IDENTIFYING VALUED SCENES AND SETTINGS IN AN ORDINARY LANDSCAPE

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Abstract.—The Georgia Scenic Byways program is a "grassroots effort … to identify, preserve, promote, and protect treasured corridors throughout the state" (Georgia Department of Transportation 2013, p. 32). To date, the Georgia Department of Transportation has designated 15 Scenic Byways. This paper presents a model "valued landscape detector," a smartphone application that uses social media and augmented reality mechanisms to engage interested citizens in evaluating the scenic value of highways (or stretches of highways). Citizen data collectors, guided by GIS via their smartphones, are invited to provide *in situ* evaluations and upload photos and geolocation data for the Georgia Scenic Byways designation program. Another goal of the project is to identify currently undesignated stretches of highway that may be candidates for future State designation. Beyond the current application, the method may be useful for identifying a wide array of cultural and natural resources that might otherwise be overlooked.

BACKGROUND

This paper presents a model for scenic highway designation that is citizen driven and grassroots in nature. The goal is to identify landscape resources that are locally valued but may otherwise go unnoticed and unrecognized in regional or statewide management initiatives.

Scenic resources are the backdrop to everyday life and provide a sense of place but it can be challenging to articulate their value(s) and in most cases there is no existing consensus about the need to protect and preserve them. Likewise, cultural resources (like archaeological and historical sites) and ecological resources are not evenly dispersed on the landscape and often go unnoticed. Some known cultural sites are prominent and well recognized while others are less well known and may be deliberately hidden from view, either physically or by withholding spatial data to avoid the removal of artifacts. Ecological resources are also highly dispersed, and protected areas receive varying levels of protection.

Over the last few decades, scholars and Federal land agencies have developed systematic ways of evaluating landscape scenic quality. The approaches have generally fallen into two categories. First, experts, often landscape architects, have developed scoring systems for landscapes based on the extent to which they have formal aesthetic characteristics such as variety in form, line, color, and texture (Bureau of Land Management 1984, Smardon and Karp 1993, USDA Forest Service 1995). Second, social scientists have developed psychophysical approaches that systematically capture research participants' evaluations of typical scenes and use statistical methods to identify the physical characteristics of the landscape that elicit scenic evaluations (Daniel and Boster 1976, Parsons et al. 1998).

Both types of approaches aim to account for public values, but when aesthetic appreciation is not the predominant value of a landscape, the utility of these approaches diminishes substantially. This is especially true in the case of cultural resources since agriculture and other built artifacts are often thought to detract from natural scenic value (Daniel 2001, Gobster et al. 2007, Parsons and Daniel 2002).

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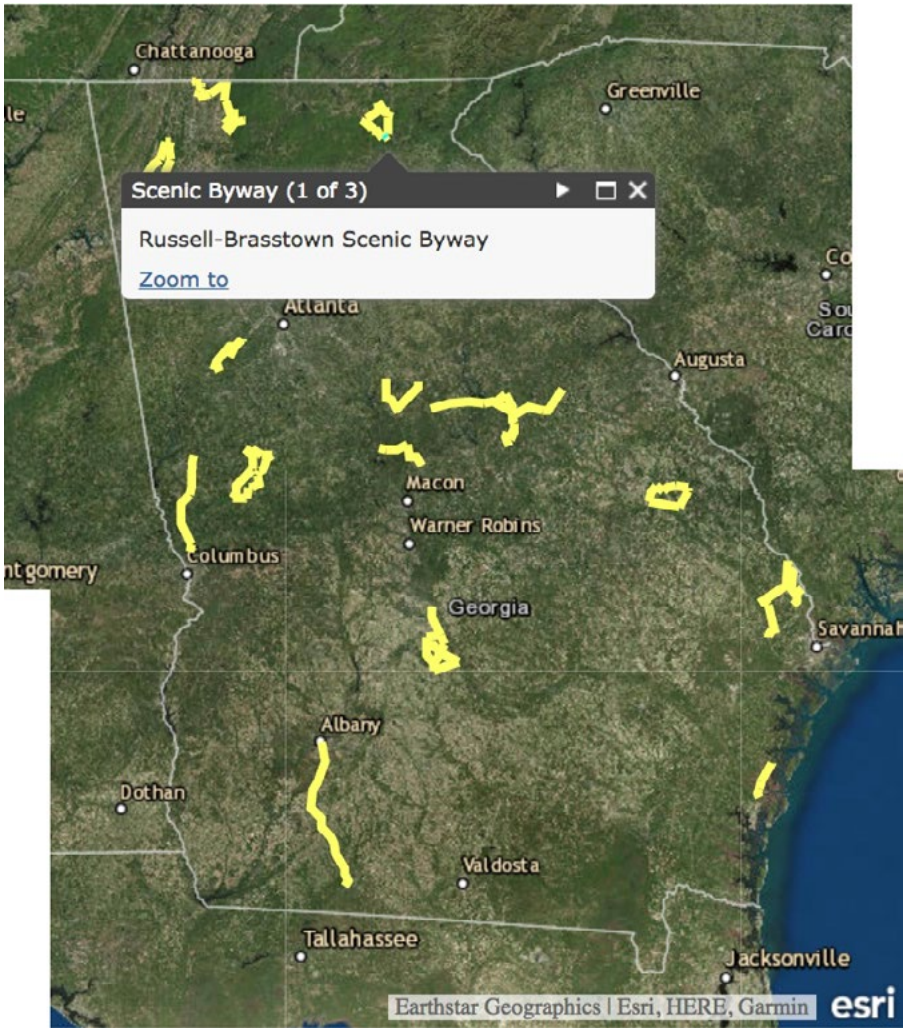


