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# Deep Mapping for Environmental Communication Design

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## ABSTRACT

This article shares lessons from designing [EcoTour](#), a multimedia environmental advocacy project in a state park, and it describes theoretical, practical, and pedagogical connections between locative media and community-engaged design. While maps can help share information about places, people, and change, they also limit how we visualize complex stories. Using deep mapping, and blending augmented reality with digital maps, EcoTour helps people understand big problems like climate change within the context of their local community. This article demonstrates the rhetorical potential of community-engaged design strategies to affect users, prompt action, and create more democratic discourse in environmental communication.

## CCS Concepts

Human-centered computing → Collaborative and social computing

## Keywords

Deep mapping, Geo-visualization, Locative media, Mobile app, Localization, Place-based pedagogy

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“If we think of the Deep Map as an incipient genre of environmental writing, that genre is marked by attention to the ways in which the smallest, most closely circumscribed locale eventuates from the deepest recesses of time and is subject to attention in the most diverse, disparate terms from the widest array of perspectives.”

—Randall Roorda (2001, para. 5)

## INTRODUCTION

On September 11, 2017, Hurricane Irma reached Gainesville, Florida—dumping over 2.5 million gallons of water onto the Alachua wetland area. Although weather radar and storm centers tracked the hurricane’s progress, the digital maps and swirling visualizations could not fully depict the impact of the storm on local Florida communities. Overnight, highways flooded, rivers overflowed, and prairie land transformed from a droughted savannah to a massive lake. Visitors to Paynes Prairie State Park could see fish and alligators swimming along hiking paths while many natural areas closed down as levels rose and excess water seeped out of the karst topography and rewrote the local geography.

For many coastal regions, this is a familiar scene, one that recurs almost every year during storm seasons. With so-called 100-year hurricanes and floods predicted to rise as a result of climate change, the relationships between place-based histories and local communities are changing. In Gainesville, local residents tell stories of “the big one” while meteorologists interpret complex data readings and map projections. In both cases, communication designers attempt to move listeners to action, both physically and rhetorically, by communicating different attitudes toward the risks associated with inclement weather. Recommendations from meteorologists to evacuate the area meet with the lore of locals whose stories of resilience help them to negotiate the relationship between their place-based identities and these data-driven predictions. Yet, for all the tall tales and technologies, few communication tools connect the impact of climate change to the ways that global issues affect local residents.

Climate change is a big idea. Despite all the maps, data visualizations, and scientific studies, people have a hard time understanding what they can do at a local level to make an impact on their community.<sup>[1]</sup> Even with smartphone apps and other advances in digital technologies, scholars across disciplines have critiqued environmental communication designs for failing to rhetorically engage public audiences and ultimately affect change. As Sonia Stephens and Daniel Richards (2020) note, users can “geolocate their picture of a flooded neighborhood, *experience* a dramatic projected visualization, or *explore* open data sets, but the main if not sole rhetorical interaction—facilitated as it is through impressive technology—is still with data. The rhetorical encounter with the technology might still be siloed from the greater social situation of the risk at hand...the communities most affected and what might be done about it” (p. 6). Digital mapping technologies are important tools in environmental communication, facilitating early warning systems and “up to the minute” alert notifications. Yet, most digital maps limit how communicators can convey a location’s topography, history, and local action. The emphasis remains on “siloed” data delivered in “technocratic design structures reminiscent of information deficit models of old” (Stephens & Richards, 2020). Digital mapping methodologies need new, location-based design approaches that can better account for the many layers of meaning at work within any place.

As maps limit the scope of information, designs can also perpetuate long standing systems of violence and erasure. In his work on mapping environmental crisis and the Standing Rock Sioux Nation (2019), Ryan Eichberger discusses how maps strategically include or exclude information and often mimic colonial practices that erase Indigenous sovereignty and obscure social and environmental issues. Eichberger calls for new communication practices that visualize large-scale issues through ethical strategies, which engage both humans and nonhumans in design. The environmental crisis we face is so massively “dispersed across time and space” (Nixon, 2011) that we need more inclusive design approaches to address the complexity of environmental justice (Stephens & Richards, 2020). The climate crisis needs to be understood not only through data analysis but also through on-the-ground, experiential, embodied, and local action.

Drawing from a case study of a locative media app we designed for a state park in Alachua, Florida, this article presents deep mapping as a more inclusive design strategy, connecting place-based pedagogy, Indigenous knowledge, and digital technologies to engage local communities in the work of environmental communication. More than a topographical survey, deep maps describe the complex layers that convey a sense of place, drawing together science, folklore, census data, weather, history, stories, memories, archeology, interviews, images, and much more. There is no one way to create a deep map—the process (and resulting product) differs depending on the specific area and approach. In general, deep mapping combines geospatial data, qualitative research, and cultural information to communicate the many layers of meaning that form a sense of place. At the advent of the spatial turn, the concept of deep mapping helped writing studies scholars cultivate a place-conscious writing classroom (Brooke & McIntosh, 2007). However, the growing popularity of digital mapping requires new approaches to communication, which combine emerging technologies and place-based practices to address issues of environmental justice. Building from scholars connecting Indigenous knowledge and spatial theories (Larsen &

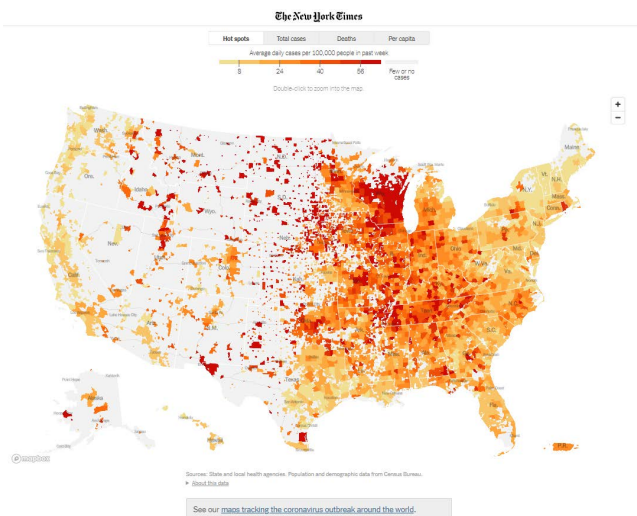
Johnson, 2017), as well as decolonial and Indigenous approaches to both science studies (Geniusz, 2009; Kimmerer, 2013; Ceccarelli, 2013) and posthumanism (Bignall & Rigney, 2018), this article deploys deep mapping as a place-based approach for designing digital projects.

