

VALUING THE INVALUABLE:
PIQUANT GEORGIA LOW-COUNTRY MARSH ECOSYSTEM SERVICES

by

Alyssa A. Wood

A Thesis Submitted to the Faculty of
The Charles E. Schmidt College of Science
In Partial Fulfillment of the Requirements for the Degree of
Master of Science

Florida Atlantic University

Boca Raton, FL

December 2017

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This thesis was prepared under the direction of the candidate's thesis advisor, Dr. Colin Polsky, Department of Geosciences, and has been approved by the members of her supervisory committee. It was submitted to the faculty of the Charles E. Schmidt College of Science and was accepted in partial fulfillment of the requirements for the degree of Master of Science.

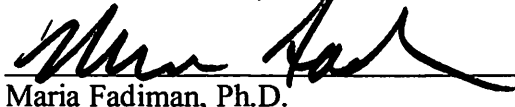
SUPERVISORY COMMITTEE:



Colin Polsky, Ph.D.
Thesis Advisor



William E. O'Brien, Ph.D.



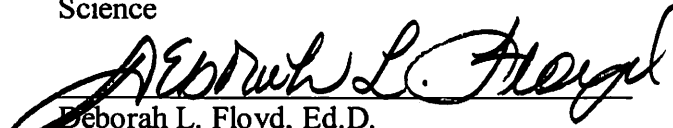
Maria Fadiman, Ph.D.



Zhixiao Xie, Ph.D.
Chair, Department of Geosciences



Ata Sarajedini, Ph.D.
Dean, Charles E. Schmidt College of
Science



Deborah L. Floyd, Ed.D.
Dean, Graduate College

November 22, 2017
Date

ACKNOWLEDGEMENTS

This research would not have been possible without my Coastal SEES teammates: Dr. Colin Polsky, Vince Edwards, Kimberly Vardeman, Jeanie Buck, Hallee Meltzer, Dr. Merryl Alber, and Dr. Rob Johnston. Special thanks to my committee members, Dr. Maria Fadiman and Dr. William O'Brien. I must also extend a heartfelt thank you for the support and patience from my partner Richard Jones and my family.

ABSTRACT

Author: Alyssa A. Wood
Title: Valuing the Invaluable: Piquant Georgia Low-Country Marsh Ecosystem Services
Institution: Florida Atlantic University
Thesis Advisor: Dr. Colin Polsky
Degree: Master of Science
Year: 2017

Coastal ecosystems, such as the salt marsh of the Georgia coast, have long been valued for decision-making purposes based on market-values of goods and services including: fishery landings, hedonic pricing of waterfront homes, and tourism dollars. These values do not show the full picture of services provided by these ecosystems. Using focus group discussions and key informant interviews I investigate socio-cultural values and benefits provided by salt marsh ecosystems in central coastal Georgia. Participants noted that through their experiences in marshes they developed a desire to be stewards. This desire, coupled with the industrial pollution, residential development, and sea-level rise threats in the area result in a need for cooperative conservation and thus better enforcement of existing regulations. This relational value persisted across geographic locations and sample populations. My results show the importance of utilizing diverse members of community to elicit qualitative value statements.

DEDICATION

This thesis is dedicated to the people of my study area, their ancestors, and the marsh itself.

VALUING THE INVALUABLE:

PIQUANT GEORGIA LOW-COUNTRY MARSH ECOSYSTEM SERVICES

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INTRODUCTION

Marsh ecosystems are among the most productive and threatened ecosystems on Earth (Finlayson et al., 2005). Georgia's coastal marshes account for nearly one-third of the marshes along the US eastern seaboard (Hollibaugh, 2010). A Washington based group, Scenic America, has listed Georgia's hammock system (situated within salt marshes and tidal creeks) as one of the US's most endangered landscapes (Scenic America, 2001). Based on the Intergovernmental Panel on Climate Change's (IPCC) 2007 Special Report on Emissions Scenarios' sea-level rise projections, the extent of tidal salt marshes on the Central Georgia coast may decline between 20% and 45% by 2100 (Craft et al., 2009). Urban development, land use conversion, pollution, alterations to the natural hydrogeological flow, and sea-level rise all threaten the ability of coastal marshes to provide valuable ecosystem services, both instrumentally and intrinsically, to their related human communities (Seabrook, 2012).

The communities along the central Georgia coast depend on these marshes to support industry, wildlife, and cultural traditions. The marshes have provided a source of cultural identity for this area since at least the colonial era, serving as the subject of a famous poem, "The Marshes of Glynn" by Sidney Lanier. In 2012 nearly 15 million people visited the Georgia coast, contributing over \$2 billion to the region's economy through the tourism industry (Georgia Conservancy, 2016). The marshes provide a nursery for the robust local fisheries industry on the coast of Georgia and the Southeast US. King & Prince Seafood Corp. is the second largest employer in Glynn County, the

export fishery for “jelly balls” (*Stomolophus melearis*) in Darien is the third largest commercial fishery (by weight) in the state of Georgia (Graitcer, 2012), and the shrimp fishery in the area with reaps well over \$20 million per year despite “black gill¹” disease (Seabrook, 2012). The marshes of the Georgia coast are vital for all its residents—human and otherwise. They are both the inspiration for literature and the fishery stocks are ecosystem services provided by these Georgia marshes.

As marsh ecosystems worldwide are in decline, it is vitally important to collect data regarding their role in a coupled socio-ecological system. The findings presented in this thesis represent a piece of the research conducted within a larger, multi-institution, and interdisciplinary project, “Coastal Sustainability: A Cross-Site Comparison of Salt Marsh Persistence in Response to Sea-Level Rise and Feedbacks from Social Adaptations”. This research is funded by the National Science Foundation’s Long Term Ecological Research (LTER) Network and “Coastal SEES” programs. The LTER Network has been gathering ecological and biophysical data since 1980. The goal of LTER research is to examine and understand ecosystem processes over long periods. Specifically, the research presented here focuses on the Georgia Coastal Ecosystem (GCE) LTER site and its surrounding communities.