Figure 1.—The 15 designated Georgia Scenic Byways. Scenic Byways are in yellow. Georgia Department of Transportation Scenic Byways map. http://www.dot.ga.gov/DS/Travel/Scenic. Sources: ESRI, HERE, Garmin, NGA, USGA, NPS (accessed February13, 2018).

GEORGIA'S SCENIC BYWAYS PROGRAM

The State of Georgia, USA, is not generally recognized as an iconic destination for the enjoyment of scenic beauty. Nevertheless, for many residents and visitors, the Southern terminus of the Appalachian Trail in the North Georgia highlands and the Golden Isles of the Georgia coast, for example, represent highly valued scenic landscapes (Georgia Department of Economic Development 2017).

Administered by Georgia's Department of Transportation, Georgia's Scenic Byways program is promoted as "a community driven effort [that] preserves these treasures in ways that appeal to Georgians and travelers alike, and ultimately enhances economic development" (Georgia Department of Transportation 2013, p. 32). Figure 1 shows the distribution of officially designated Scenic Byways in Georgia. Anyone can submit an application for a road to receive official scenic byway designation. The application requires comprehensive descriptions of the "intrinsic qualities" of the byway and its surroundings. Yet there is no official description of what comprises a scenic landscape or how its attributes should be identified. In addition, the State of Georgia currently lacks the expertise and resources to identify additional candidates for Scenic Byways designation.

Another major drawback of the program is that features of local significance such as aesthetically appealing landscapes, valued historic vistas, abandoned farms and home sites, or historic burial grounds are likely to be missed. A look at the officially designated Scenic Byways in western Georgia illustrates the point (Fig. 1). The *I-185 Byway* is a major highway corridor surrounded by mixed pine