Our case study presents [EcoTour](#), a mobile augmented reality (AR) walking tour we developed with students at the University of Florida as part of a grant-funded, public education initiative. Partnering with a local state park and nonprofit conservation organizations, this experiential learning project challenged undergraduate students across three digital writing and multimodal design courses to ‘deep map’ a location. Participants collaborated with local stakeholders to research a place, design and test digital tools, communicate environmental change, and act on issues of environmental justice. Using smartphones, an interactive map, and AR technology, visitors can scan signs within the park to access multimedia content, including archived audio-visual media related to specific physical locations. EcoTour creates a platform for ecological awareness that visitors can use while in the park space and reveals histories not documented by the official signage, such as Native American removal, slavery in the park, as well as contemporary environmental threats facing the preserve. The design approach and resulting visualizations acknowledge multiple, local perspectives in ways that weave together storytelling and science. Using EcoTour as a model, we show how decolonial design approaches can highlight the relationship between colonial histories and our climate crisis and map how slow violence emerges. Overall, this article describes how deep mapping can engage students in experiential communication practices and demonstrates the need for environmental advocates to design public projects that illustrate the complexity of place.

## VISUALIZING COMPLEXITY WITH STORY MAPPING

Increasingly, technical communication scholars interested in the intersections of digital technologies and social justice are seeking out place-based storytelling techniques to reframe the practice of communication design. For instance, Sonia Stephens and Daniel Richards (2020) describe the use of story maps to achieve better community engagement with interactive risk maps. Risk maps visualize potential large-scale environmental problems (like wildfires, flood-zones, the spread of disease, and sea-rise). A recent example of a risk map is the New York Times’s “Coronavirus in the U.S.: Latest Map and Case Count” web visualization (Figure 1).

However, Stephens and Richards identify a major problem with interactive risk maps: these visualizations often fail to engage local residents with the abstract information they convey. Likewise, attitudes towards visualizations differ across local, regional, and national scales. As public response to the global COVID-19 pandemic has shown, this is an urgent and pressing problem. In the United States, risk maps often present local and individual scales of viral spread, whereas in countries like China, the government used large-scale data collection to help identify and contain viral spread. These differences suggest the wide array of attitudes regarding visualizations, especially affecting their use in crisis communication. However, in both examples, these maps represent a top-down, deficit model for science communication. As Lynda Olman and Danielle DeVasto (2020) argue, these risk communication methods support “the old Modern barricades between technical and public ‘spheres’ of argumentation” (p. 15).



**Figure 1. Example of an interactive risk map. Screenshot taken October 27, 2020 from the New York Times’s “Coronavirus in the U.S.: Latest Map and Case Count,” showing the number of cases of COVID-19 reported per day by county in the U.S.A. Retrieved October 27, 2020.**

So, how can we communicate risk to local communities in a rhetorically effective way? Stephens and Richards’s solution to the problem is “story mapping,” which “combines the data exploration capabilities of an interactive risk map with visual stories of residents located on the map” (p. 6). For example, their story map of Hampton Roads, Virginia features video interviews of coastal residents alongside NOAA’s Sea Level Rise Viewer to emphasize how changes to coastal waters are directly affecting locals. Similarly, digital rhetoricians have been using interactive maps, locative media, and AR to design environmental advocacy projects (Morey, 2017; Jones & Greene, 2017). These studies suggest both the importance of, and the massive potential for, using maps to localize complex information in geo-visualizations. Drawing from critical geography, Stephens and Richards propose the use of story mapping as a way for technical communicators to “capture complexity in ways that linear narratives cannot” (p. 8). In other words, story maps allow local users to meaningfully interface with the large-scale, abstract information presented by geo-visualizations.

Yet, mapping and the ways that we communicate our histories are already inherently colonial. Storytelling is a knowledge-making practice, but whose stories get told? How can we create maps that highlight historical inequities and amplify the voices of marginalized communities? Following Stephens and Richards, this project extends the work of story maps through mobile technologies and deep mapping approaches to communication design. Story maps incorporate firsthand accounts of locals, and often focus on current situations and contemporary issues. Deep mapping offers one way to counter institutionalized approaches and instead experiment with how we can articulate the complexity of places through a sense of deep time.

We know that most issues arise from a confluence of events that aggregate over time, such as the structures and social forces that create poverty, pandemics, or environmental crises. These forces are usually invisible—part of what Rob Nixon (2011) calls “slow violence” that “occurs gradually and out of sight, a violence of

delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all” (p. 2) but that nonetheless contributes to the shifting baselines from which new generations imagine environmental degradation and cultural norms. As such, EcoTour draws attention to slow violence in order to promote environmental justice, a movement that is working holistically to broaden the aims of environmentalism beyond traditional approaches to natural resource management, specifically to include the need for equitable solutions that address issues of race, gender, sexual orientation, national origin, disability, and income level. Environmental justice suggests that people are an integral part of the environment and that to address environmental injustice requires that we also address its intersections with other forms of social inequity.

In this project, we produced a platform which visualized the ecology and amplified the history of Paynes Prairie to promote environmental justice through a decolonial design ethic. Decolonial efforts like the Landback movement are promoting Indigenous sovereignty through coalitional work that seeks to restore Indigenous lands. As part of our aims to promote environmental justice, our project attempts to amplify decolonial perspectives and extend them into augmented space. While park signage obscures the histories of colonial violence at Paynes Prairie, EcoTour sought to place this history back in the park. In doing so, our design methods directly engage what Kristin Arola (2018) terms a “land-based digital design rhetoric” (p. 201), which offers “a way of understanding how our experiences in digital spaces are shaped by our embodied interactions in the biosphere itself” (p. 204). In engaging with counter-narratives of the park, EcoTour challenges visitors to reckon with the slow violence of colonialism as it persists in shaping Paynes Prairie State Park.

Deep mapping is one method that can help communicators address issues of environmental justice, making visible the long-term change that alters environments by weaving together science and story in ways that counter the violence of erasure and express the multiplicity of places. As the Polis Center at Indiana University describes, “where traditional maps serve as statements, deep maps serve as conversations” (“Deep maps,” 2020). To fully understand how to create change, we need to create deep maps that consider the larger history of slow violence alongside the local stories of those most affected. We need to develop conversations that engage multiple perspectives and move people to action. Deep maps acknowledge the local and also the historical—seeking out voices that have been obscured or silenced.

## DEEP MAPPING AND PLACE-BASED DESIGN

At the risk of being over-simplistic, deep mapping can be defined as a storytelling practice that combines geospatial data with cultural and historical data to produce ‘maps’ which resist the totalizing and homogenizing spatial effects of traditional cartography. In his introduction to the *Humanities* special issue on “Deep Mapping,” Les Roberts (2016) discusses the complex and convoluted conceptual history of the term and outlines various practices which have coalesced in recent years around deep mapping. He traces the connections between deep mapping and psychogeography as part of the Situationist International, an international organization of artists, writers, and critics formed in 1957 and dissolved in 1972. In their manifesto, they describe the liberatory potential that situations hold for escaping capitalist alienation (Debord).



Roberts carefully articulates reasons why these traditions lead contemporary scholars toward “questioning the coherence and validity of deep mapping on the one hand and maintaining a loose, plural and open application of the term on the other” (2016). However, he does offer a broad definition of deep mapping as “an embodied and reflexive immersion in a life that is lived and performed spatially. A cartography of depth. A *diving within*” (2016, emphasis original). Some early examples explicitly referred to as deep maps include Wallace Stegner’s *Wolf Willow* (1962) and William Least Heat-Moon’s *PrairyErth* (1991). However, scholars like Ian Marshall (1998) and Randall Roorda (2001) have persuasively argued that the term be extended to much earlier works in the American nature and travel writing traditions.

