



## Research Paper

# Identifying public land stakeholder perspectives for implementing place-based land management



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## HIGHLIGHTS

- Identifies and classifies stakeholder perspectives for public land management.
- Measures spatial stakeholder preferences for access, conservation, and development.
- Implements a model to identify level of spatial stakeholder agreement.
- Spatial results were sensitive to method of aggregation and stakeholder weighting.
- Need for more research that integrates stakeholder analysis methods with spatial data.

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## ABSTRACT

Public lands provide significant environmental, economic, and social values to society across a range of classifications and tenures. Stakeholders representing multiple interests are presumed to hold different management preferences for these lands. The purpose of this study was to demonstrate how stakeholder perspectives can influence place-based management preferences for public lands. We developed a multi-dimensional public land preference scale and used cluster analysis of responses to classify individuals ( $n = 1507$ ) into stakeholder groups using data collected from a large public participation GIS (PPGIS) survey in Victoria, Australia. We analyzed the results of the two largest stakeholder groups (identified as “Preservation” and “Recreation”) to assess their spatial preferences for public land conservation, access, and development. We developed a method to assess the level of spatial stakeholder agreement, with the results identifying geographic areas of both agreement and disagreement between stakeholder groups. To determine the effects of unequal stakeholder participation in mapping, we performed sensitivity analysis by weighting the responses of the Recreation stakeholder group to approximate the mapping effort of the Preservation stakeholder group. The place-based management preferences changed significantly for conservation/development and improving/limiting public land access, while preferences for increasing/limiting facility development were less sensitive to stakeholder weighting. The spatial mapping of stakeholder preferences appears effective for identifying locations with high potential for conflict as well as areas of agreement, but would benefit from further research in a range of land management applications to provide further guidance on the analysis of stakeholder group responses that result from diverse stakeholder group participation.

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## 1. Introduction

Public lands provide a diversity of environmental, economic, and social values to society across a range of public land categories (Brown, Weber, & de Bie, 2014a). The laws that govern public lands often identify their purpose, but rarely provide specific guidance on how to balance the multiple and sometimes conflicting

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uses. Management of “multiple-use” public lands can generate controversy as they provide for recreation opportunities as well as resource use and extraction. Even national park agencies throughout the world, an important sector of public lands managers, are challenged to find a balance between conservation and development (see e.g., Budowski, 1976; Newsome, Moore, & Dowling, 2012; Western & Henry, 1979).

Public land management is inextricably linked with the elusive concept of public interest that seeks to advance the welfare of a social collective over private interests. In the absence of specific legislative guidance, the determination of what constitutes the public interest falls on the agencies responsible for management of public lands. The resolution as to what constitutes public interest manifests in small and large-scale decisions related to resource use versus protection, the level of public access, the types of recreation opportunities provided, the development of visitor facilities, and regulatory control. In this study, we developed an exploratory scale that measures public land management preferences across these multiple dimensions of public land management.

Individuals and organizations that share common interests in public land decisions are commonly called “stakeholders”. The term *stakeholder* has numerous formal definitions. For example, in the corporate world, Freeman (1984) defined stakeholders as groups or individuals that can affect, or are affected by the organizational purpose (p. 25). Another definition applied to natural resource management considers stakeholders to be “any group of people, organised or unorganised, who share a common interest or stake in a particular issue or system. . . who can be at any level or position in society, from global, national and regional concerns down to the level of household or intra-household, and be groups of any size or aggregation” (Grimble & Wellard, 1997, p. 176). Especially relevant to public lands, stakeholders can include the nebulous categories of ‘future generations’, the ‘national interest’ and ‘wider society’ (Grimble & Wellard, 1997). A key distinction between general stakeholders is those who *affect* decisions and those who are *affected by* decisions. In this study, we do not identify public land stakeholder groups a priori but provide for the emergence of stakeholder groups through an inductive analysis of individual preferences for public land management.