The focus of this study is to examine how people in the Central Georgia Coast (Glynn and McIntosh Counties) perceive and value their marshlands and the ecosystem services (ES) the marshes provide. I explore qualitative data measuring ES value, assessed through focus group discussions. This work contributes to the literature by suggesting a new and transparent method which can be used as a compliment to existing

¹ Black gill disease is an illness in shrimp which presents itself as black spots on their gills. Black gill disease is caused by a single-celled parasite, “ciliate”. This disease impacts the shrimp and is harmless to humans.

ES valuation methods. In this study, this new method is applied to an ecosystem and regional area to which cultural ES valuation has not occurred. As a part of developing this new method I compare public perceptions to perceptions held by decision-makers and thought-leaders through the use of key informant interviews. Furthermore, I compare the results of this study's two data collection methods (focus group discussions and key informant interviews) with results of a similar study done by Kaplowitz & Hoehn (2001). Lastly, I compare differences in perceptions of ecosystem values between Glynn and McIntosh Counties and their respective demographic, social, and institutional conditions which may act as drivers for these differences. Together each portion of this study produces its own nuance of how my study sample values ES. Collecting and presenting this data can have real-world applications when it comes to land use/conversion decisions and enhancing the adaptive capacity of this community and its marsh.

The following section introduces relevant literature and existing gaps in research regarding ES. I then discuss my data collection methods, which includes sampling, recruitment, and details into utilizing focus group discussions in this context. Also in Methods, I describe the project's study area, methods of data analysis and collection, and validation of the data. Finally, I display and discuss the project's results and suggest further research based on the direction the results suggest in the discussion.

LITERATURE REVIEW

In this section, I lay out the history of ES as a concept, and how my research is situated within this concept. First, I will define ES. Next, I describe the ways in which ES have been organized and classified such as into schemas and use versus non-use ES. I then describe the ways ES are currently valued: revealed and stated preference. Also in this section, I describe that these two methods may obscure or omit important ES of value, leading into the socio-cultural valuation of ES and relational values. Next, I describe and define the three ES the questioning instrument was designed to explore. Lastly, I present my research questions.

Ecosystem Services

ES, according to the Millennium Ecosystem Assessment are “the benefits people obtain from ecosystems” (Millennium Ecosystem Assessment, 2005, p. v). It was first introduced by name in the scholarly literature in 1981 by Mooney & Erlich (Mooney & Ehrlich, 1997). This anthropocentric mindset of human benefits from nature, however, had been described for more than two hundred years in famous works such as Peter Kalm’s *Travels to North America* (1753), George Perkins Marsh’s *Man and Nature* (1865), and Aldo Leopold’s *Sand County Almanac* (1949) (Chaudhary, McGregor, Houston, & Chettri, 2015; Newman & Payne, 2005). Since its emergence in the literature, the concept has been studied extensively by ecologists, critical theorists, philosophers, ecological economists, and sociologists alike. Between 2005 and 2009, 5,025 peer reviewed articles were written specifically on ES (Chaudhary et al., 2015). This concept

gained so much traction that in 2015 President Obama issued a memorandum “directing all Federal agencies to incorporate the value of [...] ecosystem services into Federal planning and decision making” (Zaidi, Dickinson, & Male, 2015,p. 1).

Table 1. ECOSYSTEM SERVICES PROVIDED BY OR DERIVED FROM WETLANDS

Services	Comments and Examples
Provisioning	
Food	production of fish, wild game, fruits, and grains
Fresh water*	storage and retention of water for domestic, industrial, and agricultural use
Fiber and fuel	production of logs, fuelwood, peat, fodder
Biochemical	extraction of medicines and other materials from biota
Genetic materials	genes for resistance to plant pathogens, ornamental species, and so on
Regulating	
Climate regulation	source of and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climatic processes
Water regulation (hydrological flows)	groundwater recharge/discharge
Water purification and waste treatment	retention, recovery, and removal of excess nutrients and other pollutants
Erosion regulation	retention of soils and sediments
Natural hazard regulation	flood control, storm protection
Pollination	habitat for pollinators
Cultural	
Spiritual and inspirational	source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
Recreational	opportunities for recreational activities
Aesthetic	many people find beauty or aesthetic value in aspects of wetland ecosystems
Educational	opportunities for formal and informal education and training
Supporting	
Soil formation	sediment retention and accumulation of organic matter
Nutrient cycling	storage, recycling, processing, and acquisition of nutrients

* While fresh water was treated as a provisioning service within the MA, it is also regarded as a regulating service by various sectors.

Figure 1. Ecosystem Services Provided by or Derived from Wetlands (MEA, 2005)

Table 1 Ecosystem services and functions used in this study			
Number	Ecosystem service*	Ecosystem functions	Examples
1	Gas regulation	Regulation of atmospheric chemical composition.	CO ₂ /O ₂ balance, O ₃ for UVB protection, and SO _x levels.
2	Climate regulation	Regulation of global temperature, precipitation, and other biologically mediated climatic processes at global or local levels.	Greenhouse gas regulation, DMS production affecting cloud formation.
3	Disturbance regulation	Capacitance, damping and integrity of ecosystem response to environmental fluctuations.	Storm protection, flood control, drought recovery and other aspects of habitat response to environmental variability mainly controlled by vegetation structure.
4	Water regulation	Regulation of hydrological flows.	Provisioning of water for agricultural (such as irrigation) or industrial (such as milling) processes or transportation.
5	Water supply	Storage and retention of water.	Provisioning of water by watersheds, reservoirs and aquifers.
6	Erosion control and sediment retention	Retention of soil within an ecosystem.	Prevention of loss of soil by wind, runoff, or other removal processes, storage of silt in lakes and wetlands.
7	Soil formation	Soil formation processes.	Weathering of rock and the accumulation of organic material.
8	Nutrient cycling	Storage, internal cycling, processing and acquisition of nutrients.	Nitrogen fixation, N, P and other elemental or nutrient cycles.
9	Waste treatment	Recovery of mobile nutrients and removal or breakdown of excess or xenic nutrients and compounds.	Waste treatment, pollution control, detoxification.
10	Pollination	Movement of floral gametes.	Provisioning of pollinators for the reproduction of plant populations.
11	Biological control	Trophic-dynamic regulations of populations.	Keystone predator control of prey species, reduction of herbivory by top predators.
12	Refugia	Habitat for resident and transient populations.	Nurseries, habitat for migratory species, regional habitats for locally harvested species, or overwintering grounds.
13	Food production	That portion of gross primary production extractable as food.	Production of fish, game, crops, nuts, fruits by hunting, gathering, subsistence farming or fishing.
14	Raw materials	That portion of gross primary production extractable as raw materials.	The production of lumber, fuel or fodder.
15	Genetic resources	Sources of unique biological materials and products.	Medicine, products for materials science, genes for resistance to plant pathogens and crop pests, ornamental species (pets and horticultural varieties of plants).
16	Recreation	Providing opportunities for recreational activities.	Eco-tourism, sport fishing, and other outdoor recreational activities.
17	Cultural	Providing opportunities for non-commercial uses.	Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems.

