

Anthropological approaches for cultural resource conservation design and planning

Madeline Brown & Timothy Murtha

To cite this article: Madeline Brown & Timothy Murtha (2019) Anthropological approaches for cultural resource conservation design and planning, Environmental Practice, 21:4, 179-188, DOI: [10.1080/14660466.2019.1688083](https://doi.org/10.1080/14660466.2019.1688083)

To link to this article: <https://doi.org/10.1080/14660466.2019.1688083>



Published online: 25 Nov 2019.



Submit your article to this journal [↗](#)



Article views: 5



View related articles [↗](#)




View Crossmark data [↗](#)

RESEARCH ARTICLE



Anthropological approaches for cultural resource conservation design and planning

Madeline Brown  and Timothy Murtha 

Florida Institute for Built Environment Resilience, University of Florida, Gainesville, Florida

ABSTRACT

How natural and cultural resources are defined and valued has implications for their conservation and assessment. Although legal regulations for cultural resources such as the National Historic Preservation Act or the Native American Graves Protection and Repatriation Act offer clear guidelines for evaluating entities that fall under their jurisdiction, cultural resources cover far more than these official definitions encompass. Cultural models of cultural resources may vary across individuals from different management agencies, geographic regions, or cultural backgrounds. This in turn affects how they value and perceive cultural resources, both in their work and daily life. Anthropological methods including ethnography, cultural domain analysis, participatory action research, and crowdsourcing can offer critical insights into how different stakeholders or actors classify and perceive cultural resources. By recognizing the variability and dynamism in cultural resource definitions and values, it is possible to develop more holistic and inclusive assessment criteria for management and conservation. Developing emic understandings of cultural resources is particularly important in contexts with diverse populations, nested management institutions, and competing land-use priorities. This paper highlights methodologies for incorporating anthropological methods into integrated landscape conservation design and offers recommendations for how these methods can be applied.

ARTICLE HISTORY

Received 18 September 2019
Accepted 30 October 2019

KEYWORDS

Cultural resources;
anthropological methods;
integrated cultural and
natural resource
conservation; applied
anthropology; landscape
conservation

Introduction

Cultural resources are critical elements of socioecological systems and include not only individual objects or buildings, but also entire landscapes, lifeways, and cultural practices. Cultural resources are also inextricably linked with the nonhuman ecologies in which they are embedded. Recognizing the overlap between cultural and natural resources is a critical step for improving future landscape-scale conservation. Some cultural resources, such as wilderness, trails, and protected areas all directly link both cultural and natural values. Others, such as archeological sites, museums, and historic buildings, may also contribute to conservation through creating refugia and archiving biological and genetic resources. At the same time, when natural resources such as willow branches or brook trout are used to weave traditional baskets or provide recreation and sustenance, they too take on cultural significance. The potential for local or traditional ecological knowledge to improve natural resource management strategies is well recognized

(Anderson 2005; Bliege Bird et al. 2008; Butler et al. 2012), making a strong case for the role of local knowledge in both cultural resource and integrated conservation planning. Such efforts to address cultural resources as dynamic, living entities will require greater incorporation of diverse stakeholder perspectives, including those of communities traditionally outside the purview of legally-mandated archeological or cultural resource management.

Incorporating diverse stakeholder perspectives into conservation design and planning is no small undertaking. This process can be costly in terms of both time and financial investments, and the best approaches – let alone which stakeholder groups to consult – are not always straightforward. Despite these difficulties, methodological and theoretical tools from anthropology and related disciplines are well suited to handling this particular type of socio-cultural complexity. In this paper, we compile existing and propose novel approaches for leveraging

anthropological insights to improve integrated natural and cultural resource conservation. Because the natural is also cultural for many cultures, the methodologies described can be applied across disciplines and resource management contexts.

Here we discuss several critical methodologies drawing on case studies, existing literature, and experiences working with land managers in a variety of cultural contexts. First, we outline the broad applicability of ethnographic and participant observation methodologies for identifying *emic* (or in-group) understandings of particular resource or conservation contexts. Second, we describe how cultural domain analysis and other techniques from *ethnoecology* and *cognitive anthropology* can be used to systematically generate nested taxonomies and resource attributes such as function, rank, and value. Third, we discuss approaches for leveraging big data and citizen science initiatives to crowdsource vital information about landscape quality and attributes. Both crowdsourcing and citizen science research are gaining popularity for their ability to capture large volumes of data over vast geospatial areas at relatively low costs in time and financial resources. Finally, we briefly discuss participatory action research and community engaged research techniques as means of operationalizing more theoretical understandings of cultural resources into positive actions for improving environmental justice outcomes on-the-ground. Collectively, these methodologies form a strong toolkit for contemporary researchers and land managers addressing natural and cultural resource conservation at the large-landscape scale.