Reed et al. (2009) provide a typology of stakeholder analysis approaches for participatory natural resource management research. The typology consists of methods for identifying stakeholders, differentiating between and categorizing stakeholders, and investigating relationships between stakeholders. Our approach for identifying stakeholders differs from the reviewed approaches (e.g., using focus groups, interviews, or snowball sampling) in that we first identify stakeholders based on preferences for public land management collected through a survey, and then use cluster analysis to group individuals based on these preferences. This alternative approach is pragmatic given there are many individuals and organized stakeholder groups whose interests span the diversity of public land types found within our study area, the state of Victoria, Australia.

A common stakeholder analysis technique identifies and maps stakeholders in two-dimensional space consisting of power/influence by level of interest (Bryson, 2004). Our analyses do not assess stakeholder power/influence and only indirectly assess level of interest as indicated by participatory mapping effort. Rather, we focus on how stakeholder values translate into specific place-based preferences for three key public land management issues—access, development, and conservation. We use data collected from public participation GIS (PPGIS) methods that identify spatial preferences to determine location-specific agreement or disagreement between stakeholder groups.

### 1.1. Public participation GIS (PPGIS) and stakeholder analysis

Public participation GIS (PPGIS), participatory GIS (PGIS), and volunteered geographic information (VGI) refer to methods and processes that generate spatial information for a variety of urban, regional, and environmental planning applications (see Brown, 2005; Brown & Kyttä, 2014; Sieber, 2006 for a review of applications). PPGIS has typically been implemented by government planning agencies or academics to enhance public involvement in developed countries for urban and regional planning using random sampling methods and digital mapping technology. PGIS has typically been sponsored by NGOs in rural areas of developing countries to build social capital using purposive sampling and non-digital mapping technology (Brown & Kyttä, 2014). These two methods have different origins and applications, but many common characteristics. The key difference is around the definition of participation, specifically who participates and why. A related concept, volunteered geographic information (VGI) refers to systems that create, assemble, and disseminate geographic data provided voluntarily by individuals (Goodchild, 2007). The general term “participatory mapping” describes any process where individuals share in the creation of a map and would include PPGIS, PGIS, or VGI. In practice, multiple sampling methods may be used for participant recruitment. The language used to describe participants frames the PPGIS/PGIS/VGI process and explains why some PPGIS studies have used the term “stakeholder” to characterize participants while other studies have continued to use the term “public”.

Most PPGIS/PGIS/VGI processes that inform planning may be said to involve stakeholders, given the broad definition of stakeholder that includes those affected by planning decisions. Schlossberg and Shuford (2005) describe how the term “public” in PPGIS may include decision makers, implementers, affected individuals, interested observers, or the general public—in other words, stakeholders. However, stakeholder research and analysis, as traditionally practiced, involves methods that identify key individuals and groups with interests within a specific policy domain and do not usually include broad-based social surveys (Reed et al., 2009). Thus, stakeholder analysis is considered narrower in scope than survey research and involves purposive rather than scientific sampling.

The challenge for analyzing PPGIS/PGIS/VGI data from a stakeholder perspective is the ability to differentiate mapping behavior associated with stakeholder group affiliation, from the high degree of individual variation found in general mapping behavior. Several studies have found that participants translate their personal, non-spatial attitudes and values into behavioral choices when mapping place-specific attributes. For example, in a PPGIS study of park visitors ( $n = 323$ ) to the Channel Islands National Park in the U.S., Van Riper and Kyle (2014) found differences in the mapped locations of ecosystem values perceived by visitors holding neutral versus strong environmental worldviews. In a study of mapping behavior, Brown (2013) analyzed non-spatial values and preferences with place-based values and preferred resource uses across three PPGIS studies of national forests and found that positive, non-spatial attitudes toward extractive uses of national forests were correlated with participant mapping of economic values and extractive uses while nonmaterial forest attitudes were correlated with participant mapping of amenity values and conservation-related uses.

There have been several PPGIS studies using the more narrow conception of stakeholder that targeted specific stakeholders for participation in the mapping activity for natural resource management decisions. When analysis disaggregates for stakeholder group (e.g. Darvill & Lindo, 2014; García-Nieto et al., 2014, results show differences in stakeholder perceptions of the spatial distribution of ecosystem services. These studies highlight the importance

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