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Original article

# A measurement framework to increase transparency in historic preservation decision-making under changing climate conditions

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## ABSTRACT

Today, cultural heritage planning and decision-making operate under considerable climate, political, and financial uncertainties and constraints. Consequently, decision-makers are often left making value-laden judgments of what to preserve, restore, and maintain in their best judgments, which can leave them open to criticism for not protecting the cultural resources most important to various and diverse stakeholder groups. Thus, a transparent and robust process to optimally maintain cultural heritage values for present and future generations is needed. We address this knowledge gap by developing a novel, transparent, and value-based measurement framework for assessing relative “historical significance” and “use potential” of diverse historic buildings listed on the National Register of Historic Places (United States). Measures of historical significance include: the association of a building with the purpose of a NPS site’s foundation, the current physical condition of a building, the building’s historic character, and National Register listing criteria. Specific measures of use potential consider the importance of historic building’s operational, third party, visitor, interpretative, and scientific uses. The application of the framework is presented using a subset of buildings located within two separately listed historic districts at Cape Lookout National Seashore, North Carolina. The framework focuses on the current status of the cultural resource’s significance and use potential while acknowledging that corresponding attributes, metrics and weights can change over time and should be regularly updated. It is hoped that the historical significance and use potential framework can assist the decision-makers and stakeholders, and better inform both the cultural heritage management and allocation prioritization for climate adaptation planning when it is applied in tandem with climate change vulnerability assessments.

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## 1. Introduction

To meet the challenges of climate change confronting cultural heritage preservation, multidisciplinary and robust planning and decision-making tools are needed [1,2]. Over the last decade, there has been a slow increase of scientific studies to understand both past and future climate change effects on cultural heritage and cultural resources from threats such as temperature rise, changing precipitation patterns, increased frequency and intensity of storm, sea level rise, increased coastal flooding and coastal erosion, weathering (e.g., [3–9]). Cultural heritage plays an important role in determining and shaping sociocultural capital, strengthening education and learning, and contributing to growth and economic development [10–12]. Therefore, there is a critical need to both

raise awareness about the importance of heritage preservation in the face of climate change and make feasible and transparent adaptation decisions. Failure to respond with timely climate adaptation strategies means that irreplaceable and non-renewable cultural heritage could be lost.

Cultural heritage adaptation can be defined as an array of actions undertaken to reduce or avoid adverse impacts of climate change on cultural heritage or to exploit any beneficial opportunities [13]. The complexity of cultural heritage management under climate uncertainties coupled with ongoing financial constraints and a backlog of deferred maintenance necessitate that decision-makers optimize cultural heritage preservation for present and future generations [14]. While a common economic approach for allocating funding is to invest in projects where the economic rates of return on investment are the highest [15], we argue that decisions for prioritizing adaptation actions for cultural heritage should be based on projected climate change vulnerabilities, stakeholders and decision-makers’ values about significant cultural heritage, and the cost for preserving this heritage.

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In this sense, a recent study on cultural heritage and climate change conducted in the United States [14] found that there is an increasing need for developing a systematic and transparent methodology for optimizing and prioritizing cultural heritage adaptation under changing climate conditions. A few approaches and/or frameworks for prioritizing climate adaptation of cultural heritage exist, but currently only focus on archeological sites [16–20]. Similarly, the US National Park Service (NPS) issued Policy Memorandum 14-02<sup>1</sup> in 2015, which explicitly states that climate change vulnerability and significance to cultural heritage must be evaluated so that “management decisions are directed to cultural resources that are both significant and most at risk.” The NPS [21] defines significance as a cultural resource possessing importance to the history, architecture, archeology, engineering or culture of a community or the nation. Moreover, significance is based on association with a historical event, significant person, distinctive physical characteristics of design, construction or form, and/or potential to yield important information [21]. The ability to evaluate and assess the significance of cultural heritage is currently constrained by an absence of methodology and measurable indicators. Additionally, managers of NPS are typically responsible for numerous cultural resources that have been listed on the National Register of Historic Places<sup>2</sup> (NRHP) and a process for distinguishing their relative “significance”<sup>3</sup> among these resources is needed.