Methods

This paper highlights cases from existing literature and our work where anthropological methods are used in cultural and natural resource conservation contexts. Case studies are drawn primarily from several ongoing projects in the Eastern United States, though other research contexts are also incorporated where relevant. Ethnographic work was conducted with the Appalachian Landscape Conservation Cooperative (AppLCC) during 2017–2018 while M. B. served as a Landscape Conservation and Postdoctoral Fellow. In addition to participating in daily partnership activities, we conducted phone

interviews with 18 AppLCC steering committee members in December 2017. Online surveys were conducted with Qualtrics, where we sent out ~900 surveys and received responses from 125 cultural resource specialists working in the public sector in the Eastern United States, with around 60 near complete survey responses. Our sample included federal and state cultural resource specialists, state historic preservation office staff, and city planners. Survey questions asked cultural resource specialists to identify the main types or categories of cultural resources in their geographic region, as well as the functions, values and specific objects or places that fit within each cultural resource category. Twitter data were scraped using a 275-word keyword query – *ILTerms* (Brown et al. 2019) – and were processed and analyzed with Python and R. Although big data approaches are not always considered anthropological in the way that ethnography and participant observation traditionally are, these methodologies are united in their seeking of an *emic*, or insider, perspective on a cultural phenomenon. Here, we connect these approaches for their similar ability to offer insights into how different social groups understand the socio-ecological landscapes in which they are embedded. In addition, the public perceptions gathered via Twitter offer ground-truthing for assessments of culturally significant places, events, and practices.

Anthropological approaches

Anthropology has much to offer for enhancing integrated natural and cultural resource conservation. However, there are many methods for capturing anthropological information. Here, we introduce ethnography, cultural domain analysis, crowdsourcing, and community-engaged research. Collectively, these methodologies comprise a versatile toolkit for conservation researchers and practitioners alike. A goal of this paper is to outline applicable anthropological methods for conservation professionals looking to expand their research repertoire.

Ethnography and participant observation

Ethnographic methods excel at identifying diverse cultural resource values. By embedding oneself in a particular cultural context, an ethnographer begins

to become aware of how a place is experienced and valued by the members of the community in which they are working. Ethnography is often undertaken over a long time period, although rapid ethnographic research is also gaining popularity in certain sectors. The defining feature of ethnography is that the observer attempts to understand the emic, or insider/local, experience of cultural phenomena. The goal is to understand these beliefs and practices within their particular socioecological context. To quote Geertz, drawing on Max Weber, people are “suspended in webs of significance he himself has spun, I take culture to be those webs” (1973, 5). Studying these webs involves participating in daily life, observing local practices, listening to community narratives, and other processes of holistic observation. Ethnography asks us to step outside an imposed, external worldview and instead embrace cultural relativity and local perspectives. Here, we consider cultural norms and beliefs as dynamic and negotiated by groups with a shared identity. In addition to formal culture groups, this can include members of the same community, individuals with the same profession, those with shared educational backgrounds, or other shared attributes or interests.

In the case of cultural resource conservation, ethnography can be a productive first step for understanding the local cultural resource landscape, conflicts or issues around cultural resources, ownership of cultural resources, and the history of a given place (Hollowell and Nicholas 2009). For example, depending on who one is talking to, turkeys may be considered either natural or cultural resources (for their ecological niche, role in hunting culture, and symbolic importance for US holidays), or both. In our ethnography with the AppLCC conservation partnership in the eastern United States we found that although natural and cultural resources were considered by some conservation practitioners as distinct conservation arenas, in fact, the perceived threats to natural and cultural resources often overlapped (Brown and Murtha 2018). Identifying overlap in threats to conservation across categorical domains can leverage additional resources for conservation activities. As one stakeholder put it, linking cultural and natural resource conservation helps widen the pool of available resources for

conservation, rather than dividing it (Brown and Murtha 2018, 2019). To paraphrase this interviewee: *“this isn’t about competing for the piece of the pie, [but] rather broadening the pie, the stakeholder base, and constituencies. Helping people who have been focused on wild turkey restoration to see cultural resources: it’s not about the number of turkeys, but human-turkey interaction, human interaction with one another and the turkeys.”* Understanding how individuals interpret and experience socioecological landscapes may build common ground for conservation discussions.

In addition to unstructured observation, structured and semi-structured approaches can enhance ethnographic research. One such method is participatory transects or walks. Participatory walks can be used to collect detailed descriptions of places and the specific cultural touchstones within them. This is a common approach for agroecological and ethnoecological studies, where participants are asked to identify all the crops, animals, or birds that are encountered as they move through a space with the researcher. Participatory walks may also be used to document oral histories of a place or to identify culturally-significant features in an area.