*We include ecosystem 'goods' along with ecosystem services.

Table 1. Costanza et al.'s Typology. Reprinted by permission from Macmillan Publishers Ltd: Nature (Costanza et al., 1998)

Organizations such as The Economics of Ecosystems & Biodiversity (TEEB) have introduced a typology similar to the MEA's, only differing in the inclusion of "habitat" with supporting services (Sukhdev et al., n.d.). The Common International Classification of Ecosystem Services (Haines-Young & Potschin, 2011) differs slightly from the MEA as well with its three-part classification which includes: provisioning, regulating & maintenance, and cultural values. While the MEA typology is generally

accepted and utilized by scholars, the classification done by the general public may be entirely different than the above typologies.

Use and non-use ES

In addition to the multi-part grouping of ES typologies, ES can also be divided into use and non-use values. Use values are further differentiated between direct use and indirect use (Barbier, 2012). Direct use values “consist of both consumptive and non-consumptive uses that involve some direct physical interaction with the ecosystem and its services,” while indirect uses are “derived mainly from the support and protection of economic activities and livelihoods that have directly measurable values” (Barbier, 2012, p. 3). Non-use values are a more elusive concept, but include existence and bequest values, both of which are nestled within the Cultural ES aspect of classification schemas (Barbier, 2012).

Market and non-market values

Use and non-use ES can be linked to existing market values or not, depending on the method and data available. While market ES are straightforward to measure and value, the valuation of non-market ES proves to be both controversial and difficult (Robertson, 2000). In fact, most of the ES literature has marginalized the concept of non-market, non-use and “Cultural” ES (Chan, Guerry, et al., 2012). Costanza et al. (1998) was able to put a dollar amount on worldwide ES, and yet the ethics and methods of valuing non-market ES is still up for debate (Chan, Guerry, et al., 2012; Milcu, Hanspach, Abson, & Fischer, 2013; Robertson, 2000; Schröter et al., 2014).

Final and intermediate ES

ES valuation, as a subjective topic, is surrounded by differing typologies which can and have altered and impacted econometric valuations of ES (Johnston & Russell, 2011). Johnston & Russell (2011) suggest a conceptual model to determine whether an ES is “final” or “intermediate” in order to avoid double counting. In this conceptual model a single ES can be viewed as either final or intermediate depending on the ultimate goal or wish of the person valuing the ES. Their definitions are as follows: “...final ecosystem services are biophysical outcomes which directly enhance the welfare of at least one human beneficiary” and “[i]ntermediate services, in contrast, are those conditions or processes that only benefit humans through effects of other, final services” (Johnston & Russell, 2011, p. 2244). In order to be deemed a “final” ES, that service must be valued by at least one human beneficiary, be valued prior to human input in terms of “labor capital, or technology”, provide a direct benefit to a human beneficiary which that beneficiary would be willing to pay to increase the benefit, and *can* potentially encompass intermediate ecosystem services (Johnston & Russell, 2011). Johnston & Russell (2011) use the example to clean water as an ES to exhibit how this is a final service to a waterfront homeowner (for aesthetic and health purposes) and an intermediate service to a fisherman who depends on clean water for a safe and ample catch.

Valuing Ecosystem Services

The concept of ES has been utilized to provide a monetary “value” of ecosystems on a local or global scale (Costanza et al., 1998). The MEA associates three value-domains with ES: the ecological, economic, and socio-cultural (Millennium Ecosystem

Assessment, 2005). ES valuation is important because it “can be used to derive a common measure to compare outcomes of land-use decisions” (Schröter et al., 2014, p. 519). This valuation makes ES a “boundary object” (Star & Griesemer, 1989) or a tool which “allow[s] conservation’s message to reach a wider set of audiences” (Boyd, 2011, p. 178). Essentially, while narrative, artistic, and other forms of expression attribute value to an ecosystem and its ES, quantitative assessments are a straightforward and simple way for decision-makers to conceptualize a place or a problem.

Revealed and stated preference

Existing approaches to attribute value to ES include *revealed preference* and *stated preference* methods (Defra, 2007). Revealed preference “methods rely on data regarding individuals’ preferences for a marketable good which includes environmental attributes” (Defra, 2007, p. 33). Examples of this approach include hedonic pricing and travel cost method. An example of travel cost method would be calculating the average distance people drive to get to a particular location, say a state park, and also denoting zones from which people come from different distances. This approach allows economists to determine how willing people are to travel to this state park, and thus its ES value.

Stated preference methods are hypothetical and an appropriate way to ascribe monetary value to cultural ES and non-market ES values, given that often there is no market price associated with these ESs. Stated preference methods gather data regarding people’s opinions and projections of what they imagine they would be willing to pay (WTP) to keep an ES or how much money they would be willing to accept to endanger or

destroy said ES (Defra, 2007). Methods within this approach include *contingent valuation*/ WTP options.

There are many ways to elicit WTP. The main methods utilized include: open-ended questions, an incentive-compatible open ended question, a payment card, closed ended questions, and iterated closed-ended questions (Horowitz & McConnell, 2002). Open-ended questions can refer to asking bluntly, “how much would you be willing to pay” to obtain a certain service. Incentive-compatible open-ended questions refer to methods such as a Vickrey auction, where participants bid on the good and the value is determined through the second highest bid. Payment cards introduce the value of real money in the decision-making process, and thus are the only non-hypothetical method for attributing value to a participant’s WTP for a certain service. Lastly, a closed-ended question is often a “yes” or “no” option for predetermined values for a service. Often times the closed-ended question can also be presented in the form of a choice experiment, where a small number of scenarios and associated prices are presented to the participant. Figure 2 provides an example of a choice experiment survey (Johnston et al., 2013). With all of these methods, it is a best practice to test these elicitation methods in focus groups prior to issuing them for valuation (Johnston, 1995).