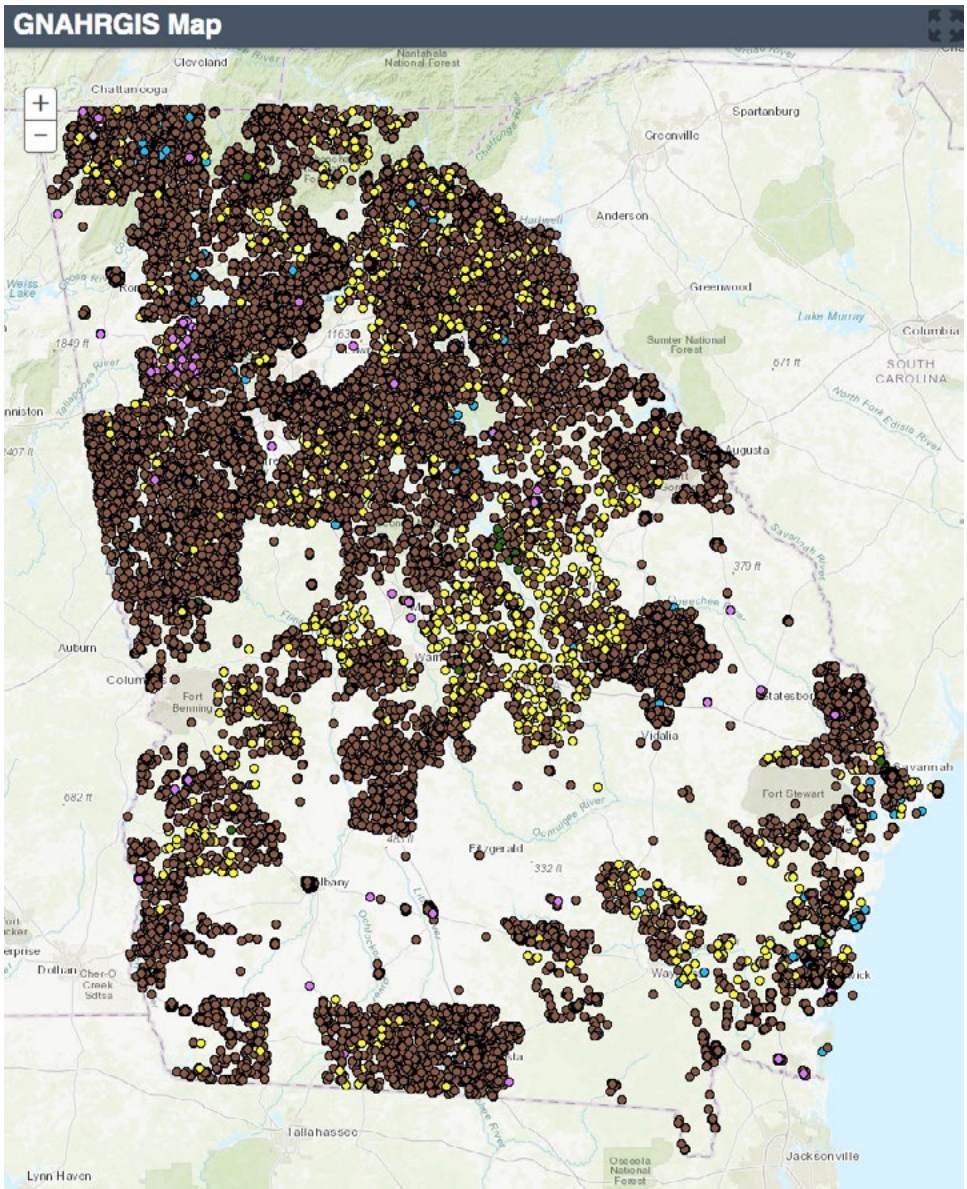


Figure 2—Georgia Archaeological and Historic Resources. Georgia's Natural, Archaeological and Historic Resources (GNAHRGIS) GIS. https://www.gnahrgis.org/gnahrgis/index.do (accessed March 2, 2018).

forest. *Enduring Farmlands* showcases historic rural towns and their pastoral settings. *Ridge and Valley* focuses on the natural attractions of the southern tip of Appalachia and *Altamaha* threads a mix of natural and cultural settings in coastal Georgia (Georgia Department of Transportation 2017). While the eclecticism of these examples is appealing and encompasses a wide range of values, it is clear that other, similar potential Scenic Byways may not yet have been recognized. In addition, there are substantial "gaps" in the northeast, southeast, and southwest corners of the State that do not reflect Georgia's widespread natural and cultural richness.

Once a Scenic Byway does receive official designation, the Georgia Department of Transportation develops a Corridor Management Plan that describes the scenic, natural, historic, cultural, archaeological, and recreational features that deserve protection (see Figs. 2, 3). However, the only legal mechanism for protecting these features is a restriction on billboards in Scenic Byway corridors.

To address the potential loss of scenically, culturally, and ecologically valuable landscapes in Georgia, we need a process that captures grassroots values in a way that can be applied across the entire network of Georgia highways.