In conjunction, diverse cultures and people groups across the globe have long practiced place-based storytelling as a method for making and communicating knowledge (Basso, 1996; Goeman, 2008). In particular, Mishuana Goeman highlights methods of Indigenous mapping that resist colonial geographies by focusing on “storied land” as “living and layered memory” that connects people across space and time (pp. 24–25). Based on this large and diverse body of scholarship, we employ deep mapping as a practice that layers stories within places to create complex and embodied spatial and textual experiences.

Over the past few decades, scholars working from the traditions of critical geographic information system (GIS) and human/cultural geography have laid the groundwork for using deep mapping as a spatial method for environmental communication design. As geographer David Harvey (1996) argues, “maps are typically totalizing, usually two-dimensional, Cartesian, and very undialectical devices” (p. 18). In contrast, artist-scholars like Ian Biggs (2011) are using deep mapping to engage “a multidimensional understanding of place” that challenges traditional approaches “through our engagement with a second, specifically cultural, space-between” (p. 5). At the same time, critical geographers like Juliana Maantay (2002) have discussed the use of GIS to trace environmental health and equity. Others have used mapping to redefine networks of spatial socio-geography, such as Frampton et al.’s work with Hong Kong as “a city without ground” (2012). The work of geographic psychogeography (Wood, 2020) has also played a role in the work of digital rhetoric scholar Gregory Ulmer, who has been influential for scholars interested in the spatial rhetorics of augmented reality (such as Greene, 2017 and Tinnell, 2017). Furthermore, as we describe below, this project also directly drew methods from the rich historical and emplaced relationship formed between the traditions of deep mapping, place-based storytelling, psychogeography, and digital rhetoric as they take place at Paynes Prairie.

## Deep Mapping Paynes Prairie

In our approach to place-based design, we sought to engage with the ways that contemporary deep-mapping approaches are directly built on experiences between settlers and Indigenous peoples at Paynes Prairie. The American naturalist William Bartram visited Paynes Prairie in spring of 1774 as part of an expedition he would later describe in his most famous work, referred to in shorthand as *Travels*.<sup>[2]</sup> There, Bartram met with Creek mico (or chief) Ahaya, who Bartram refers to by the name Cowkeeper, and who bestowed on him the guest name Puc Puggy, or “the flower hunter.” According to Bartram’s account, this nickname also gave him permission to conduct fieldwork throughout the Creek territories in north-central Florida. *Travels* presents a recounting of Bartram’s experiences

throughout the American southeast, arguably producing one of the earliest American examples of what we now refer to as deep mapping (according to scholars like Marshall and Roorda). The text layers meaning and place together to create a rich narrative tapestry that powerfully depicts the natural and cultural history of the region at a time of violent colonial change. Bartram’s deep map captivated a wide range of audiences in America and Great Britain and profoundly influenced both the British Romantic and American nature writing traditions.<sup>[3]</sup>

Such a literary inheritance leaves deep mapping on shaky ethical ground. Put reductively, which is all that the scope of this section permits, the attitude of contemporary ecocritics and environmental communication scholars toward *Travels* falls into two basic camps: those who interpret the book as having sown the seeds of an American environmental consciousness (such as Branch, 1996; Sivils, 2004; Porter, 2010) and those who argue the work perpetuated violence toward Indigenous peoples through a narrative of colonial scientific exploitation (such as Looby, 1987; Regis, 1999; Pratt, 1992). Between these basic viewpoints, other scholars have taken a more nuanced, if not ambivalent, position between standard readings of Bartram as either colonist or proto-ecologist (Bellin, 1995; Hallock, 2001; Sturges, 2014). As these scholars demonstrate, deep mapping is a practice which is imbricated within both the colonial traditions of travel writing and the ecological traditions of American environmental writing. Yet, more recently, Mark Sturges persuasively argues that Bartram’s narrative engages with deep time in *Travels* precisely to avoid removing “the Indians from time [or] from the land, as U.S. policy would later do,” and instead “saw them as agents in a natural-cultural history of colonial contact” and through his deep map “envisioned a political geography of pluralism, a kind of multicultural federalism and accommodation” (p. 59). In this way, Bartram worked to amplify Indigenous knowledge in *Travels* and models a more collaborative approach to mapping design. Bartram’s influence on the deep mapping tradition might likewise offer a methodology for environmental communication design, which directly confronts and engages with the colonial histories of place.

However, mapping history by itself is not enough. While Bartram’s writings document the fight for Indigenous sovereignty, he often played the role of observer rather than activist. To activate the rhetorical potential of deep mapping, we need to combine digital communication technologies with decolonial methodologies to produce more collaborative, democratic design approaches. Decolonial methods analyze the violence and erasure of settler-colonialism and work to make visible knowledge that has been pushed aside, forgotten, buried, or discredited. Such knowledge is not merely historical, but also a living, contemporary network of relationships that continues to inform how we engage with place (Haas, 2012; Legg, 2014).

As white, cis-gendered scholars working with a land-grant university, we came to the complexity of fieldwork at Paynes Prairie with ethical concerns. In the years following the publication of *Travels*, the colonial violence towards Creeks and other Indigenous peoples erased much of their presence in the North Florida landscape. Today, this erasure is evident in places like Paynes Prairie, where park signage tends to focus on the area’s contemporary ecology, with the complex history of peoples, cultures, and conflict relegated to anecdotes and the dusty pages of archives. As outsiders to the place, we wanted to develop strategies for place-based research and pedagogy that highlight historic erasure and prioritize collaboration

and respect. To be clear, no design or communication strategy can undo the damage done to the people or ecology of Paynes Prairie. However, it is our hope that deep mapping approaches can draw attention to the ways that communication designs and mapping technologies have a rhetorical effect—shaping how people interact and understand land, people, and power structures. EcoTour works to educate users while also connecting them to action groups that can author sustainable change, thus demonstrating how more inclusive, evolving designs can work to counter colonial practices and have a material impact on structures of power.

Like Bartram’s *Travels*, we drew upon deep time as a strategy to tell the story of place through both natural and cultural history. In doing so, we followed Nedra Reynolds (2004) who argues that we must develop new maps of writing and uncover new ways to articulate “the sense of place and space that readers and writers bring with them to the intellectual work of writing, navigating, remembering, and composing” (p. 176). “New maps of writing,” according to Reynolds, “will devote a layer to the where of writing” because “writing can be studied or understood only in a cultural context—and only through the thin, smudged layer of a palimpsest” (p. 176). Deep mapping approaches dig deeper into the complexity of places and use the map as a communication tool to explore cultural issues that shaped an area, changes to the ecology over time, geographic data, political associations, and the many narratives that develop a sense of place. Developing new maps of writing means working on the ground and focusing on locative storytelling experiences that help users connect to environmental justice issues on site. EcoTour explores the “where” of writing by positioning users on location, mapping the effects of climate change, and making visible the historic violence done to people and places to create communication designs that users can connect to *in situ*.