Question 5. Projects A and B are possible restoration projects for the Pawtuxet River, and the **Current Situation** is the status quo with no restoration. Given a choice between the three, how would you vote?








Effect of Restoration	Current Situation (no restoration)	Restoration Project A	Restoration Project B
 Fish Habitat	0% 0 of 4347 river acres accessible to fish	5% 225 of 4347 river acres accessible to fish	20% 900 of 4347 river acres accessible to fish
 Population Survival Score	0% Chance of 50-year survival	30% Chance of 50-year survival	30% Chance of 50-year survival
 Catchable Fish Abundance	80% 116 fish/hour found out of 145 possible	70% 102 fish/hour found out of 145 possible	70% 102 fish/hour found out of 145 possible
 Fish-Dependent Wildlife	55% 20 of 36 species native to RI are common	80% 28 of 36 species native to RI are common	60% 22 of 36 species native to RI are common
 Aquatic Ecological Condition Score	65% Natural condition out of 100% maximum	70% Natural condition out of 100% maximum	80% Natural condition out of 100% maximum
 Public Access	Public CANNOT walk and fish in area	Public CANNOT walk and fish in area	Public CAN walk and fish in area
 Cost to your Household per Year	\$0 Increase in Annual Taxes and Fees	\$15 Increase in Annual Taxes and Fees	\$25 Increase in Annual Taxes and Fees
HOW WOULD YOU VOTE? (CHOOSE ONE ONLY)	<input type="checkbox"/> I vote for NO RESTORATION	<input type="checkbox"/> I vote for PROJECT A	<input type="checkbox"/> I vote for PROJECT B

Figure 2. Discrete Choice Survey Example. (Johnston, Schultz, Segerson, Besedin, & Ramachandran, 2013)

The data from these methods are then entered into an econometric model which calculates a general/public WTP, or value, from the individuals' stated preferences and values for said service. Stated preference is incredibly important for the valuation of non-market ES, as it provides a value for services which can often feel priceless or invaluable. However, these values are typically gathered on an individual basis, instead of gathering public opinion through group settings. Wilson & Howarth (2002) argue that the public nature of ES should call for public deliberative valuation in order to ensure that social equity and normative expectations are included in the valuation exercise.

Many environmental economists criticize contingent valuation methods for providing hypothetical outcomes and values versus what people would actually pay to

protect or preserve an ecosystem. A common critique is that studies often find a discrepancy between WTP and willingness to accept, when in theory they should be the same value (Hausman, 2017). A person's income, hypothetical bias, and habits of overstatement can further obscure value to participants (Hausman, 2017; Spash et al., 2009). Also, a full rendering of a person's valuation of a space or ecosystem sought through pre-determined categories is bound to miss some nuances and hard-to-describe feelings. Issues in replication of certain contingent valuation studies are ever-present. More often than not, the value ascribed to a service through contingent valuation varies when tested with another group, at a different time or with any changes. This is, however, due to not properly testing the elicitation methods prior to WTP exercises (Johnston, 1995).

Many environmental philosophers, ecologists, and sociologists criticize monetizing nature in general (Robertson, 2000). Trying to squeeze a complex valuation system into "objective" numbers is problematic for many (Robertson, 2000; Satterfield, Gregory, Klain, Roberts, & Chan, 2013; Silvertown, 2015). Robertson (2000) notes a long history critical theorists opposing the "inscription of capital upon the landscape." Sandel (2012) argues that the monetization of many intrinsically valued goods has caused the degradation of those objects' values by equating complex concepts with easily defined commodities (Sandel, 2012; Silvertown, 2015). Sandel (2012) asserts that reducing goods and services to a commodified value is a moral issue and not a logistical one. Philosopher Krieger notes: "[t]he ecology movement seeks to have man's environment valued in and of itself and thereby prevent its being traded off for the other benefits it offers to man" (Krieger, 1973). Under these perspectives, once an ES has been

reduced to a monetary value, the other aspects of value are no longer utilized in decision-making. It is only through ensuring that ES are valued beyond or outside of market or commodified value that they can be considered for their full value in decision-making.

In a wetland-specific example, Robertson (2000) cites the “No Net Loss” policy on wetland conservation and mitigation as a failing under the commodification of nature. Under this policy, native, functional and long-standing wetlands are equated with the same value as constructed, subpar wetlands (Robertson, 2000). Under this policy, cultural ES including intrinsic and existence values, are not considered within the value of the wetland because the wetland’s value is so squarely situated within commodified services. This incomplete valuation of wetlands has led to a long-standing policy which is administered under incomplete and inaccurate pretenses.

While *contingent valuation and WTP* methods do utilize public input in the crafting and testing of questionnaires, many scholars suggest that more public input is necessary (Johnston, 1995; Karrasch, Klenke, & Woltjer, 2014; Wilson & Howarth, 2002). In response to these calls to action, new participatory approaches have emerged in ES valuation methods. These participatory approaches “tend to explore how opinions are formed or preferences expressed in units other than money” (Defra, 2007, p. 63). These methods are particularly important when examining cultural ES values to a given community. A subjective narrative explanation of ES is absolutely necessary to compliment “objective” market based or model based approaches to ES valuation.

Socio-cultural valuation of ecosystem services

People’s conceptions of nature are socially constructed, and thus it is necessary to include public opinion in ES valuation. Julia B. Corbett notes:

“Landscapes” are the symbolic environments created by human acts of conferring meaning to nature and the environment, of giving the environment definition and form from a particular angle of vision and through a special filter of values and beliefs. Every landscape is a symbolic environment (Corbett, 2006, p. 116).

However, social construction of nature does not “arise out of thin air” and is thus intrinsically connected to a physical location (Stedman, 2003). The concept of cultural ES includes *sense of place*, or “the concept [which] embeds all dimensions of people’s perceptions and interpretations of the environment, such as attachment, identity or symbolic meanings, and has the potential to link social and ecological issues” (Hausmann, Slotow, Burns, & Di Minin, 2016, p. 117). Human geographers have defined “sense of place” differently to include “all the meanings that people assign to places, which define the perceived value of their attributes and appearance” (Hausmann et al., 2016, p. 118; Y.F., 1990). Sense of place is included as an ES in the MEA (2005) and encompasses many of the ES aspects of this research.