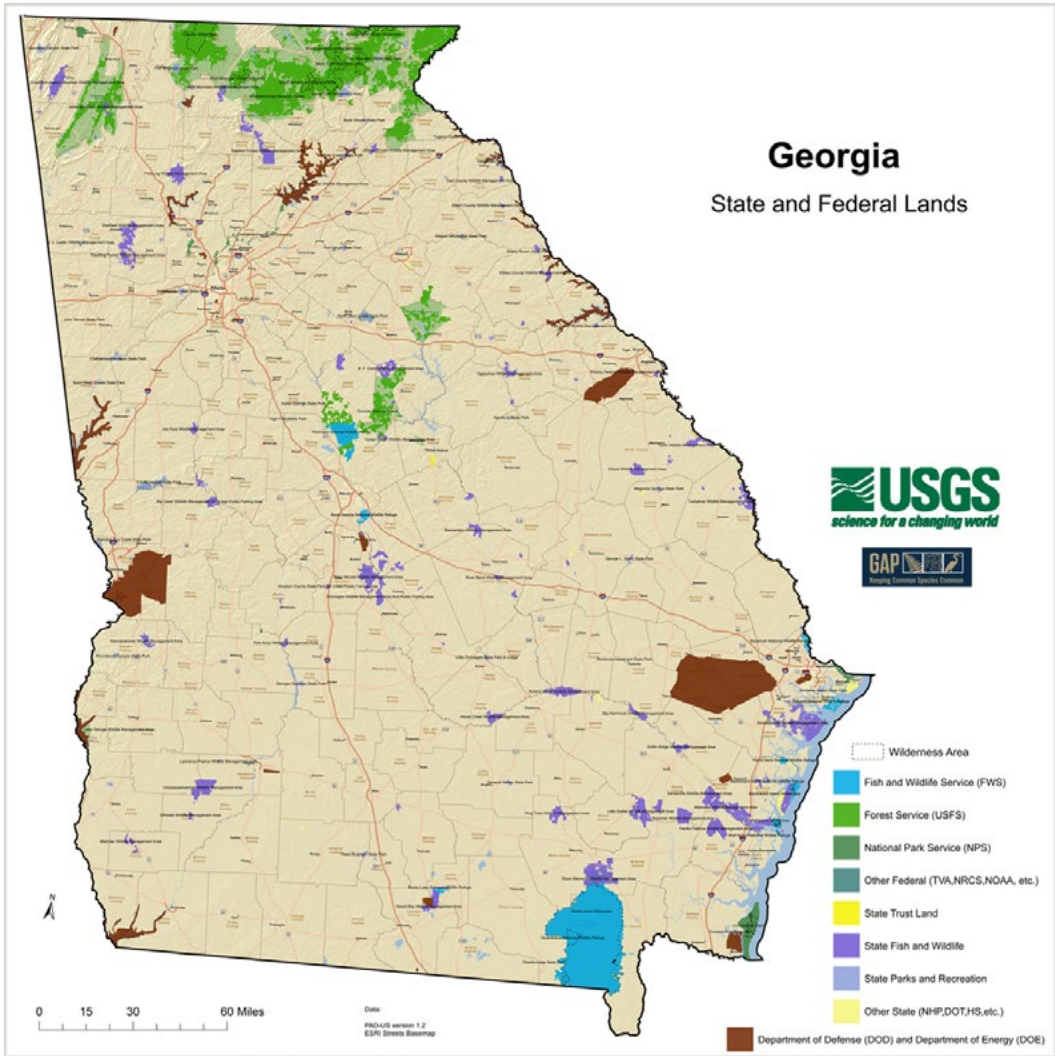


Figure 3.—Georgia protected areas highlighted by agency jurisdiction. USGS National Gap Analysis Project|Protected areas data portal. https://gapanalysis.usgs.gov/padusapps/maps/Georgia.pdf (accessed March 2, 2018).

"GRASSROOTS" VALUES IN SCENIC ASSESSMENT

There are many processes that have been used to identify and officially designate scenic highways and byways in the past (Clay and Smidt 2004, Evans and Wood 1980, Muck 2006, Rottle 2006). However, as noted above, these approaches may have been biased toward the opinions of outside experts and consequently may have undervalued the place-based knowledge of local stakeholders.

Expert planners Dzur and Olson (2004) observe that scientific and professional knowledge alone cannot solve complex design and planning issues. Rather, they encourage scientists and planners to stop thinking of themselves as working *for* the public and instead think of working *with* the public. This approach includes developing placemaking narratives and employing participatory design and action research to capture local knowledge. One challenge of this approach noted by Orland and Murtha (2015) is that local stakeholders may believe that they lack broad knowledge of natural and cultural systems and are not qualified to participate fully in land planning processes. If this can be overcome, authentic and effective participation of a range of stakeholders can lead to deeper engagement with the design process, ownership of the outcomes, and future involvement in ensuring that plans are implemented (Phillipson et al. 2012).

Another inherent tension in "grassroots" processes to identify scenic resources is the possibility that the assessment of resources will not be thorough and

systematic. This could lead to a lack of compelling evidence for extensive and effective scenic resource protection and may inhibit identification of some scenic resources. A key to addressing both issues lies in: 1) raising public awareness of locally "treasured" resources, and 2) developing mechanisms by which such places can be found in the landscape and brought to the appropriate forum for discussion and potential recognition.

Capturing People's On-site Records of Valued Places

Visitor Employed Photography and Photovoice are two techniques for capturing people's responses while they are immersed in the study of landscapes. Visitor Employed Photography has been used for more than 40 years to study how people use and connect with particular places during outdoor recreation (e.g., Balomenou and Garrod 2016, Chenoweth 1984, Cherem and Traweek 1977, Hull and Stewart 1995). Participants are asked to photograph places where they encounter peak enjoyment of an environmental experience. Instead of waiting until the experience is over to report on it, the photograph records the immediacy of the situation *in situ*. Chenoweth (1984), for example, used the powerful connection of place and experience to argue in favor of protecting important recreational landscapes along the Lower Wisconsin River.

Photovoice is a related qualitative method where people are asked to take a photograph and then talk about the subject of the photograph and what it means to them (e.g., Balomenou and Garrod 2016, Beilin 2005, Guell and Ogilvie 2015). In this case, the respondent's physical location and narrative provide context such as the motivation for taking the photograph and other evaluative responses.

Both Visitor Employed Photography and Photovoice involve a deliberate intervention—participants are solicited, trained, and motivated to follow a prescribed protocol. Participation is structured and shaped in ways that help investigators identify significant relationships between place and response. However, the deliberateness of the approach and the consent to participate may bias who contributes to the research, what they choose to photograph, and how they report on their experiences to the researchers.

By contrast, social media such as Internet shared photographs, blog posts, and Twitter tweets are potentially rich sources of information about place evaluation that are unaffected by researcher influence. Researchers have pointed to photo sharing services as potential sources of information for identifying, for example, optimum or popular travel routes (Alivand and Hochmair 2013, Dunkel 2015) or valued viewsheds (Berbés-Blázquez 2012, García-Palomares et al. 2015, Goldberg et al. in this proceedings, Salmond et al. 2017). These volunteered data sources, if accompanied by geolocations, could also help identify potential scenic highway corridors.

Crowdsourced Evaluation and Identification of Roadside Scenic Landscapes

There is a growing body of literature calling for greater public engagement in design and planning and in proposing new mechanisms for engagement (Brown and Donovan 2013, Griffon et al. 2011, Phillipson et al. 2012). In developing such tools, the public needs to see its own values represented in emerging plans, be able to engage in the planning process on its own terms, and see its contribution expressed in the way it intended. The use of crowdsourced information, including photographs and personal narratives, offers the opportunity to see one's contribution appear as part of a developing view of the world, not only as an eventual evaluator of plans but also as a participant in establishing evaluation criteria (Alivand and Hochmair 2017, Dunkel 2015, Liu et al. 2016, Martín et al. 2016, Nieuwoudt et al. 2016).