Similar to participatory transects, participatory mapping is a powerful tool for documenting local culturally-salient landscape features. Participatory maps have been used in a variety of contexts to highlight community values across a landscape. There are several ways to approach participatory mapping. Some researchers ask key informants to draw maps of their community, either including any features they feel are important or following a prompt to include particular types of features. Another approach is to create a map as a collective group. The best approach to participatory mapping depends on the goal of the process. In one project in southwest China, with community members, M.B. mapped forest parcel boundaries in a community where no formal paper maps existed (Brown 2017). A list of all the names of the parcels was collected from conversations with local forest users and boundaries were physically mapped by walking borders with local experts. Through the act of walking boundaries, the layout

of the land became clear and the activity of walking with experts and mapping at the same time doubly served as a participatory transect of the forest. Walking the forest also provided a deeper understanding of the forest and the differences across parcels, further informing future conversations about the social and ecological values of each parcel. Whichever method is used, participatory mapping can be a powerful tool for uncovering local values embedded in living landscapes. In the context of cultural resource conservation, similar participatory mapping and transects could be conducted with land managers, local residents, and tourists, to capture diverse ways of experiencing and knowing a place.

Photovoice is another approach with value for cultural resource conservation. In photovoice research, cameras are given to research participants who are asked to document places, objects or events around them, perhaps along a particular theme. Photovoice gives locals the power to frame the visual representation of their community and in so doing, can flip power dynamics in cultural resource prioritization.

Cultural domain analysis and interviews

Cultural domain analysis has been widely used to investigate how cultural groups classify and perceive the world around them. Classic examples of these approaches include ethnoecological surveys of plants and animals, classifications of medical symptoms, and kinship studies (Bernard 2011). Nazarea (1999) describes ethnoecology as “situated knowledge,” or ways of knowing and classifying nature based on lived experience or place-based cultural traditions. Ethnoecology recognizes the plurality of value systems and knowledge frameworks in which science, experience, belief, and history come together to influence how humans classify and relate to their environments. Cultural domain analysis often begins with freelisting, where research participants are asked to name all the items that fit within a particular category. This might seem like a simple exercise, but when one considers that a tomato can be either a fruit or a vegetable depending on if you are talking to a botanist or a chef, the utility of this methodology for teasing out distinct knowledge

frameworks becomes clear. Once a freelist is obtained, these data can be further analyzed through pile sorting, pairwise comparisons, and ranking exercises (Bernard 2011). These methodologies collectively create nested typologies for particular domains of knowledge.

In our work on cultural resource classification, we asked cultural resource specialists from the United States National Capital Region (i.e. Washington D. C. and surrounding states) to name as many types or categories of cultural resources as possible. We received 53 responses about cultural resource categories, which covered 290 unique categories. In our initial analysis, we grouped the 290 unique category responses into 115 general categories and 53 broad groups. These categories range from highly specific to general, including trails, entertainment, foodways, structures, viewsheds, parks, landscapes, transportation infrastructure, and cemeteries. Once respondents outlined all the primary categories of cultural resources, they were asked to further identify specific sites, objects, events, or other entities which fit within each category. This approach generates individual cultural resource typologies. A strength of this approach is that categories are completely participant-defined, rather than being pre-defined by the researcher. This strength also complicates data analysis by making it difficult to compare data across respondents if they do not offer the exact same responses. For exploratory research, the benefits of generating highly diverse responses can be more important than statistical power. In general, approaches drawn from cultural domain analysis have great potential to inform cultural resource conservation.

Crowd sourced data and citizen science

In recent years, crowdsourced data and citizen science initiatives have become important forces for conservation. Additionally, the importance of social media and online communities in shaping conservation and heritage narratives, nature experiences, and environmental action cannot be understated (Büscher 2016; Di Minin et al. 2015; van der Hoeven 2019). Although there are numerous ways to gather data from the general public,

here we focus on two main approaches: social media and citizen science projects.