Scholte et al. (2015) note that

“from a social constructivist perspective, social factors construct values, rules and perceptions; values assigned by an individual are the result of a social process. Values are, in this case, not only an expression of personal preference and self-interest, but also an expression of what is appropriate given the situation” (p. 71).

These socio-cultural values are place and social-context specific which can be formed through local culture, economies, politics, and life experiences (Scholte, Van Teeffelen, & Verburg, 2015a).

The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) utilizes the concept of “relational values”(Pascual et al., 2017). Within this concept, values “are not present in things but derivative relationships and responsibilities to them” (Chan et al., 2016; Pascual et al., 2017). These values are unique to people and

communities based on their subjective realities, experiences, normative values, and identities. Chan et al. (2016) argue that focusing on either intrinsic or instrumental value of ES “may miss a fundamental basis of concern for nature.” Chan elaborates: “[r]elational values also apply to interactions with nature. Some people’s identities are rooted in long-term care and stewardship” (Chan et al., 2016). By incorporating relational values into a value assessment or analysis one may be able to reconcile how “cultural ecosystem services are both everywhere and nowhere” because those services are inextricably bound with other services and “are valued in the context of desired and actual relationships” (Chan et al., 2016).

The collection of qualitative social and relational data is necessary to adequately and fairly value ES for a specific place (Johnston, 1995; Kaplowitz, & Hoehn, 2001; Karrasch et al., 2014; Wilson & Howarth, 2002). As people conceptualize nature differently across the world and the US, utilizing focus groups as a method of data collection provides hope for characterizing a discourse-based public opinion about ES values. As Scholte et al. state, “Whereas the neoclassical economic interpretation of value focuses on individual utility and rational choice, a socio-cultural interpretation of value required a more holistic approach towards value” (Scholte, Van Teeffelen, & Verburg, 2015, p. 68).

Targeted Ecosystem Services

This research, via the questioning instrument, was designed to examine three types of ES that are not situated squarely within any one ES typology discussed above. The closest these ES of interest come to an established schema is within the MEA’s designation of Cultural ES and Regulating ES. The three services targeted in this Thesis

include: wildlife/habitat ES, cultural ES, and coastal protection ES. In the remainder of this section, I provide existing conceptualizations of these ES as well as distilled definitions that will be utilized throughout this thesis.

Wildlife/habitat ES

These services are comprised of benefits and values human beneficiaries garner through their use or non-use of salt marshes and their associated wildlife. For the purpose of this study wildlife/habitat ES are defined as: the presence, characteristics, and changes in wildlife and habitat. Examples of this ES could include plentiful fish, charismatic megafauna like dolphins or manatees, or a diversity of birds. Intermediate services leading up to this visible biodiversity and less noticeable genetic diversity include sufficient *Spartina* to provide nursery to small fish, water quality, nutrient cycling, and other provisioning or regulating services.

Cultural ES

The MEA defines cultural ES as “the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences” (Millennium Ecosystem Assessment, 2005, p. 40). Others have expanded this definition to include cultural heritage, educational values, ingenuity, perspective, and life teaching (Chan & Ruckelshaus, 2010; Gould & Lincoln, 2017; Milcu et al., 2013). The definition I utilize is: “ecosystem’s contributions to the non-material benefits that arise from human-ecosystem relationships” (Chan, Guerry, et al., 2012). Gould & Lincoln (2017) list existing and accepted Cultural ES within the literature as: recreation, spiritual, aesthetic, artistic, cultural heritage, education, sense of place, intrinsic value, social capital/relations, existence, knowledge systems, cultural

diversity, identity, and bequest. Cultural ES include the concept of intrinsic value. The non-use values of Cultural ES also include “bequest” and “option” values (Defra, 2007). These values exist even if the individual does not set foot in the ecosystem because they value the ecosystem for simply being there. The bequest value is the value of passing on the intrinsic nature of the ecosystem and thus ES to future generations.

Coastal protection ES

Coastal protection ES for the purpose of this study is defined as: concerns regarding flooding and storms, and appreciation of the coastal protection provided by the marsh. Examples of this ES could include the indirect or passive protection against floods offered by marshes.

Emergent themes

This study, via the questioning instrument, is designed to elicit responses regarding the three ES defined and listed above. However, the open-ended nature of the data collection methods allow for other ES to emerge and be discussed.

Research Questions

This research fills a gap in the literature to value the above ES in a holistic manner from actual discursive public input as opposed to isolated individual opinions. The data collected throughout this research adds dimensionality to existing valuation methods.

My overarching research question is: How and why do the communities of the central Georgia coast value their local marshland ecosystem? More specific research questions include:

1. How do the people of my study area value and perceive marshes?

2. How does the public's perception/valuation of marshes compare to that of local decision-makers/thought leaders?
3. Do the focus group discussions and key informant interviews provide different information as reported in Kaplowitz & Hoehn (2001)?
4. How does their perception differ between Glynn (suburban/industrial) and McIntosh (rural) Counties?
5. What does each community value from the marshes most? Why?

METHODS

Background

Salt marshes

Marshes are defined as “wetlands frequently or continually inundated with water, characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions” (US EPA, 2016). Salt marshes are “intertidal grasslands that form in low-energy, wave-protected shorelines along continental margins” (Barbier et al., 2011, p. 178). This research focusses on the salt marshes present along the Central Georgia coast, marked by their *Spartina alterniflora* vegetation. These marshes contain specific ecosystems including high marsh, low marsh, tidal creeks, mudflats, hammocks, and ballast islands. Marshes play a number of important roles in the Georgia and coastal ecosystems worldwide. These roles are shown in Figure 3 (Finlayson et al., 2005).