At first glance, photographs taken near a scenic highway (as accessed via Google Earth Pro) appear too eclectic to derive any generalizable insights into what constitutes valued scenery (Fig. 4). In some cases, the existing number of available images may also be too small to derive any generalizations (Fig. 5). However, the variety of photos may signal that the values of a Scenic Byway are more varied than a traditional scenic analysis perspective would suggest. The scenic analysis literature supports this observation with numerous examples of highway related studies where assessments from expert approaches fail to capture factors that are crucial in nonexpert viewer evaluations (Clay and Smidt 2004, Evans and Wood 1980, Hull and Stewart 1995, Rottle 2006).

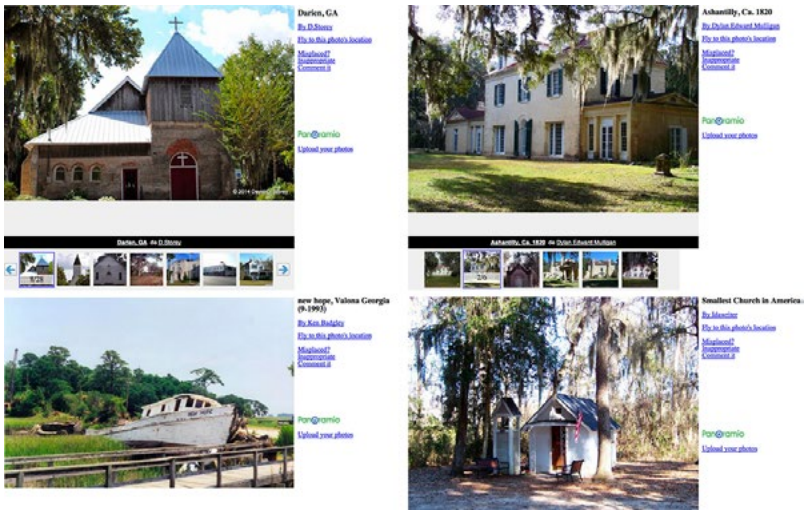


Figure 4.—Photos of locations along the Altamaha Historic Scenic Byway. Google Earth, Google Imagery 2018, TerraMetrics, 2018 (accessed February 13, 2018).

Figure 5.—Google Earth image of Altamaha Historic Scenic Byway. Google Earth, Google Imagery 2018, TerraMetrics, 2018 (accessed February 13, 2018).

In contrast, the Photovoice literature views the eclectic content of scenic photographs as a benefit. Various studies have used photographs to discern a broad range of values in the landscape; for example, sense of place and symbols of well being in rural landscapes (Beilin 2005, Berbés-Blázquez 2012, Guell and Ogilvie 2015, Pastur et al. 2016, Ramírez et al. 2011) and cultural landscapes in urban settings (Liu et al. 2016, Mahmood et al. 2012, Richards and Friess 2015).

In each case, the more explanatory approach of Photovoice (Balomenou and Garrod 2016) addresses what an increasing number of authors are calling cultural ecosystem services. Once the benefits of these services are articulated and understood, land use planners have an incentive to prioritize ecosystem and landscape features that affect them. The research concludes that crowdsourced data can help identify spatial patterns of cultural ecosystem services and their associated landscape settings (Berbés-Blázquez 2012, Matthews 2011, Muck 2006, Nieuwoudt et al. 2016, Pastur et al. 2016).

DEVELOPING A PROTOTYPE "VALUED LANDSCAPE DETECTOR"

The following sections describe a process to identify candidate Scenic Byways in coastal Georgia. The basic idea is that metrics derived from known scenic locations are used to identify potential scenic locations; then, as travelers approach a potential scenic location, they are contacted via a mobile augmented reality (AR) application (app) and prompted to provide *in situ* evaluations of the scenery.

Augmented reality is a subset of virtual reality that overlays images of a projected alternate onto a direct experience of the real world. Rather than replace the viewer's complete world with an immersive computer generated synthetic view, AR uses geolocation and orientation techniques to project parts of the scene based on the location of the viewer (Bishop 2015, Orland 2015). The Pokémon Go craze of 2017 was one example of AR in action (Anthony 2017).

We are developing a tool that prompts users to evaluate their surroundings when they (and their AR device) pass scenic, cultural, or ecological features. The tool delivers narratives and images based on the device's location. Our prototype tool uses the concept of geofences within an AR environment to trigger prompts about cultural/ecological/scenic benefits. A geofence is a virtual threshold located via spatial coordinates that triggers a response in a mobile device. One version of our app delivers visual and audio augmentation to smartphone users who scanned a static map or landscape model in a community location such as city hall or post office (Fig. 6a) (Morrison et al. 2011). A second version delivers imagery and audio narratives to automobile passengers and audio-only cues to drivers, again via their location-enabled smartphones (Figs. 6b, 6c) (Blattner et al. 1989, Vazquez-Alvarez et al. 2012).