While a “spatial turn” has been taking place across the humanities over the past few decades, place-based storytelling is far older than Google Maps and is deeply rooted in questions of social justice. With this in mind, our project builds on the work established by scholars exploring on-the-ground, participatory design approaches that engage local communities (Grabill & Simmons, 1998; Covi & Kain, 2016; Stephens & Richards, 2020). In undertaking this project, we sought to design and enact what John Tinnell (2017) theorizes as an “actionable archive” (p. 108). Tinnell argues that ubiquitous technologies like mobile smartphone apps are capable of disrupting the “differed time” that characterize most traditional archives or museums, what he refers to as the “deferred archive.” Deferred archives collect and house materials *ex situ*, outside of their place of origin, siloed in repositories, and often using a standardized system for cataloging. In contrast, actionable archives present “texts and audiovisuals [that] are encountered amid the proximate present, often while we are doing something else” (p. 82).

Actionable archives organize information already present on site, engaging users by contextualizing media or detailing points of interest. The disruptive elements of ubiquitous media like augmented reality, Tinnell believes, offer a means to change the ways that we encounter, and act on, media. Through EcoTour, we sought to put Tinnell’s theory into practice, effectively bringing together conversations in cultural and multimodal rhetoric (Haas, 2007; Riley-Mukavetz & Powell, 2015; Rios, 2015; Arola, 2018;), cultural and material approaches to technical communication (Slotkin, 2020), place-based ethnography (Rai & Druschke, 2018; McKinnon et al., 2016), rhetorical fieldwork (Senda-Cook et al.,

2019; Middleton et al., 2015), participatory design (Endres et al., 2016), and localization (Gonzales & Zantger, 2015; Shivers-McNair & San Diego, 2017) into a community-engaged digital project. Deep mapping as a methodology allowed us to amplify the complexities, layers, and constellations of stories that shape place and to disrupt dominant and fixed narratives of place, which focus strictly on the present and threaten to elide the history of place as sites of erasure, violence, and change.

## Augmented Experiences

In recent years, writing studies scholars have turned to emerging technologies to address issues of environmental justice. By visualizing connections between sites of local change and global environmental crises, digital maps help make large-scale environmental problems meaningful on human scales. However, while interactive maps help users visualize change, few designs work with/in an environment to directly engage the user with the specific location. People often learn about environmental issues out of context, or at least off site. Pollution, flooding, and a host of other environmental issues become a set of communicated facts rather than relatable actions. The emergence of locative media such as GIS-mapping and augmented reality have helped scholars build location-based projects that move beyond the traditional boundaries of the classroom and prompt public engagement (Morey & Tinnell, 2017; Greene, 2017; Boyle & Rivers, 2018; Blevins, 2018). Building from this body of research, EcoTour uses an interactive augmented reality platform to engage users directly with their environment (Figure 2).

Augmented reality (AR) technologies overlay digital content in a physical environment. Through AR apps, users can position a mobile device in a physical location to trigger a digital ‘pop-up’



**Figure 2: Designer tests how augmented reality overlays will work with the Paynes Prairie map at the beginning of the EcoTour Trail.**

of information on a screen— similar to an audio tour or GPS that guides users through a place. Designing with augmented reality apps layers information on site so users can interact with environments and experience the multiplicity of place. AR enables communicators to build location-based projects that connect users to local action, creating opportunities for more emplaced, democratic writing practices attuned to the ways in which the relationships between a text and the material environment co-construct meaning. Walking through the state park, participants can scan a sign, hear



about invasive algae growth and see the algae growing directly in front of them. More than merely interacting with a screen, users get to interact with their environment. Instead of merely incorporating lived experiences, EcoTour prompts one.

By (re)connecting to specific locations and real-time information, we can design new media for environmental communication, media that prompts civic action and local engagement. AR technologies offer mobile platforms for education, art, and activism that invite users to *be active*, to participate in a media ecology that teaches “us about the way things move, transform, effect change, and become rhetorical” (Gries, 2015, p. xvii ). For example, through AR overlays, EcoTour traces the historical movements of people, and changes to the composition of flora and fauna, showing how these shifts transformed the ecology of the area. Users can see how historical forces shaped the physical space and conditioned how people talk about the Prairie, how the space evolved rhetorically. In addition, the AR prompts link visitors to additional resources, funding sites, community action groups, and nonprofits working on social and ecological justice issues related to climate change, #landback initiatives, and human development on the Prairie. The EcoTour app not only drove traffic to these sites, but also authored new partnerships in the community: numerous students joined local action groups and are now working to teach others about Paynes Prairie’s history and ecology. In addition, the EcoTour website invites community members to propose new AR points of interest and continue telling the stories of Paynes Prairie. In creating and following AR prompts, users not only move through a site, but also participate in a “writing in situ” that revises public spaces and creates new opportunities for participatory media. As a hybrid practice that writes “through, with, and alongside” (Hayles, 2012) technology and materiality, augmented reality offers a framework for understanding the complexity of composing across diverse networks and environments—both as a design approach and a communication practice.

As Morey and Tinnell (2017) point out, mobile AR technologies “support new writing and design spaces, which, in turn, *demand new aesthetic and rhetorical principles* to help orient acts of production and interpretation amid this emerging dimension of digital culture” (p. 9, emphasis added). Deep mapping approaches help communicators develop new aesthetic and rhetorical principles in ways that prioritize intersectional, decolonial approaches to communication design. Combining augmented reality tools with deep mapping creates opportunities to collaborate with local stakeholders and design location-based projects that more ethically engage communicators in the work of environmental action. Through a deep mapping approach, environmental communicators can combine mapping technologies with place-based storytelling approaches to illuminate hidden histories, amplify marginalized voices, and connect geographical and cultural information. Thus, communicators can develop not only for diverse users but also blend scientific information with storytelling to build a rhetorically persuasive platform that has the potential to be more accessible and more “affective.” EcoTour uses a deep mapping methodology for designing augmented reality experiences in order to foster more equitable approaches to environmental communication by acknowledging a greater range of voices and affective histories in engaging with place (Figure 3).

## PEDAGOGY IN PLACE (METHODOLOGY)

The EcoTour project began as a grant-funded education initiative



**Figure 3: Ecotour, Visualizing the Environment of Paynes Prairie, an introductory image in the EcoTour app**

that was both pedagogical and public-facing: a mobile app, designed and built by students at the University of Florida, that would educate users about their surrounding environment as they walked along the LaChua Trail in Paynes Prairie State Park. Working with colleagues at the University of Florida (Jason Crider and Jacob Greene), we designed EcoTour as a communication project that would unite story and science to engage the rhetorical potential of digital mapping technologies and deep mapping methods. To explore the pedagogical opportunities of deep mapping approaches, we decided to build the app with students in our digital rhetoric, technical writing, and environmental communication courses. Since the project involved making a mobile app while teaching others how to make a mobile app, EcoTour offers a unique example of communication design as well as pedagogical approaches to communication design. The following section describes how we built prototypes of EcoTour as part of three university courses.