Table 1. ECOSYSTEM SERVICES PROVIDED BY OR DERIVED FROM WETLANDS	
Services	Comments and Examples
Provisioning	
Food	production of fish, wild game, fruits, and grains
Fresh water ^a	storage and retention of water for domestic, industrial, and agricultural use
Fiber and fuel	production of logs, fuelwood, peat, fodder
Biochemical	extraction of medicines and other materials from biota
Genetic materials	genes for resistance to plant pathogens, ornamental species, and so on
Regulating	
Climate regulation	source of and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climatic processes
Water regulation (hydrological flows)	groundwater recharge/discharge
Water purification and waste treatment	retention, recovery, and removal of excess nutrients and other pollutants
Erosion regulation	retention of soils and sediments
Natural hazard regulation	flood control, storm protection
Pollination	habitat for pollinators
Cultural	
Spiritual and inspirational	source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
Recreational	opportunities for recreational activities
Aesthetic	many people find beauty or aesthetic value in aspects of wetland ecosystems
Educational	opportunities for formal and informal education and training
Supporting	
Soil formation	sediment retention and accumulation of organic matter
Nutrient cycling	storage, recycling, processing, and acquisition of nutrients
^a While fresh water was treated as a provisioning service within the MA, it is also regarded as a regulating service by various sectors.	

Figure 3. (Finlayson et al., 2005)

Georgia’s 100 miles of coastline contains salt marshes which account for nearly one third of salt marshes along the US’s eastern seaboard (Hollibaugh, 2010). The MEA notes that valuation of marsh ES is a “powerful tool for placing wetlands on the agendas” of decision makers (Finlayson et al., 2005). In fact, in 1968 and 1969 Georgia marsh scientists, environmental activists and politicians used the value of the salt marsh to protect it from strip-mining, resulting in the 1970’s Coastal Marshlands Protection Act. Eugene Odum, the “father of modern ecology,” who’s work was done on Sapelo Island, identified that the Georgia salt marsh ecosystem “should be valued at a minimum of \$2,000 per acre [...] because indirectly the marshes produced a yearly income (in 1970 dollars) of \$100 per acre, totaling \$40 million per year for the whole coast” (Craig, 2002). Local environmental group, the Center for a Sustainable Coast updated this value to \$3.5 billion annually as of 2004 (Kyler, 2004). Neither of these dollar amounts

includes the socio-cultural value of the salt marshes and each one is based on Department of Labor statistics from 1970. Regardless, the initial 1970 valuation swayed the then anti-environmentalist Governor of Georgia to pass this landmark law.

Study area

This study investigates people's perceptions and valuation of marsh ES within the confines of the Central Georgia Coast. Specifically, the study area includes Glynn and McIntosh Counties, GA. This site was selected because the two counties are within the boundaries of the Georgia Coastal Ecosystem Long Term Ecological Research (GCE LTER) site, and because a regional focus is most useful in terms of influencing later regulations and decisions about the ecosystem (Simpson, Brown, Peterson, & Johnstone, 2016). The study area includes the Altamaha River as well as the Doboy and Sapelo Sounds, which contain large swaths of salt marsh.

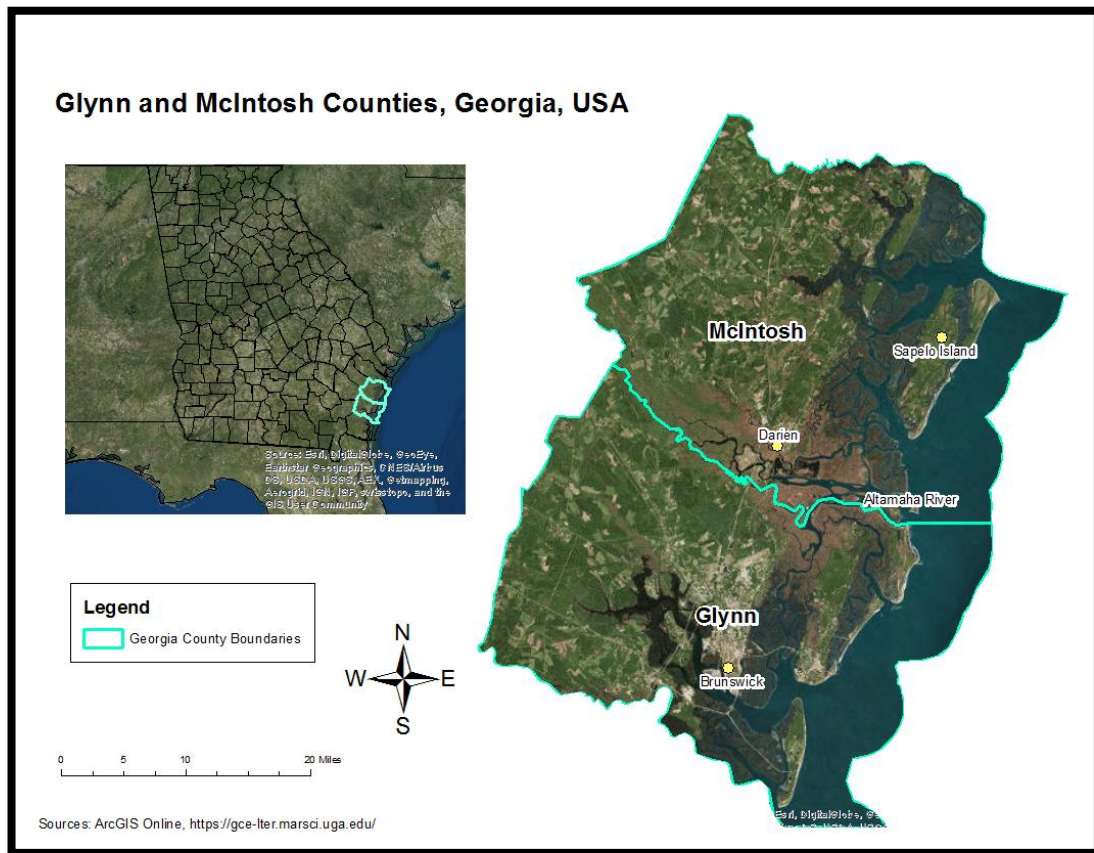


Figure 4. Map by the Author

Glynn County, GA.

Glynn County is 585 square miles and home to 79,808 people (U.S. Census Bureau, 2010a). The median age is 39.4, 52.5% of the population is female while the remaining 47.5% are male (U.S. Census Bureau, 2010a). 67.6% of the population is Caucasian, followed by 26% African American and 6.4% Hispanic/Latino (U.S. Census Bureau, 2010a). The median household income in Glynn County is \$38,765 (U.S. Census Bureau, 2010a). In terms of poverty, 19.7% of Glynn County residents live at or below poverty level (U.S. Census Bureau, 2010a). The largest employing industries in Glynn include education, retail, and entertainment (U.S. Census Bureau, 2010a).