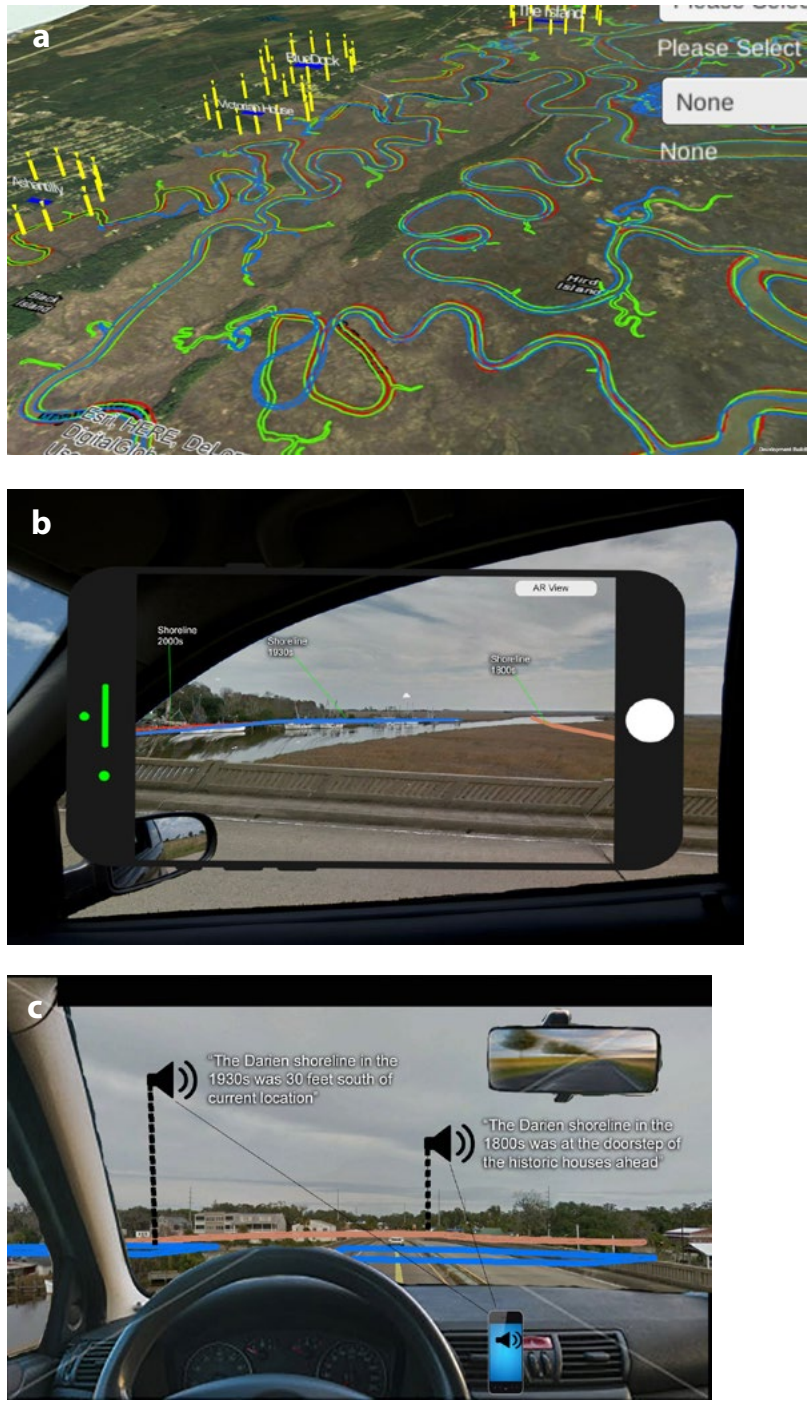


Figure 6.—(a) Map target-based augmented reality; (b) passenger audiovisual augmented reality, and (c) driver audio cue augmented reality. ESRI Basemap. Sources: Earthstar Geographics, CNES/Airbus DS|ESRI, HERE, Garmin.

In the scenic highway version, AR users move along a highway, either viewing a highway map via their smartphone or listening to cues as they drive. The tool delivers visual and/or aural cues preassembled from crowdsourced photos and narratives. The map user or vehicle driver can record their evaluation of the landscape with either a geolocated verbal response or a photograph uploaded to a publicly accessible database of cultural, ecological, and scenic resources. These evaluations may form the basis for an application to the Georgia Department of Transportation for Scenic Byway status.

An Example Based on the Altamaha Historic Scenic Byway

For the app prototype, we used the Altamaha Historic Scenic Byway to test AR features and evaluation tools that could be used in other highway settings for scenic, cultural, or ecological protection.

Sixty-seven miles of U.S. Highway 17 in Georgia, from Richmond Hill to Brunswick, are recognized as a scenic drive (http://www.exploregeorgia.org/). A 7-mile stretch of that highway crossing the Altamaha River from Glynn County to Darien and 8 miles of GA Hwy 99 to Meridian make up the Altamaha Historic Scenic Byway (Fig. 7). Google Earth images from along this route include iconic scenic views of coastal salt marshes, damaged and abandoned boats, community churches including the smallest church in the United States, favorite restaurants, and historic landmarks (Figs. 4, 5).

Creating a Highway Image Log

We assembled an initial image log from crowdsourced images posted to Google Earth. Each of the scenes in Figure 4 contributes to the overall value of the Scenic Byway. Some are discrete locations such as churches and historic sites while others represent typical landscape scenes. For each, our evaluative system must be able to assign a score to distinguish more and less valuable aspects of the landscape.