The EcoTour app developed in three phases—1) Research and Analysis on site, 2) Disrupting design for a deep mapping, and 3) Building the EcoTour app through a deep mapping methodology and rhetorically informed design perspective. Together, we designed, taught, and prototyped EcoTour over the course of six weeks.

### 1) Research and Analysis on site

Deep mapping begins by exploring a specific area and gathering both qualitative and quantitative data. We began the initial research by consulting with local biologists, park rangers, hydrologists, and archives. We reviewed historic and ecological data of the area alongside oral histories from local residents and Indigenous peoples. To understand Paynes Prairie as a place, we conducted numerous site visits, interviewed people within the park, and analyzed the current signage and available resources. As a team, we collected drone footage of the area to compare geospatial data with our on-the-ground experiences. We then evaluated information featured at the park compared to other nature preserves or sanctuary areas. A deep mapping approach encourages designers to document the full context of a place or event. David J. Bodenhamer (2015) describes this process as “a pastiche of everything that could be discovered about a place—topography, climate, folklore, symbols, literature, and the like” (para. 3). To contextualize the area and detail our pastiche, we also documented key terms and phrases people used to describe the area and the associated emotions and personal meanings. The result was a complex network of discoveries that created a multifaceted sense of place.

In the classroom, we evaluated existing maps of Paynes Prairie and

discussed keywords in design thinking to create learning goals for our project. We began to work with students, showing them how to research, conduct site visits, analyze data, determine knowledge gaps, and draft designs for a mobile app. Students collected images (both current and historic) and used Google drive to sort information by specific location in the park. The main goal of EcoTour is to help learners define climate change within the context of their local environment and to evaluate how to take action. However, the deep mapping methodology challenged communicators to reframe the design process and explore how digital technologies shape user experiences. The goal was not merely the communication, but the experience. Our design process centered around the following questions:

1. How can we use digital mapping technologies to communicate the complexity of climate change?
2. How can we rhetorically engage users and illustrate how local threats connect to larger environmental and social justice issues?
3. How can we engage participatory design practices to create more democratic platforms for environmental communication?

The challenge was to engage complexity without creating overly complex maps. In creating EcoTour (and with it a deep mapping methodology) we wanted to establish design principles that work pedagogically, both in the classroom and in the community. Our approach pushes back against deficit driven models for environmental communication design, following Druschke and McGreavy's (2016) call for science communication to move "from a deficit model to a contextual model" (p. 47). While a deficit model assumes that the audience lacks information, a contextual model works to interface with the community in communication. EcoTour designs were collaborative and crowd-sourced as students worked from the specifics of the site, exploring the area, interviewing visitors, and building the design from a ground-up, local perspective. As Stephens and Richards note, interactive risk maps "are often designed by experts for experts" and fail to consider how "the public" might engage map data. In contrast, our design process prioritized public audiences and created a rhetorical framework that considers how diverse users can interact with the space.

## 2) *Disrupting design for a deep mapping*

Deep mapping disrupts the linear narratives and reductive focus of cartesian approaches to mapping. Similarly, decolonial approaches recognize the many, pluralistic ways of producing knowledge. Following recent composition scholars using AR to "disrupt normative writing instruction practices, we cultivate here dis-orientation, dis-census, and dis-obedience as necessary dispositions for unlearning and unmaking hegemony in the classroom" (West-Puckett & Shepley, 2020, para. 1). The EcoTour design process decentralized power in the classroom as students worked across classes and with members of the community. Throughout the project, students drove the design and development—not merely responding to assignments but instead creating the workflow, designs, and deliverables progressively. The making process authored opportunities to reframe communication design pedagogically and challenged students to reevaluate common techniques or principles. Design principles such as *Emphasis*, *Balance*, *Hierarchy*, *Contrast*, *Movement*, and *White Space* became opportunities to learn more about communication design, as well as opportunities to disobey or reinterpret. For example, rather

than creating one emphasis for the project, we discussed how to communicate the multifaceted history and diversity of the area. Instead of crafting a clear hierarchy or linear progression, we identified "points of interest" and created media that users could experience in any order. When considering contrast, we looked at how designs might look on a screen as well as how alternate points of view could change or contrast overarching narratives.

Analyzing balance and white space became a way to evaluate cognitive load and design aesthetics while also considering the slow violence of erasure that often occurs through conflict and the removal of Indigenous peoples and animals. In de-constructing and dis-mantling design principles, students participated in a deep mapping approach that turned the pedagogical process towards social justice and repositioned students as design advocates. "Design advocacy," according to Jialei Jiang and Jason Tham (2019), encourages students to "broaden their rhetorical understanding of design beyond reductive and functional terms, and to cultivate their critical awareness of social equity issues through guided processes of research and design" (para. 4). The deep mapping approach encouraged students to reevaluate how we could use digital technologies to rhetorically engage users and discover new, more decolonial approaches to emplaced design.

GIS and AR technologies enable designers to layer information on site and use the environment as an interface. As such, our classes discussed experiential learning and how emplaced communication technologies can move the user: digitally, physically, and rhetorically. The rhetorical considerations of design are key here—a focus on how the specific design choices made within the application connect the users to our larger learning goals. How could we help users relate local experiences to the slow violence of climate change? As part of our design approach, we created a list of rhetorical goals that would shape the making process:

1. Reframe the map-making process as layered
2. Create a lived experience
3. Engage users with the hidden histories of Paynes Prairie State Park
4. Amplify marginalized voices
5. Illustrate the slow violence of climate change
6. Make users aware of their own position/orientation in the space (bodies/boundaries)
7. Prompt users to action—propose a POI, join in sustainable change, share the project—create a more democratic map making method in general

Our rhetorical goals informed our fieldwork and through the EcoTour design/making process, we developed a set of deep mapping design principles. These principles, as discussed in the EcoTour sections below, engage the complexity of places and model the rhetorical potential of digital map making technologies in environmental communication.

## 3) *Building the EcoTour App*

After analyzing the area, curating content with the local community, disrupting design principles, and developing rhetorical goals, we put together the augmented reality prototype using HP Reveal. HP Reveal is a free, AR visualization tool that lets users link trigger images with digital overlays. By using a ready-made, plug and



play AR tool, we were able to focus on communication design and content in the classroom. However, because HP Reveal is not an open-source platform (and is no longer active), we also developed our own standalone AR application in Unity, using the workflow developed by Jacob Greene (2018). We used our existing research to write content and design the look and feel of the mobile app—including how the app would use augmented reality technologies to respond to signs within the park (Figure 4). Students drafted proposals and created storyboards that detailed how the AR interface would instigate popups to visualize information at specific locations and move users (digitally, physically, and rhetorically). The final tour was broken down into 15 modules, each a specific augmentation or “point of interest” that users would walk to and access in the park space (Figure 5). Points of interest include information about animals, plants, water runoff, Indigenous peoples, human development, and current conservation efforts. Communication methods include audio, video, and still images. Users access the tour through the Google play store or HP Reveal app. In addition, we used grant funding to purchase six smart tablets that users can check out at the visitor’s center. The Unity version of EcoTour is downloaded on each tablet. The full tour is also published at [ecotourapp.com](http://ecotourapp.com), a website we created to explain the project and detail our engagement with Paynes Prairie. In what follows, we materialize the connections between place and method, presenting materials from our work as teachers, designers, and community advocates.



