, A.; Jin, L.; Cortazzi, M.; Phillipson, J.; et al. Knowledge exchange: A review and research agenda for environmental management. *Environ. Conserv.* **2013**, *40*, 19–36. [\[CrossRef\]](#)
21. Segan, D.B.; Bottrill, M.C.; Baxter, P.W.; Possingham, H.P. Using conservation evidence to guide management. *Conserv. Biol.* **2011**, *25*, 200–202. [\[CrossRef\]](#) [\[PubMed\]](#)
22. Sutherland, W.J.; Bellingan, L.; Bellingham, J.R.; Blackstock, J.J.; Bloomfield, R.M.; Bravo, M.; Cadman, V.M.; Cleavelly, D.D.; Clements, A.; Cohen, A.S.; et al. A collaboratively-derived science-policy research agenda. *PLoS ONE* **2012**, *7*, e31824. [\[CrossRef\]](#)
23. Machlis, G.E. Social science and protected area management: The principles of partnership. *Georg. Wright Forum* **1993**, *10*, 9–20.
24. Briceland, R. Social science in the national park service: An evolving mission and program. In *Proceedings of the 1991 Northeastern Recreation Research Symposium*, Saratoga Springs, NY, USA, 7–9 April 1991; Vander Stoep, G.A., Ed.; USDA Forest Service, Northern Forest Experiment Station: Saratoga Springs, NY, USA, 1992; pp. 3–5.
25. Lewis, S. The role of science in national park service decision-making. *Georg. Wright Forum* **2007**, *24*, 36–40.
26. Murphy, J. The role of social science in park management. In *Proceedings of a Symposium Held at the Algonquin Provincial Park*; Lemieux, C., Murphy, J., Beechey, T., Nelson, G., Eds.; Parks Research Forum of Ontario: Waterloo, ON, Canada, 2003; pp. 3–5.
27. Wahle, C.; Lyons, S. *Social Science Research Strategy for Marine Protected Areas*; National Marine Protected Areas Center, MPA Science Institute: Santa Cruz, CA, USA, 2003.

-
28. Sandbrook, C.; Adams, W.M.; Büscher, B.; Vira, B. Social research and biodiversity conservation. *Conserv. Biol.* **2013**, *27*, 1487–1490. [[CrossRef](#)]
 29. Hallstrom, L.K.; Hvenegaard, G.; Gould, J.; Joubert, B. Prioritizing research questions for protected area agencies: A case study of provincial parks in Alberta, Canada. *J. Park Recreat. Adm.* **2019**, *37*, 110–122. [[CrossRef](#)]
 30. Bennett, N.J.; Roth, R. Realizing the transformative potential of conservation through the social sciences, arts and humanities. *Biol. Conserv.* **2019**, *229*, A6–A8. [[CrossRef](#)]
 31. Grove, R.; Pim, J.E.; Serrano, M.; Cidrás, D.; Viles, H.; Sanmartin, P. Pastoral stone enclosures as biological cultural heritage: Galician and Cornish examples of community conservation. *Land* **2020**, *9*, 9. [[CrossRef](#)]
 32. Múnera-Roldán, C.; Roux, D.J.; Colloff, M.J.; van Kerkhoff, L. Beyond calendars and maps: Rethinking time and space for effective knowledge governance in protected areas. *Land* **2020**, *9*, 293. [[CrossRef](#)]
 33. Needham, J.L.; Beazley, K.F.; Papuga, V.P. Accessing local tacit knowledge as a means of knowledge co-production for effective wildlife corridor planning in the Chignecto Isthmus, Canada. *Land* **2020**, *9*, 332. [[CrossRef](#)]
 34. Bloom, R.; Deur, D. Reframing native knowledge, co-managing native landscapes: Ethnographic data and tribal engagement at Yosemite National Park. *Land* **2020**, *9*, 335. [[CrossRef](#)]
 35. Hood, G.A. Accessing and mobilizing “new” data to evaluate emerging environmental impacts on semi-aquatic mammals. *Land* **2020**, *9*, 345. [[CrossRef](#)]
 36. Murray, G.; Randall, G.; Rollins, R. Informing protected area decision making through academic-practitioner collaborations. *Land* **2020**, *9*, 375. [[CrossRef](#)]
 37. Atkinson, H. Mobilizing indigenous knowledge through the Caribou Hunter Success working group. *Land* **2020**, *9*, 423. [[CrossRef](#)]
 38. Blye, C.J.; Halpenny, E.A.; Hvenegaard, G.T.; Patriquin, D. Knowledge mobilization in the Beaver Hill Biosphere, Alberta, Canada. *Land* **2020**, *9*, 424. [[CrossRef](#)]
 39. Milligan, B.; Kraus-Polk, A.; Huang, Y. Park, fish, salt and marshes: Participatory mapping and design in a watery uncommons. *Land* **2020**, *9*, 454. [[CrossRef](#)]
 40. Carruthers Den Hoed, D.; Murphy, M.N.; Halpenny, E.A.; Mucha, D. Grizzly bear management in the Kananaskis Valley: Forty years of figuring it out. *Land* **2020**, *9*, 501. [[CrossRef](#)]
 41. Hallström, L.K.; Hvenegaard, G. Fostering evidence-based decision-making for protected areas through the Alberta Parks Social Science Working Group. *Land* **2021**, *10*, 224. [[CrossRef](#)]