Creating Geolocated Narratives

We have found that creating a narrative for cultural/historical/popular destinations—reasons for selecting or identifying it as a place of value—is relatively easy to do based on available descriptions (Fig. 8a, 8b). Creating a narrative may be more difficult when the records associated with scenic landscapes lack an explanation about why the photograph was taken.

For the embedded AR narratives, we used interview and survey responses from a post-Hurricane Matthew study that focused on climate-related migration but also included questions about place attachment and reasons for living on the Georgia coast (Orland and Welch-Devine 2017). We established geofences to trigger images or narratives based on prior crowdsourced knowledge of a cultural/historical/popular feature or by prior GIS-based designation as a scenic, cultural, or ecological "hotspot."

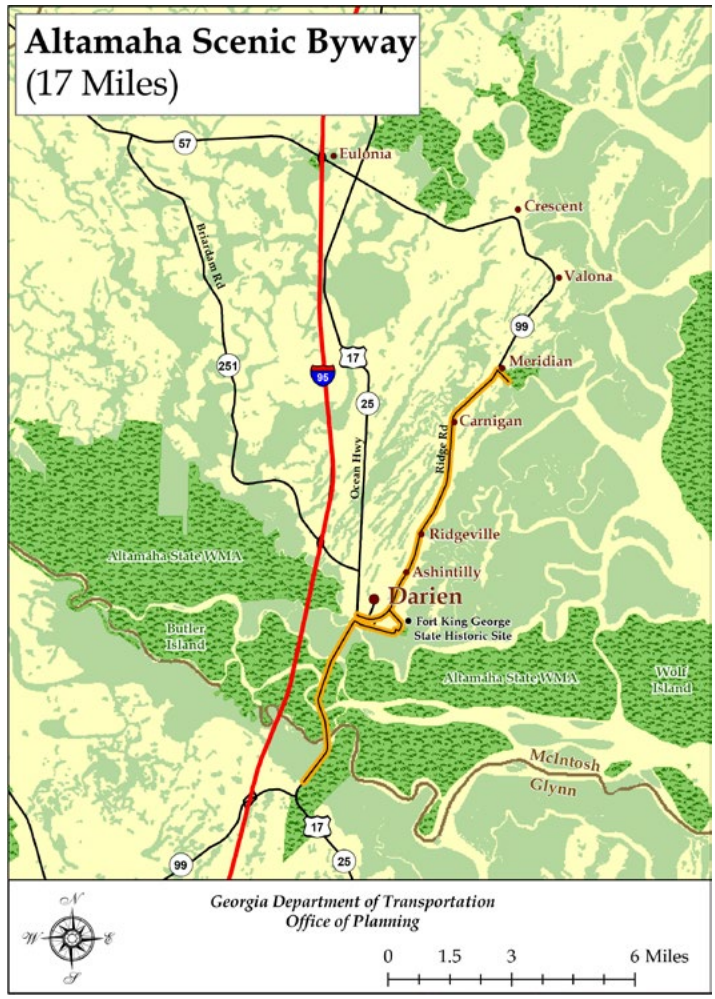


Figure 7.—The Altamaha Historic Scenic Byway (shaded in yellow).Georgia Department of Transportation.

In our prototype visual interface, viewers can select virtual buttons that reveal ancient shorelines of the Altamaha River or NOAA projections of sea level rise in the coastal salt marshes. The app can also respond to GIS indicators to develop a virtual topographical "surface" based on characteristics of known photo locations (Bishop and Hulse 1994, García-Palomares et al. 2015, Martín et al. 2016, Ramírez at el. 2011); the topographic high points of these locations serve as geofences for the evaluation system. A similar process could be used to add nonvisible features, such as locations valued for their known or projected ecological, archaeological, or historical data. There are many possibilities for conveying modeled or projected data.