Every day, social media users generate data that may be used for assessing cultural resource diversity, distribution, and values. When users upload text or photographic content online, they are sharing something about their lived experience and the world around them. In the case of cultural and natural resource conservation, social media and volunteered geographic information can also yield insights into what types of places or landscape elements are either positively or negatively perceived; the state of biodiversity, cultural ecosystem services, or other landscape attributes in a given area; and park visitation levels (Clemente et al. 2019; Donahue et al. 2018; Fisher et al. 2018; Langemeyer et al. 2018; Levin et al. 2017; Norman and Pickering 2017; Roberts 2017; Tenkanen et al. 2017). Currently, we are examining the suitability of using Twitter data to examine public landscape values (Brown et al. 2019). We find that Twitter users often describe and tag particular locations they are visiting, making it possible to map landscape values and activities across the Twittersphere. Using natural language processing, it is possible to separate parts of a tweet into a sentiment/assessment (e.g. beautiful, breathtaking, dirty), with a particular place (e.g. Rocky Mountain National Park, Lake Tahoe, etc.) or landscape feature (e.g. sunset, lake, trail) and activities (e.g. kayaking, hiking, hunting). Parsing out what activities people are engaged in across different land-use categories, protected or private land, and other spatial designations will enable the construction of a cultural resource value map.

Citizen science data collection initiatives are widely used in natural resource conservation, capturing bird migration patterns (e.g. ebird), natural sounds (Cornell Library of Natural Sounds [(see: Bruyninckx 2015)], biodiversity monitoring (Chandler et al. 2017; Pocock et al. 2018) and more (Chase and Levine 2016). Cornell's ebird platform mobilizes bird enthusiasts worldwide to track migration dates, biodiversity, and other critical data points about global bird ecology. These data may be used as evidence of climatic shifts and other environmental issues, through the lens of

how they affect birds. In addition, the birding community has a long tradition of staging bird counts (e.g. the Audobon Society's Christmas Bird Count or Great Backyard Bird Count), where groups of or individual birders go out and document as many bird species as possible within a certain time period. Such enthusiasm has been critical for mobilizing public interest and awareness about bird conservation, generating ripple effects for conservation in other domains as well. Another project, iNaturalist, from the California Academy of Science and National Geographic, asks users to upload photos of observed species. Each of these initiatives creates user-generated databases about particular phenomena.

Cultural resource conservationists could learn from these efforts in the natural sciences and work to generate public interest in documenting community cultural resources. Not only would this increase data availability but would also expand and decentralize definitions of what a cultural resource is or is not. Giving the public the ability to document and evaluate cultural resources is a critical step in this process. In addition to well-known social media platforms such as Twitter, Facebook and Instagram, there are many other online data repositories that may be of interest to conservation planners. Some of these systems involve crowdsourcing digitization or other curation activities (Oomen and Aroyo 2011; Ridge 2013). In addition, there are significant efforts to crowdsource public perceptions of scenic landscapes and trails, such as Greenmapper and Greentracker (Bubalo et al. 2019), or other cultural resource documentation platforms (Dhonju et al. 2017). One tool developed in Europe, MyPlaceToBe, is designed to identify tourism locations from user-input data (Bubalo et al. 2019). The Eurasian Kurgan Database is another interesting project that explicitly links cultural and natural resource values in a single open-source database using OpenBioMaps as a platform (Deák et al. 2019). Expanding on these citizen science tools may be a productive avenue for future cultural resource conservation planning, particularly when spatial data layers are involved. In addition, given the wide range of existing citizen science platforms, some degree of cross-project data sharing

or community building might greatly improve the impact of these initiatives.

Visual resources, such as scenic vistas, skylines, and particular landscape esthetics are critical assemblages of cultural and natural resources. Unlike some other resource types, visual resources are rarely composed of a single element or feature, but rather emerge out of a particular arrangement of multiple landscape elements, both human and nonhuman in origin. A question remains however: how do we identify important or iconic visual resources? Work like this has been conducted for decades by Landscape Architects and Planners (e.g., see Goldberg et al. 2018; Orland and Murtha 2015) and continues to evolve as new technologies and approaches are developed.

A subset of visual resources have already been identified and formalized through the creation of scenic vistas along trails or pullouts along highways at particular scenic spots. Other officially recognized scenic resources include the National Scenic Byway or the National Wild and Scenic Rivers designations in the United States. Documenting and formalizing these areas as having scenic value has allowed them to become powerful tools for conservation. Expanding on previous efforts, the National Park Service has an outlined visual and scenic resource inventory protocol including Enjoy the View (NPS 2019; Sullivan and Meyer 2016).

Identifying new areas of scenic importance can be a massive undertaking. In some cases, land and resource managers conduct visitor surveys or set up automated data collection devices to track visitor use. Digital tools and social media such as open street map, Instagram, or Flickr offer exciting new prospects for identifying important visual resources. For example, Goldberg and colleagues (Goldberg et al. 2018) used Panoramio (a user-uploaded photo sharing platform originally linked with Google Earth) to identify scenic hotspots across the state of Pennsylvania.

Community engaged research

Participatory research has often been employed in environmental justice cases, such as where a change

in agroecological practices may have benefits for both the human and nonhuman actors in a place.