Figure 4: Home page of the EcoTour app.

## TOUR MAP

CLICK ON THE ICONS BELOW TO LOCATE AUGMENTED REALITY POINTS OF INTEREST

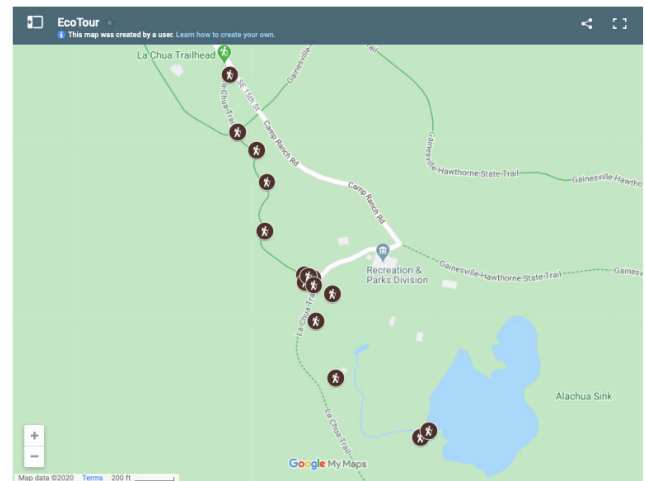


Figure 5: Map of Augmented Reality points of interest

## ECOTOUR: YOU ARE HERE

EcoTour is a rhetorical approach to environmental storytelling. Our goal in this case study is to model a deep mapping approach to digital mapping—a way to rhetorically engage users and explore the possibilities of emerging technologies. The following sections introduce Paynes Prairie as a place and highlight deep mapping, decolonial design principles that our students discovered during the making process. Each principle discusses how designers mapped the area, crafted content, designed media, and created augmented reality points of interest to communicate the complexity of the environment. To watch the EcoTour introduction video, visit [ecotourapp.com](http://ecotourapp.com).

A unique system of uplands and freshwater wetlands, Alachua County’s Paynes Prairie became Florida’s first state preserve in 1971 and is home to more than 20 biological communities and over 400 species of wildlife. Visitors come from around the world to walk the La Chua Trail in hopes of seeing alligators, bison, wild horses or a vast array of birds. However, while Paynes Prairie offers many spaces for viewing the natural world in its splendor, the preserve lacks on-site educational spaces that make visible the environmental threats to the Prairie. In conjunction, the existing signage emphasizes current ecology with little mention of the historic people and events that shaped this place. EcoTour connects the ecological history of Paynes Prairie to the physical environment through augmented reality technologies that layer information on site. As a result, the open access digital walking tour helps users engage the complex ecology of the prairie’s natural environment, human development, and community interaction.

## Embodied

Our first step in creating local, rhetorically effective maps was to physically experience the area we were mapping. In addition to studying existing visualizations and historic documents, we chose to visit the area, talk with local people, and participate in “bodystorming” Paynes Prairie State Park. “Bodystorming” is an invention method that helps designers physically test how environments might affect user experiences. Much like brainstorming, bodystorming is a combination of role-play and



**Figures 6 and 7: Students practice bodystorming to test how augmented reality designs would work with plaques and signs along a boardwalk, planning and testing communication design within the context of specific environmental conditions.**

simulation that imagines how a product might work. However, bodystorming creates a lived experience so that designers can go through the motions of using a product, analyze potential problems, and develop empathy for the anticipated users. Brian K. Smith (2014) describes the process of bodystorming through three categories: design in place, prototype in place, and embodied performance (Figure 6). By physically engaging a place, the embodied process of bodystorming helps designers refine communication design and evaluate how environmental factors might affect performance (Figure 7).

For us, bodystorming helped introduce students to the area and created a lived experience so that designers would better understand how EcoTour might work “in the wild” (Oulasvirta et al., 2003). And the wildness of the area became part of the design. In composing EcoTour, communicators not only considered the arrangement of content or layout and design on a page, but how the entire tour would interface with the surrounding environment. As an actionable text in a dynamic space, the augmented content would be viewed in situ, where too much sun might obscure a screen or noises from the wildlife might create a secondary soundtrack. When creating overlays, students worked to integrate content as part of the larger whole—as a piece of the natural composition scene of Paynes Prairie. Designers considered the size of device screens, how people would listen to audio outside, where sunlight might create screen glare, how visitors would move along the walkways, where people might stop, the sequencing of activities (both in the app and in the physical space), how people might orient the screen, and the most accessible colors and fonts. Instead of “siloiing” data, each point of interest situates the user within the surrounding environment, making participants part of the story of Paynes Prairie.

Bodystorming also encouraged communicators to consider the diverse bodies that frequent Paynes Prairie. Visitors use elevated boardwalks and well-trodden paths for morning runs, family outings, and picturesque hikes. Many of the boardwalks are paved, wheelchair accessible, and designed to move people and animals safely through the space. Occasionally pathways are even blocked by large, sunning alligators stretched across the trail. When researching the area and developing user profiles, students listed a variety of characteristics such as everyday visitors, international

tourists, children, birdwatchers, families, people in wheelchairs, runners, cyclists, and more. But they also noted the frequency of birds, the movements of alligators, and the position of the sun as it moved throughout the day. These non-human and celestial bodies also affect user experience and become key factors in rhetorically affective design.

Bodystorming challenged students to consider the sensory experiences of emplaced communication designs—the sights, sounds, smells, and physical interactions of the Prairie. The embodied experience highlighted how digital technologies could compliment the environment or purposefully disrupt the scenes and sounds of nature. Prioritizing the embodied experience of following a map also challenged designers to account for the limitations of digital design. While walking through a nature preserve, people might not have access to data services or want to listen to long videos. As a result, each EcoTour point of interest limits content to simple images, audio clips, and short videos that are two minutes or less. In addition, the augmented locations consider how the surrounding environment might affect users as well as communication. Points of interest are spaced out along the La Chua trail and located under pavilions, along covered walkways, and under shade trees to ensure that viewers can physically see the augmented reality content and are sheltered from any sun or rain. To understand how the movement of human and non-human bodies shaped Paynes Prairie State Park students needed to walk the trails, document signage, and experience the layout of the area firsthand.

## Local

To go deeper than simple topography, students needed to analyze local action and community discourse. In technical communication, localization is the process of adapting media or technology to a specific place and culture. Localization pays attention to how people think, feel, and act so that designers can create rhetorically effective media that easily integrates within an area and moves users to action. However, a deep mapping, decolonial approach to localization should consider not only contemporary culture or dominant viewpoints but seek out perspectives that have been obscured by settler-colonialism and modern structures of power. To create a deep map of the Alachua area, we had to understand the local community through a sense of deep time.