Glynn County is the second most urbanized area on the Georgia Coast, after Savannah. The area has a long history utilizing its riparian and marsh areas for industry. According to the Georgia Department of Labor, some of the top private sector employers in Glynn County include: Brunswick Pulp & Paper (Georgia Pacific), King & Prince Seafood Corp, Brunswick Cellulose Inc., and the Sea Island Company (Georgia Department of Labor, 2016). Each of these businesses depends on the Altamaha River and associated marshlands for one or more aspects of their trade. Glynn County is also home to the Port of Brunswick, which oversees the third largest volume of roll-on roll-off² imports in the country.

Glynn County is home to 21 public parks, many of them boat ramps or areas adjacent to the water. Glynn County is also home to 16 hazardous waste sites, six actively polluting industries and three superfund sites (EPA, 2017). This contamination has led to a decades-long seafood advisory in the area, exhibited below. Nearby paper mills, notably Brunswick Pulp & Paper, also contribute to the pollution of the near-shore waters. Local advocacy groups such as the Glynn Environmental Coalition, the Altamaha River keeper, and Center for a Sustainable Coast are committed to monitoring the ecological health of the area in response to the evident pollution problem.

McIntosh County, GA

McIntosh County is 575 square miles and home to 14,333 people (U.S. Census Bureau, 2010b). McIntosh County is significantly more rural than Glynn County. The median age in McIntosh County is 44.4 and 51.2% of its residents are female with the remaining 48.8% male (U.S. Census Bureau, 2010b). The race makeup of McIntosh

² Roll-on-roll off refers to cargo ships which carry wheeled cargo which literally drives, or rolls-off the ship when docked.

County is as follows: 61.5% of McIntosh Residents are Caucasian, with 35.9% African American and 1.6% Hispanic (U.S. Census Bureau, 2010b). The median household income is \$30,102 (U.S. Census Bureau, 2010b). In McIntosh County, 17% percent of residents are living at or below poverty level (U.S. Census Bureau, 2010b). Very little information is available regarding the county’s spatial data as well as employment data. Regardless, the community prides itself on its commercial fishing, which recently started to include jellyballs, or Cannonball Jellyfish, for export to Asia. McIntosh County is home to 12 public parks and more than seven different National Wildlife Refuges. Sapelo Island, where the GCE LTER field station is situated, is the last remaining “sea island” populated by Gullah-Geechees³.

Data Collection Methods

There are currently three methods utilized in ES valuation: the ecological approach⁴, the economic approach, and the social approach (Felipe-Lucia, Comín, & Escalera-Reyes, 2015). The separation between the economic and social approach has not been well defined, leading many scholars to think that the economic approach captures social values wholly (Felipe-Lucia et al., 2015). I argue that the economic approach does not capture the important complex social valuations of ES. This research utilizes focus groups and key informant interviews to gather qualitative social data to report these aspects of ES valuation.

³ Gullah-Geechees are descendants of slaves taken from West Africa (areas that today include Senegal, Gambia, Sierra Leone, and Liberia) who grew rice, indigo and cotton on Sea Island Plantations starting in 1750. The Gullah-Geechees have held on to traditions, culture, and even language from their ancestors. Most importantly, Gullah-Geechees have held on to their ancestors’ lands. Sapelo Island is home to about 150 Gullah-Geechees in the Hog Hummock Community.

⁴ “The ecological approach focuses on measuring ecological functions or ecosystem properties” (De Groot, Wilson, & Boumans, 2002).

Glynn County Advisory Area for Fish You Catch and Eat



Consumption Guidelines for Advisory Area

NO LIMIT – EAT AS OFTEN AS YOU LIKE



Shrimp*

EAT ONLY ONCE PER WEEK



Red Drum (Red Fish)



Blue Crab



Spotted Seatrout



Flounder

EAT ONLY ONCE PER MONTH



Spot*



Black Drum



Striped Mullet*



Whiting



Atlantic Croaker*



Sheepshead

Printed August 2011.
Fish illustrations by
Diane Rome Pebbles, used
with permission from the
Florida Department of
Environmental Protection.
Design: mPrintDesign.com

**Purvis and Gibson Creeks and the adjoining area of Turtle River: Eat Shrimp only once per month; Do not eat Atlantic Croaker, Spot, or Striped Mullet. Terry and Dupree Creeks: Do not eat Spot. Buffalo River: Do not eat Striped Mullet.*

Figure 5. Glynn County Seafood Advisory

Focus group discussions

ES valuation has long been done through contingent valuation surveys, revealing individual options of what participants think they would pay for a given ES. This method has proven to be useful in many contexts, but not useful in gathering the total value of an ES including, most significantly, cultural values (Chan, Satterfield, & Goldstein, 2012). Furthermore, this method aggregates individual opinions, which is a group average and not an accurate representation of the local discourse (Kaplowitz et al., 2001). Simply put, only gathering quantitative information regarding ES paints an incomplete picture of how a community actually values ES.

Focus groups emerged as a method of data collection in the 1950's for market research and the management of the military (Rodriguez, Schwartz, Lahman, & Geist, 2011). It was not until the 1980's that this method became utilized in social science research (Ryan, Gandha, Culbertson, & Carlson, 2014). In a focus group, researchers and/or moderators ask questions from a focus group instrument, or list of potential questions, to elicit "collective views and opinions" on the subject in question (Ryan et al., 2014). Focus groups differ from other methods of data collection in the social sciences because they do not focus on individual opinions like in key-informant interviews, surveys, etc., rather they focus on discourse. Wilson & Howarth (2002) state:

The basic idea is that small groups of citizen-stakeholders can be brought together to deliberate on the economic value of a public good, and that the values derived in this forum can then be used to guide environmental policy [...] By implementing a fair and openly structured procedure for deliberation, it is assumed that small groups of citizens can render informed judgements about public goods not simply in terms of their own personal utility, but also in terms of widely held social values (Wilson & Howarth, 2002, p. 432).