Anthropologists have a history of contributing to biodiversity and natural resource conservation through ethnoecological inquiry. This approach involves collaborating with local communities, documenting indigenous and local knowledge, and advocating for the inclusion of diverse world-views in conservation decision-making (Orlove and Brush 1996). In cultural resource management, it may be used to co-create local counter-maps, document personal narratives of an event or place, and protect or repatriate important cultural objects. Community archeology is a thriving field (Chirikure and Pwiti 2008), yet in some cases North American land managers have limited engagement with contemporary and intangible cultural resources, that is, those other than archeological or historic resources.

Though not usually framed as participatory research, in some ways the process of creating a landscape conservation design (LCD) mimics this practice. In their creation of a landscape conservation design for the Appalachian region, Baldwin, Leonard and colleagues brought together over 60 natural resource scientists and land managers to identify shared conservation priorities (Leonard et al. 2017). They began with terrestrial resources, followed by aquatic resources. Similar types of participatory priority setting could be completed for cultural resources, using the same methodological justification as has been used for natural resources. Holding focus groups to collect stakeholder experiences and values is a common practice in anthropology but has not readily been linked to creating quantitative models in the way they have been for natural resources. There are efforts to map cultural resources across large landscapes using existing datasets (Mazurczyk et al. 2018; Ogletree et al. 2019), but at this point, no large landscape participatory or community-engaged mapping projects are known to the authors.

Social network analysis is increasingly used to investigate natural resource management strategies. Because multi-stakeholder conservation is

on the rise, network analysis can be a powerful tool for understanding information exchange, collaboration networks, and power dynamics in resource governance contexts (e.g. Bodin and Crona 2009, 2011; Crona and Bodin 2006, 2011; Crona et al. 2011; Prell et al. 2009, 2010). In fact, the multi-stakeholder cooperatives are themselves sometimes considered a form of network governance, which may be well-suited to handling multi-resource (e.g. wildlife, water, cultural resources) and issue (e.g. climate change, forest fragmentation, linear infrastructure) contexts (Bixler et al. 2016; Scarlett and McKinney 2016). Many successful examples of using social network analysis in natural resource conservation contexts exist, making this an area of opportunity for complex cultural resource governance dilemmas.

Discussion

Much of what we consider to be *natural* landscapes are created through human activity. This recognition requires a reevaluation of the role of humans as landscape co-creators. In their long-term study of Martu fire regimes in Western Australia, Bliege Bird et al. (2008) found that the landscape's successional mosaic and fire regime patterns were created through traditional burning practices. Anderson (Anderson 2005) similarly identifies the role of Californian Indians in shaping the ecological communities in their region. *Wilderness*, by contrast, can be created when humans are intentionally excluded from places, making it an in-between place, where humans shape the environment through intentional inaction. When we conserve, we are keeping something (whether a landscape, a building, or a traditional practice) in a certain steady state. An anthropological lens, through ethnographic practice, cultural domain analysis, and community engaged research, provides insight into the multiple frames through which a particular landscape can be interpreted. Putting these frames in conversation with one another supports conservation planning that represents diverse actor values and priorities. In a syncretic conceptualization of heritage, Harrison (2015, 36) describes its role in "assembling alternative futures" and being made through four processes: "Categorizing ... Curating ... Conserving ... [and] Communicating"; regardless of whether the heritage is natural or

cultural. This framework recognizes the common ground across resource or heritage categories, encouraging greater collaboration and shared efforts. Each of the methods outlined here can contribute to these four processes, whether through crowdsourcing heritage curation efforts or sharing personal narratives collected during ethnographic inquiry.

Natural resource conservation has largely adopted a landscape approach in recent years. Benefiting from many years of data collection, models of entire ecosystems can be created and manipulated under different scenarios to see how they react. Cultural resources have not had this advantage. When a cultural resource is destroyed, it is often considered in isolation, rather than as part of a broader, measurable pattern. We know little about the socioecological niche of particular resources or sites, which may limit clear justifications for their conservation. Adopting a comprehensive landscape approach will mean documenting cultural resources across large geospatial areas, typologies, and cultural groups.

Greater incorporation of anthropological tools into land manager activities can improve their conservation programs. At this point, we would not recommend fixed standards for applying these methods to specific management or planning practices. Clearly certain approaches provide important information at appropriate scales. For example, when preparing environmental impact assessments, having available evaluative data layers (e.g. statewide archeological and historical databases) for overlay analysis would facilitate rapid integration of cultural resource data into reports. Unfortunately, those databases are not currently structured to provide that information (Murtha et al. 2019). These data would also benefit land use and regional planning, but should be combined with active data collection using ethnography, community engagement, and crowdsourced approaches. Perhaps most critically, we recommend drawing on foundational ethnographic information when developing conservation plans for natural areas. Initial ethnographic research can provide information about important communities across the geography of the natural area. In depth-ethnographic research can then inform understandings of specific resources and communities, (e.g., water, fish, and the people who fish).