What we consider “local” changes as places change. Before Paynes Prairie became a state park in 1972, the Alachua area hosted riverboats, rail lines, Spanish cattle ranchers, British occupiers, enslaved people, French buccaneers, and the Seminole, Creek, Potano, and Timucua people. The Alachua savannah frequently served as grazing land, but also flooded enough to create a lake deep enough for steamboats. In the 1920s and 30s, canal systems cut through the Alachua Savannah and rerouted water coming into the Prairie Basin and the Alachua Sink. Construction of US Route 441 and later I-75 divided sections of the land and further altered the ecological balance. Subsequent urbanization in the nearby city of Gainesville increased water pollution and sewage runoff. Non-native species such as Chinese tallow and wild taro threaten to choke out Indigenous marsh plants while growing colonies of feral cats encroach upon endangered bird habitats. Additionally, hundreds of years of wood treatments and illegal dumping at the Cabot/Koppers superfund site leached creosote, chromated copper arsenate and other harmful toxins into the soil, contaminating the Floridan Aquifer, the source of 90% of Florida’s drinking water and the source of much of the prairie’s water flow. Even today, overpumping of the Floridan Aquifer by bottled water companies and corporate farming interests has placed additional strain on these connected ecosystems.

However, current signs within the park barely mention the historic cultures or human development that shaped the land. Using a deep mapping approach to localization, students investigated the multiplicity of cultures connected to Paynes Prairie—from the Timucua people to the current tourists. Working with local archives, preservation groups, and oral history initiatives, students researched the hidden histories of the park and created digital overlays to illustrate the cultural and ecological diversity of the area. Through their research, students were able to identify numerous points of erasure and analyze the social forces that altered the area—tracing a history of slow violence (Figure 8).



**Figure 8: AR Overlay of Holata Micco, also known as Bolek or Chief Billy Bowlegs, was a son of Ahaya “Cowkeeper,” and fought to preserve Indigenous lands in the Seminole Wars. Paynes Prairie is named after his older brother, King Payne. [4] Students chose to create an overlay with the “Authorized Personnel Only” sign to emphasize “authorized” structures of removal.**

A deep mapping approach to localization reminds users that information is not merely data, but discourse connected to specific communities. To ensure a respectful localization process, students needed to engage in what Kimberly Christine calls “collaborative curation,” a relational process that works with local stakeholders to decide how best to present information. Collaborating with locals helped students step outside their roles as designers and consider how technologies position users, bringing attention back to the relationships and living practices that continually shape how people participate in environmental communication and develop ecological literacies. Mindful not to reiterate colonial practices, our deep mapping approach advocates for many ways of making and communicating knowledge, drawing from Indigenous and Western practices. A decolonial ethic emphasizes the collaborative work of knowledge-making that structures how we communicate ecological ideas, especially environmental crisis (Gonzales, 2018; Clary-Lemon, 2019). Building on this approach, our process of localization pulled together diverse perspectives and scholarship to present the multiplicity of Paynes Prairie.

Localization also pays attention to how specific communities produce and share knowledge (Sun, 2006; Gonzales & Zantger, 2015). For early Indigenous peoples, the stories of place and culture were often orally passed down. However, like many national and state parks across the country, Indigenous people have not lived on Paynes Prairie for some time. As settlers moved into the area, the local Timucua, Creek, and (Oconee) Seminole people were driven out—either through the Seminole Wars or by official “Indian Removal” efforts and missionization. To document the movement and erasure of people groups, students worked with a variety of sources including tax documents, archival reports, oral histories from the Samuel Proctor Oral History Program, and contacts from the Seminole Nation. How to share and what to share became ethical considerations that shaped student designs. For example, part of the hidden history of Paynes Prairie includes an unmarked slave graveyard, unearthed by University of Florida professor Ntozake Shangé. To honor the sanctity of the space, EcoTour does not identify the specific coordinates of the graveyard, but instead includes a point of interest that amplifies the all too quiet history of slavery in the area. By paying attention to the diverse history of local culture, communicators were able to respectfully put into place some of the stories of Indigenous peoples, marginalized cultures, and oppressed groups, and in turn highlight some of the structural forces of slow violence that so often remain invisible.

The process of localization reoriented the designers as well, repositioning them as part of the local action of Paynes Prairie. Students were not just researchers working to communicate or developers looking to build a product, but design advocates rewriting public spaces to create more accessible, equitable platforms for environmental communication. As students designed content, they practiced user localization strategies and drew on their own experience as local residents to adapt information and connect with their audience. The lived experience of designing on location, collaborating with locals, and reflecting on their own positions helped students craft rhetorically engaging, respectful content that communicates the diversity of the area, articulating multiple stories while also drawing attention to whose stories get told.

### Layered

Layered communication designs emphasize the ecology of communication, highlighting how environments, information,





**Figure 9: EcoTour app instructs users how to position their phone camera to trigger the AR overlay**

tools, and users work together to create meaning. Layered design approaches organize information in ways that illustrate the multiplicity of places, shaping new, innovative designs that deviate from linear organization, rewrite public spaces, and engage users with the surrounding environment. Instead of a one-dimensional map, AR enables designers to create multiple augmentation points that directly connect users to the surrounding environment, initiating more rhetorically engaging communication experiences (Figure 9).

AR is an inherently layered technology, which allows designers to draw upon place-based strategies to organize information. AR layers information on site, creating experiences that directly connect users to the land and to a multiplicity of perspectives and ways of inhabiting that space. These features allow for a more ecological (as opposed to linear) experience with the digital tour, both in design and participation. By emphasizing these relational rhetorics on-location, communicators can illustrate connections over time, linking disparate problems like the slow violence of settler-colonialism to contemporary issues of water quality in central Florida. Localization helped students discover stories to connect data and discourse, but layered communication practices help them design media to illustrate those connections. These layers help to bring the slow violence of colonial ecocide to the surface, to make these problems visible through an experiential counter-narrative. EcoTour presents a counter-story map that resists cartesian approaches to mapping relations, allowing for an affective approach to communication design which activates users as part of the experience.

A layered approach to communication design resists cartesian mapping structures or top-down topologies, but instead works on the ground to foster decolonial methods that promote pluralism. As

students worked to design points of interest, they considered how each physical location and digital overlay would work together to communicate meaning. For example, along the raised boardwalk, several informative signs educate visitors on the unique wetland ecology of Paynes Prairie. Walking viewers through the seasonal water cycle as well as the native plants and animals, each sign communicates general details about the site. Employing a layered design approach, students crafted digital overlays that interact with each sign and link changes in the local ecology to historic damage done over time. Overlays detail how settlers relocated Indigenous people groups, canal systems disrupted the natural hydrology, roads and fences altered animal movements, and how excess sewage and fertilizer runoff have created algae growths that threaten to choke out marsh life below the surface. The digital layers present multiple viewpoints and offer information that counters the reductive signage on site, connecting the history of slow violence to modern environmental issues.