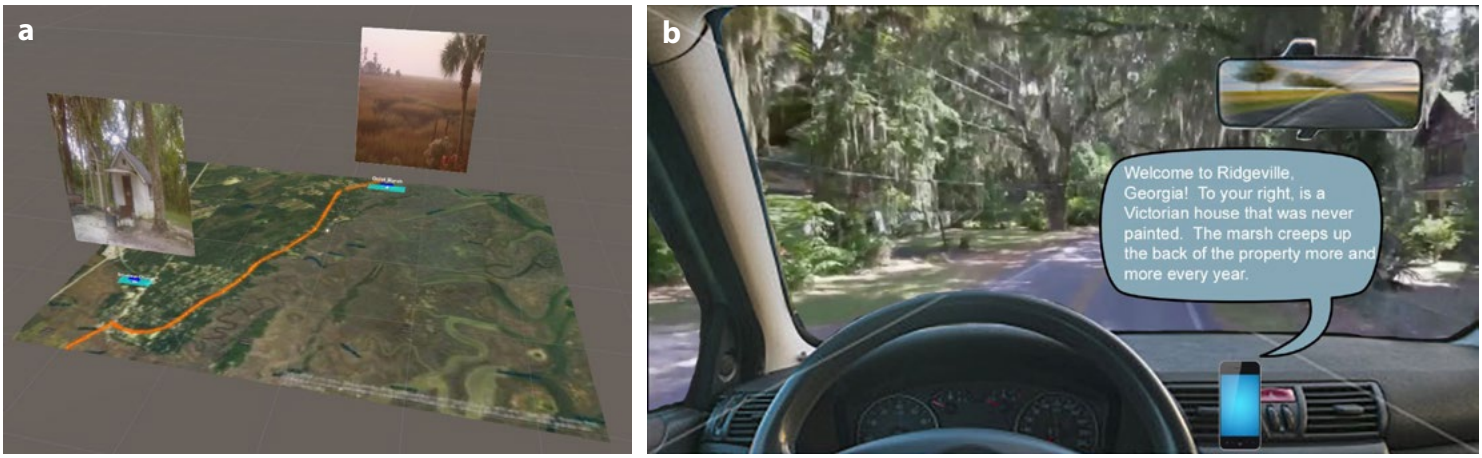
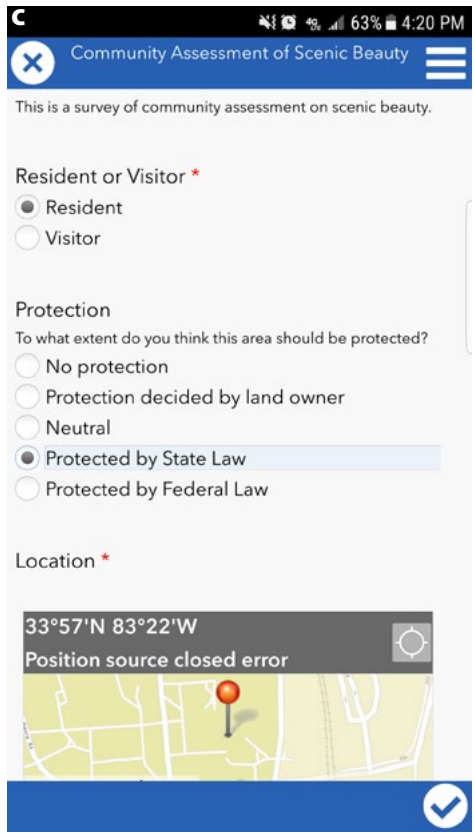


Figure 8.—(a) Smartphone interface, (b) location-triggered in-car audio, and (c) geolocated feedback. Sources: Earthstar Geographics, CNES/Airbus DS|ESRI, HERE, Garmin.



Evaluating the Passing Landscape

Our evaluation approach is based in the use of locationally aware devices like personal smartphones that deliver a narrative of the drive along the candidate highway. At locations determined by scenic, cultural, or ecological geofences, the user is asked to comment on their surroundings and provide a scenic preference score. Drivers may respond verbally, and their input is recorded and tagged with a geolocation. Passengers may take their own photographs, augmenting the crowdsourced photo resource and providing a more comprehensive evaluation (Fig. 8c). Users may also choose to provide unprompted input at any time, and all responses are tagged with geolocation information. Responses are georeferenced at the time of collection, and users can decide in advance if they want to upload evaluations to a resource database in real time or by later upload.

The evaluations of historical, cultural, and scenic resources that users submit via this crowdsourcing mechanism can be made available to other app users as well. In this way, individuals may contribute their own views and at the same time learn about the preferences and insights of other active users.

CONCLUSION

Locating candidate scenic highway landscapes for protection is not necessarily a straightforward endeavor, particularly when it involves identifying cultural and ecological resources that may be locally important but are not well known to visitors. Consequently, some locations are likely to be under-sampled, and even when a place or feature catches a motorist's eye, there have not been convenient ways to register this information while moving down the highway. The value of tools such as Visitor Employed Photography and Photovoice has been recognized, but their use has been limited to what can be readily seen, heard, or smelled in a specific location.

Here, we propose that such methods can be taken further to capture not just individual experiences of place but also collective experiences reported by multiple individuals. We are able to capture the richness of experience along a scenic highway via

crowdsourced photography and narratives and then invite others to consider and respond to those experiences via a smartphone app. We can use the app to convey scientific and historical insights about the landscape.

In the prototype case described here, the goal was to bring attention to scenic landscapes, but the general approach can be applied in numerous other settings where collective grassroots experiences of landscape are essential to protection and preservation efforts. The insights of local people—such as what flooded and how frequently, which family farmed there and how—add authenticity to existing knowledge bases. We hope that the tools described here may lead to a broader understanding and appreciation of landscapes as local people see their own "views" (literal and figurative) represented and honored in larger frameworks of decision making.

ACKNOWLEDGMENTS

Partial support for this project was provided by: U.S. National Park Service cooperative agreement #135414 P11AC30805, "Comparative Landscape Scale Cultural Resource Conservation: West Virginia and Georgia"; U.S. National Science Foundation award 055736-01, "The Wake of Hurricane Matthew: Rethinking Vulnerability, Resilience and Migration"; and Institutional Grant NA10OAR4170084 to the Georgia Sea Grant College Program from the National Sea Grant Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

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