While these approaches target particular management and planning activities, they require cultural resource data that is already available at the time of the management intervention. We also recommend that land managers begin planning and assembling these data layers now in advance of future conservation and management activities. Natural area land managers can start initiating citizen science programs emphasizing cultural resources now, so that baseline information can be gathered before planning activities begin. For example, the Florida Public Archeology Network runs programs such as the Shipwreck Tagging Archeological Management Program (STAMP) or Heritage Monitoring Scouts (HMS) for citizen scientists to document cultural resources across the state (see FPAN 2019). In addition, leveraging social media to inform management project prioritization may be an efficient way to make decisions over a large spatial extent without needing to conduct lengthy and costly visitor surveys. Finally, land managers have the ability to incorporate cultural domain analysis and interviews into their already existing cultural and natural resource inventories. Such approaches might initially require additional time and resource expenditure, but ultimately will create a cultural resource typology that more closely mirrors the values and preferences of their constituencies. Rather than relying on legislation, instead social justice concerns, public outreach or educational opportunities, and contemporary community values can become guides for cultural resource conservation action. Collectively, these approaches are opportunities for land managers to assess cultural resources at all stages of conservation design and planning.

Recommendations

- Cultural and natural resource conservationists would benefit from greater incorporation of anthropological methodologies into research and practice.
- Greater emphasis on emic (insider or local) perspectives on cultural resources can enable conservation practitioners to more effectively increase community support for projects and improve social justice outcomes.

- Investigating cultural and natural resources through an ethnoecology lens connects lived experiences to conservation opportunities.
- Integrating cultural resources in landscape scale conservation design requires an equal commitment to classification, mapping, and data layer compilation of cultural information as has been undertaken in landscape-scale natural resource conservation design and planning.
- Ethnographic research is critical for landscape scale conservation design and planning.
- Cultural resource managers need to develop evaluative spatial data sets for use in conservation design and planning.
- Citizen science, focused on cultural resources and communities, should be piloted in order to integrate this information before management and planning activities are initiated.

Acknowledgments

This study was supported in part by the Wildlife Management Institute and the National Capital Region of the National Park Service.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This study was supported by the Wildlife Management Institute [APPLCC2016-1] and the U.S. National Park Service [PRO00015347].

ORCID

Madeline Brown  <http://orcid.org/0000-0002-7993-5014>

Timothy Murtha  <http://orcid.org/0000-0002-1931-1226>

References

- Anderson MK. 2005. *Tending the wild: native American knowledge and the management of California's natural resources*. Berkeley (CA): University of California Press.
- Bernard HR. 2011. *Research methods in anthropology: qualitative and quantitative approaches*. New York (NY): AltaMira Press.
- Bixler RP, Johnson S, Emerson K, Nabatchi T, Reuling M, Curtin C, Romolini M, Grove JM. 2016. Networks and