Mobile writing technologies not only write on a space, creating new layers of meaning, they can also articulate existing relationships in situ by communicating specific events, experiences, and affects working within an environment. By ‘environment’ we mean more than a static situation or site, but a dynamic understanding of place, what Nedra Reynolds (2004) defines as “made up of affective encounters, experiences, and moods that cohere around material spaces” (p. 147). The experience of a space is not static or uniform, but layer upon layer of affective encounters, experiences, and moods that constantly change as “active, historical, and lived processes” (Phelps, 1988). AR technologies visualize the multiplicity of environments by weaving in layers that add to or articulate the rhetorical structures already present. Mobile devices act as a medium that can reveal the relationships already at work within a specific location. According to Reynolds, “places evoke

powerful human emotions because they become layered, like sediment or a palimpsest, with histories and stories and memories” (p. 2). How we define a place depends on how we access and experience the layers of meaning. Augmented reality technologies help articulate a sense of place by identifying hidden layers and making them apparent to the public. As a result, augmented reality communication designs can weave together layers of science and story to evoke powerful human emotions and create meaningful interactions with environmental data.

## Portable

EcoTour lays the groundwork for using AR as a novel approach for communication design in the classroom, but also demonstrates the potential for location-based media to be a portable research tool for practitioners to localize large-scale issues of social and environmental justice like climate change. In their introduction to the special issue on “Durable and Portable Research in Technical and Scientific Communication,” Kirk St. Amant and Scott Graham (2019) describe portable research as a set of knowledge practices which are able to cross disciplinary fields and “spheres of resonance” (p. 107). Portable research, or “research that resonates,” engages public audiences by communicating that the research is important or has value. The larger the resonance, the greater the value. EcoTour communicates the value of local environmental issues, but also resonates beyond the space of Paynes Prairie, connecting a large and diverse audience to the complexity of social justice issues by balancing scientific rigor, historical accuracy, and cultural expertise.

St. Amant and Graham argue (based on Latour, 1987) that one of the key elements of portability is durability (p. 102). That is, durable research has been subjected to rigorous methods, tests, and trials. When research has been carefully vetted and tested, it has a stronger ethos and reliability. Building upon their work, Cathryn Molloy (2019) demonstrates how interdisciplinary partners (such as advocacy groups) also play a role in contributing to both durability and portability of research. EcoTour promotes the portability of environmental communication through coalition-building across communities. Working with non-profits, park officials, scientists, the University of Florida, local people groups, and other stakeholders, EcoTour created an experiential learning project where students worked across the disciplines and discourse communities to engage in scientific, historical, sociological, geographical, and cultural research.

In our classes, we discussed the ways that building from durable research supported our project’s portability. For example, through user testing and simple community surveys students were able to refine points of interest and create intersectional work that connected locals to larger conversations about climate change, racial justice, and data collection practices. These strategies worked to make large-scale issues like climate change visible, durable, and portable within the local community. As such, this project demonstrates how mobile media can contribute to making knowledge portable across a wide range of contexts and fields. AR provides a platform to make climate change (and other complex social justice issues) portable by localizing large-scale data.

Beyond our classrooms and our case study, this project demonstrates how deep mapping can be implemented as part of broader coalitional efforts to engage local communities in public-interest communication design. Locative media offer ways to make communication more portable by creating spaces for active

user experiences, which engage communities as part of the media ecology. While it is beyond the scope of this article to offer a full treatment of how this study might contribute to the practice of communication design more broadly, it raises important questions of community engagement in designing user journeys and experiences. Deep mapping offers one strategy to expand, and even to decolonize, our communication design practices. Through practices like bodystorming, localization, and engaging with white space, it became clear that we needed to dehomogenize the ways we map and wayfind within Paynes Prairie, our communities, and in our larger practice as communication designers.

## CONCLUSION

In working together to build EcoTour, we explored how environmental communicators can draw upon the rhetorical elements of place to better confront the complexity of climate change and illustrate the slow violence of environmental destruction. Our deep mapping approach reframed the design process as active, lived, and on location by linking archival and scientific data to local stories and environments. Building the tour was labor-intensive, requiring four lead designers and a small army of up to 60 students collecting data and producing content. The project would have been impossible without the funding and support of a small community grant to provide tablets and a camera to make the project. In addition, Paynes Prairie State Park officials were excited about our work and eager to see the new educational possibilities AR created in the park space. Even with this enormous amount of support, the project met with many limitations and constraints, from technical issues like data usage and physical limitations in space, to larger questions of efficacy which could only be answered through large-scale user testing beyond the scope of our case study and our funding. Beyond these limitations, we found that EcoTour was an incredible opportunity to extend students’ multimodal design work to a public-facing platform which connected them to the community and to the place itself. Doing so not only encourages students to see themselves as producers, and not just consumers, of emerging digital media experiences, but offers them a potential avenue for exploring AR’s potential as a place-based writing technology. In future projects, we will build on these lessons as we continue to create digital storytelling projects which engage students in experiential learning while connecting their work to the communities to effect positive change.

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## ENDNOTES

1. This phenomenon is referred to as the “problem of scale” by science and technology studies scholars (Zylinska, 2014; Clark,

2015; Latour, 2018) and has recently garnered interest from rhetoricians interested in STS (Pilsh, 2017; Mueller, 2017; Jones, 2019). Large scale problems appear on the one hand too vast for individuals to solve and on the other hand are made up of minute and mundane decisions. This leads to “scalar derangement,” where individuals feel powerless to confront large-scale problems at the local level.

2. The unabridged title is *Travels Through North & South Carolina, Georgia, East & West Florida, the Cherokee Country, the Extensive Territories of the Muscogulges, or Creek Confederacy, and the Country of the Chactaws; Containing An Account of the Soil and Natural Productions of Those Regions, Together with Observations on the Manners of the Indians* (1791).

3. For example, his description of a nearby Salt Springs made its way into Coleridge’s famous poem “Kubla Khan.” *Travels* also helped to initiate an American tradition of nature and environmental writers which includes H.D. Thoreau, Aldo Leopold, and Edward Abbey (Adams, 1994). Gregory Ulmer draws upon these connections in his work combining psychogeography, place-based writing practices, and digital rhetoric (Ulmer, 2008). While it is beyond the scope of this essay to unpack the connections between these practices, Madison Jones (2018) discusses how places like Paynes Prairie served as a “complex premise for Ulmer, which he connects to Bartram’s ecological understanding of the world and how this sense of place became a commonplace for Coleridge in the formation of Romantic sensibility.” Thus, the overlapping conceptual histories of travel writing, psychogeography, and cultural geography are both a rich part of deep mapping traditions and implicated in the histories of Paynes Prairie itself.

4. As the oldest son of Ahaya, Payne was his successor as chief of the Alachua Oconee Seminoles. Both brothers, Payne and Holata, were raised to become tribal leaders. Payne was killed in the border warfare between frontier settlements and the Seminole tribe in 1812 as part of early border conflicts that would lead to the Creek War of 1813–14. Today the place name “Payne” is one of few remnants of the tribe’s presence in the state park. The name “Paynes Prairie” demonstrates the complexity of naming as an appropriation tool and speaks to the recovery work that can expose the tensions between removal and erasure, and support the work of Indigenous survivance and sovereignty.

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