## 2. Research aim

We argue that a process for differentiating between significant cultural resources is needed to strengthen efforts for more transparent and robust cultural heritage management under climate uncertainty and financial constraints. Therefore, we address this knowledge gap by presenting a novel, transparent and value-based framework for creating distinction among one type of cultural heritage: historic buildings. Specifically, we present a measurement framework for evaluating and assessing the significance of historic buildings with the explicit intention of its future use being integrated with measures of vulnerability in climate adaptation planning efforts that enable funding allocations to be optimized. During the participatory approach we employed to develop this framework, it was determined that evaluations for climate adaptation planning should also include metrics of the potential uses of historic buildings. Therefore, the framework presented here enables assessments of the relative “historical significance” and “use potential” among sets of buildings that can be applied at a range of scales, including historic districts, park units, states, or regions. We illustrate the application of this framework using a subset of historic buildings in two NRHP listed historic districts on the barrier island Cape Lookout National Seashore (CALO), North Carolina.

## 3. Material and methods

This paper is a part of a larger research project [14], which applied a specific decision analytic approach (structured decision-making) to develop a decision-support tool for cultural resource climate adaptation planning. The framework presented in this paper provides an in-depth look into one key and contentious

aspect of the decision-support tool. We developed the framework using a transparent and iterative process (Fig. 1) that included deliberative workshops, individualized meetings, and opinion surveys, which occurred between December 2015 and April 2017. This mixed-methods approach was used to lay the foundation for the framework, develop its components, and to provide experts an opportunity to formulate the integration of its components. Building the components of the framework using qualitative methods (focus group techniques, expert interview techniques, facilitated group discussion techniques, thematic analysis of meeting transcripts) [22] can contribute to a more nuanced and productive assessment of values associated with cultural heritage [23]. In this paper, cultural heritage values refer to historical, architectural, archeological, engineering, or cultural values [21] important to project participants and the diversity of stakeholders they represent. The participants’ descriptions of necessary decision criteria were transformed into measurable attributes based on data availability, then quantified and combined using expert opinion. The quantitative data elicited from in-person and online survey questionnaires can be updated based on decision context and as cultural heritage values change through time.

The first workshop employed a decision analytic approach, called Structured Decision-making (SDM) [24,25]. SDM uses an iterative framework, Problem, Objectives, Alternatives, Consequences and Trade-offs (PrOACT), which can facilitate transparency and, hence, legitimacy in situations with high uncertainty such as climate adaptation planning. This five-day workshop was held at the Cape Lookout National Seashore Park Headquarters office on Harkers Island, NC in December 2015. Sixteen participants included: representatives from federal (i.e., NPS personnel from the Washington Office, Southeast Regional Office, and the National Seashore) and state [i.e., North Carolina State Historic Preservation Office (NC SHPO)] government personnel; regional key stakeholders whose employment is tied to tourism, historic preservation and coastal dynamics; and representatives from two partner organizations who membership have direct ties to two villages (historic districts) on the barrier island. This workshop identified a need for a conceptualization of historical significance (Objective 1). It was determined that a more targeted and transparent framework for conceptualizing and quantifying historical significance was necessary given the competing values, knowledge gaps and uncertainties revealed during the first workshop. Initial criteria (hereafter “attributes”) of historical significance were suggested at this workshop but were not associated with NPS data sources. Therefore, it was determined that the attributes of historical significance would be most efficiently determined through a series of iterative meetings and then presented to the workshop participants during a subsequent workshop.

Three separate in-person meetings were held with two NPS personnel responsible for natural and cultural resource management at CALO to develop and refine the attributes and the metrics (i.e., units that make the attribute measurable) for each attribute of historical significance according to the availability of data that could be accessed through the NPS web-portal or within documents, such as nomination forms and historic structure reports. During these meetings, the need to include measures of potential uses of historic buildings became clear, as one participant noted that alternative funding for preservation existed for buildings that also serve operational purposes for the NPS (e.g., storage, visitor center, staff lodging, concessionaire services). This resulted in the development of an additional set of “use potential” (Objective 2) attributes and metrics. However, it was determined that vetting from the NC SHPO office would be beneficial, as the checks-and-balances partnership between the SHPO and the NPS is less concerned about park operations as it is preserving cultural heritage. Therefore, we held one in-person meeting with three personnel from the NC

<sup>1</sup> Policy Memorandum 14-02, see <https://www.nps.gov/policy/PolMemos/PM-14-02.htm>.

<sup>2</sup> National Register of Historic Places, see <https://npgallery.nps.gov/nrhp>.

<sup>3</sup> We use the term “significance” with a lower-case “s” in an attempt to separate the term from the designation of “Significance” within the National Register Criteria. We adopted this lower-case “s” to reinforce that it is not a policy definition of the term. A similar approach was adopted to differentiate “wilderness” character from federally designated “Wilderness” areas.

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