- landscapes: a framework for setting goals and evaluating performance at the large landscape scale. *Front Ecol Environ.* 14(3):145–153.
- Bliege Bird R, Bird DW, Coddling BF, Parker CH, Jones JH. 2008. The “fire stick farming” hypothesis: Australian Aboriginal foraging strategies, biodiversity, and anthropogenic fire mosaics. *Proc Natl Acad Sci.* 105(39):14796–14801.
- Bodin O, Crona B. 2009. The role of social networks in natural resource governance: what relational patterns make a difference? *Global Environ Change.* 19:366–374.
- Bodin O, Crona B. 2011. Barriers and opportunities in transforming to sustainable governance: the role of key individuals. In: Bodin O, Prell C, editors. *Social networks and natural resource management: uncovering the social fabric of environmental governance.* Cambridge (UK): Cambridge University Press; p. 75–94.
- Brown M. 2017. Contracting the commons: socioecological dynamics of wild mushroom harvesting in Yunnan, China [Doctoral Dissertation]. Stanford University. purl.stanford.edu/nb366tm6258.
- Brown M, Murtha T. 2018. The present and future possibilities of landscape scale conservation: the Appalachian Landscape Conservation Cooperative (AppLCC) ethnographic study. Technical report. https://maddiebrown.github.io/LCC/LCCreport_finalforweb.pdf.
- Brown M, Murtha T. 2019. Integrating natural and cultural resources in North American large-landscape conservation. *Environ Pract.* 21(2):57–68.
- Brown M, Murtha T, Wang L, Wang Y. 2019. ILAS: intrinsic landscape assessment system for landscape design and planning in the national capital region. *J Digital Landscape Archit.* 4:84–94.
- Bruyninckx J. 2015. Trading twitter: amateur recorders and economies of scientific exchange at the cornell library of natural sounds. *Soc Stud Sci.* 45(3):344–370.
- Bubalo M, van Zanten BT, Verburg PH. 2019. Crowdsourcing geo-information on landscape perceptions and preferences: a review. *Landscape Urban Plan.* 184:101–111.
- Büscher B. 2016. Nature 2.0: exploring and theorizing the links between new media and nature conservation. *New Media Soc.* 18(5):726–743.
- Butler JRA, Tawake A, Skewes T, Tawake L, McGrath V. 2012. Integrating traditional ecological knowledge and fisheries management in the Torres Strait, Australia: the catalytic role of turtles and dugong as cultural keystone species. *Ecology Soc.* 17(4). doi:10.5751/ES-05165-170434
- Chandler M, See L, Copas K, Bonde AMZ, López BC, Danielsen F, Legind JK, Masinde S, Miller-Rushing AJ, Newman G, et al. 2017. Contribution of citizen science towards international biodiversity monitoring. *Biol Conserv.* 213:280–294.
- Chase SK, Levine A. 2016. A framework for evaluating and designing citizen science programs for natural resources monitoring: resource-based framework for citizen science. *Conserv Biol.* 30(3):456–466.
- Chirikure S, Pwiti G. 2008. Community Involvement in archaeology and cultural heritage management: an assessment from case studies in Southern Africa and elsewhere. *Curr Anthropol.* 49(3):467–485.
- Clemente P, Calvache M, Antunes P, Santos R, Cerdeira JO, Martins MJ. 2019. Combining social media photographs and species distribution models to map cultural ecosystem services: the case of a natural park in Portugal. *Ecol Indic.* 96:59–68.
- Crona B, Bodin Ö. 2006. What you know is who you know? Communication patterns among resource users as a prerequisite for co-management. *Ecology Soc.* 11(2):7.
- Crona B, Bodin Ö. 2011. Friends or neighbors? Subgroup heterogeneity and the importance of bonding and bridging ties in natural resource governance. In: Bodin Ö, Prell C, editors. *Social networks and natural resource management: uncovering the social fabric of environmental governance.* Cambridge (UK): Cambridge University Press; p. 206–233.
- Crona B, Ernstson H, Prell C, Reed M, Hubacek K. 2011. Combining social network approaches with social theories to improve understanding of natural resource governance. In: *Social networks and natural resource management: uncovering the social fabric of environmental governance.* Cambridge (UK): Cambridge University Press. p. 206–233.
- Deák B, Tóth CA, Bede Á, Apostolova I, Bragina TM, Báthori F, Bán M. 2019. Eurasian Kurgan database – a citizen science tool for conserving grasslands on historical sites. *Hacquetia.* 18(2):179–187.
- Dhonju HK, Xiao W, Shakya B, Mills JP, Sarhosis V. 2017. Documentation of heritage structures through geo-crowdsourcing and web-mapping. *ISPRS. XLII-2/W7*:17–21.
- Di Minin E, Tenkanen H, Toivonen T. 2015. Prospects and challenges for social media data in conservation science. *Frontiers Environ Sci.* 3. doi:10.3389/fenvs.2015.00063
- Donahue ML, Keeler BL, Wood SA, Fisher DM, Hamstead ZA, McPhearson T. 2018. Using social media to understand drivers of urban park visitation in the Twin Cities, MN. *Landscape Urban Plan.* 175:1–10.
- Fisher DM, Wood SA, White EM, Blahna DJ, Lange S, Weinberg A, Tomco M, Lia E. 2018. Recreational use in dispersed public lands measured using social media data and on-site counts. *J Environ Manage.* 222:465–474.
- FPAN. Projects. [accessed 2019 Oct 29]. <https://www.flpublicarchaeology.org/projects/>.
- Geertz C. 1973. *The interpretation of cultures.* New York (NY): Basic Books.
- Goldberg LK, Murtha TM, Orland B. 2018. The use of crowdsourced and georeferenced photography to aid invasional resource planning and conservation: a Pennsylvania case study. In: Gobster PH, Sardon RC, editors. *Visual resource stewardship conference proceedings: landscape and seascape management in a time of change.* Gen. Tech. Rep. NRS-P-183. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. p. 116–126.

- Harrison R. 2015. Beyond “natural” and “cultural” heritage: toward an ontological politics of heritage in the age of anthropocene. *Heritage Soc.* 8(1):24–42.
- Hollowell J, Nicholas G. 2009. Using ethnographic methods to articulate community-based conceptions of cultural heritage management. *Public Archaeol.* 8(2–3):141–160.
- Langemeyer J, Calcagni F, Baró F. 2018. Mapping the intangible: using geolocated social media data to examine landscape aesthetics. *Land Use Policy.* 77:542–552.
- Leonard PB, Baldwin RF, Hanks RD. 2017. Landscape-scale conservation design across biotic realms: sequential integration of aquatic and terrestrial landscapes. *Sci Rep.* 7(1). doi:10.1038/s41598-017-15304-w
- Levin N, Lechner AM, Brown G. 2017. An evaluation of crowd-sourced information for assessing the visitation and perceived importance of protected areas. *Appl Geogr.* 79:115–126.
- Mazurczyk TJ, Murtha T, Goldberg L, Orland B. 2018. Integrating visual and cultural resource evaluation and impact assessment for landscape conservation design and planning. In: Gobster PH, Smardon RC, editors. *Visual resource stewardship conference proceedings: landscape and seascape management in a time of change*. Gen. Tech. Rep. NRS-P-183. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. p. 149–160.
- Murtha T, Lawres N, Mazurczyk T, Brown M. 2019. Investigating the role of archaeological information and practice in landscape conservation design and planning in North America. *Adv Archaeol Pract.* 1–13. doi:10.1017/aap.2019.32
- National Park Service. 2019. Enjoy the View: Potomac Heritage Trail Network. [accessed 2019 Nov 4]. <https://www.nps.gov/pohe/learn/enjoy-the-view.htm>.
- Nazarea V. 1999. *Ethnoecology: situated knowledge/located lives*. Nazarea V, edited. Tucson (AZ): University of Arizona Press.
- Norman P, Pickering CM. 2017. Using volunteered geographic information to assess park visitation: comparing three on-line platforms. *Appl Geogr.* 89:163–172.
- Ogletree SS, Powell RB, Baldwin RF, Leonard PB. 2019. A framework for mapping cultural resources in landscape conservation planning. *Conserv Sci Pract.* 1(6):e41.
- Oomen J, Aroyo L. 2011. Crowdsourcing in the cultural heritage domain: opportunities and challenges. Paper presented at: Proceedings of the Fifth International Conference on Communities and Technologies, C&T 2011, Brisbane, QLD, Australia. p. 138–149.
- Orland B, Murtha T. 2015. Show me: engaging citizens in planning for shale gas development. *Environ Pract.* 17(4):245–255.
- Orlove BS, Brush SB. 1996. Anthropology and the conservation of biodiversity. *Annu Rev Anthropol.* 25(1):329–352.
- Pocock MJO, Chandler M, Bonney R, Thornhill I, Albin A, August T, Bachman S, Brown PMJ, Cunha DGF, Grez A, et al. 2018. A vision for global biodiversity monitoring with citizen science. In: *Advances in ecological research*. Vol. 59. Elsevier. p. 169–223. [accessed 2019 Sep 13]. <https://linkinghub.elsevier.com/retrieve/pii/S0065250418300230>.
- Prell C, Hubacek K, Reed M. 2009. Stakeholder analysis and social network analysis in natural resource management. *Soc Nat Resour.* 22(6):501–518.
- Prell C, Reed M, Racin L, Hubacek K. 2010. Competing structure, competing views: the role of formal and informal social structures in shaping stakeholder perceptions. *Ecology Soc.* 15(4):34.
- Ridge M. 2013. From tagging to theorizing: deepening engagement with cultural heritage through crowdsourcing. *Curator.* 56(4):435–450.
- Roberts HV. 2017. Using Twitter data in urban green space research: a case study and critical evaluation. *Appl Geogr.* 81:13–20.
- Scarlett L, McKinney M. 2016. Connecting people and places: the emerging role of network governance in large landscape conservation. *Front Ecol Environ.* 14(3):116–125.
- Sullivan RG, Meyer M. 2016. Documenting America’s Scenic Treasures: The National Park Service Visual Resource Inventory. Paper presented at: National Association of Environmental Professionals Annual Conference, Chicago, Illinois. [accessed 2019 Nov 4]. <https://www.researchgate.net/publication/301698961>.
- Tenkanen H, Di Minin E, Heikinheimo V, Hausmann A, Herbst M, Kajala L, Toivonen T. 2017. Instagram, Flickr, or Twitter: assessing the usability of social media data for visitor monitoring in protected areas. *Sci Rep.* 7(1). doi:10.1038/s41598-017-18007-4
- van der Hoeven A. 2019. Historic urban landscapes on social media: the contributions of online narrative practices to urban heritage conservation. *City Culture Soc.* 17:61–68.