This method of data collection is important because the literature displays an overwhelming use of contingent valuation and WTP, without also ascertaining the

associated narratives and group opinions. While focus groups have been used to test elicitation methods, they rarely have been employed to investigate ES value (Johnston, 1995; Johnston & Russell, 2011; Kelemen et al., 2013; Scholte et al., 2015a; Tadesse, Zavaleta, Shennan, & Fitzsimmons, 2014). Contingent valuation has often overlooked socio-cultural valuation of ES values in a group setting (Chan, Satterfield, et al., 2012; Gould et al., 2014; Kaplowitz et al., 2001; Scholte, Van Teeffelen, & Verburg, 2015b).

Ryan et al. (2014) distinguishes two types of focus groups: *individualistic social psychology perspective*⁵ and *social constructionist perspective*. Throughout this study I will be utilizing the *social constructionist perspective* in which “opinions are ‘socially shared knowledge’ or tacit knowledge that is generated, maintained, and changed through social participation” (Ryan et al., 2014, p. 331). Simply put, focus group participants may change their minds on certain questions given the points others in the group are asserting.

As described above, it is imperative for ES valuations to come from deliberative methods. Thus, I will be utilizing focus group discussions (FGDs) and key informant interviews (KII) to gather comparable data for this thesis. Three, 90-minute-long semi-structured FGDs were held between June 18-23, 2017. Random sampling and recruitment was outsourced to GreatBlue Research Inc., which utilized a mix of address and cell phone lists to make initial contact. The Coastal SEES team chose to utilize random sampling to mimic the sampling of revealed and stated preference methods. GreatBlue Research Inc. recruited 12 participants for each FGD, assuming 10 participants would attend. The full recruitment screener used by GreatBlue Research Inc. is attached in Appendix A. These FGDs were held in comfortable and neutral locations conveniently

⁵ This kind of focus group assumes the content discussed will not change throughout the course of the discussion (Ryan et al., 2014).

located for each set of participants. Specifically, these FGDs were held at the Sapelo Island Nature Center in Meridian (McIntosh) and the Marshes of Glynn Brunswick Library (Glynn County). The FGDs were audio-recorded and transcribed using ExpressScribePro immediately following the FGDs, to ensure accuracy. Other Coastal SEES team members were present at each FGD, taking notes regarding when and which participant was speaking to assist in the transcription.

The full FGD instrument with specific discussion questions is available in Appendix B. Prior to the FGDs in June, the Coastal SEES team held three “mock FGDs” to test the instrument, to ensure that the questions were easily comprehended by participants. During the process of testing the instrument, the team members, received feedback from mock FGD participants in order to improve our moderating skills, questions, and other issues. During the course of this instrument testing all members of the Coastal SEES team practiced transcription and coding, working to create a coding protocol prior to the actual data collection.

Key informant interviews

I identified key informants with the help of Dr. Meryl Alber from the University of Georgia and GCE LTER. I initially compiled a list of individuals identified as decision-makers or thought-leaders after compiling a preliminary “community profile” of the study area utilizing internet and print resources. Dr. Alber reviewed this list and provided feedback as well as suggesting individuals to contact who were not on the preliminary list. These semi-structured interviews followed the same line of questioning

as the FGD as shown in Appendix B. I held key informant interviews (KIIs) until content saturation⁶ was met.

KIIs in this study will be utilized for the sake of comparison, to show differences in understanding, valuation, and future goals between the people of Glynn & McIntosh Counties and their public figures.

Transcript Validation

To ensure the validity of our data, the three graduate students on the Coastal SEES team at FAU each transcribed and coded the FGD data. One member of the team would do the initial transcription at an audio speed approximately 55% of the natural cadence of the speaker and type what they heard, verbatim. That same team member would then review the transcript once typed alongside the audio at 100% speed, making changes as necessary. A second team member would then listen to the audio at 100% speed and make any necessary changes to the previous version, saving it as a new file. A third member of the team would review the transcript and audio (at 100%) again, format the transcript, and save the transcript as a final version. This process took approximately two weeks to complete.

As for the KIIs, I transcribed this data and went through all the above steps. I reviewed the transcripts with 100% speed audio the same number of times, staggered on different days as to make the transcripts seem fresh to my ears. This differed from the FGD validation method because the KII data was not being applied to the larger Coastal SEES project. This process also took two weeks to complete.

⁶ Saturation refers to a point in qualitative research when no new insights appear to be arising in the data (Punch, 2014).

The Value of Comparing FGD and Key Informant Interviews

Both FGD and individual interviews have been utilized almost interchangeably in the testing stages of ES elicitation methods (Kaplowitz et al., 2001). However, both methods can elicit information outside the scope of WTP surveys as they are most commonly used. Both methods provide detailed qualitative data, which spans topics that cannot always be simplified into a three-choice option survey. Kaplowitz et al. (2001) study shows that “cultural and aesthetic significance (e.g. wetland beauty) was raised in every focus group discussion, but that it was only the ninth most frequent ES topic raised during individual interviews” (p. 241). These two methods reveal “significantly different ecosystem service information” and a more full picture of community valuation of ES (Kaplowitz et al., 2001, p. 243). In fact, Kaplowitz et al. (2001) suggest these two methods be used in a complementary manner in future ES valuation studies.

Moving forward, within the larger NSF Coastal SEES project, the FGD data collected in this Thesis will be used to inform planning charrettes to assist the communities to adapt to SLR and protect their marshes in ways that fit for their defined value system⁷.

Data Analysis Methods

I analyzed my data/transcripts through a process called “Grounded Theory” (Charmaz, 2006).

⁷ Of course, the data collected through the FGDs and Key-Informant Interviews (KII) are not fully representative of the community’s value system as a whole. Regardless, the data will be used to drive further discussion and make assumptions which may be challenged through the charrette process by other community members.

Grounded Theory

Grounded theory is an inductive method of qualitative data analysis where theories emerge from the data analysis process (Strauss & Glaser, 1967). This method rejects the positivist notion of objective and replicable observations that lead to grand theory for social science research questions. Grounded theory is done through a process of constant comparison of three sets of codes assigned to the data (Punch, 2014). The coding process includes open coding, axial coding, and selective coding which results in apparent theories associated with the data (Punch, 2014). This process is illustrated in Figure 6 below. Open coding is often done as a line by line annotation of the transcript(s) considering questions like “what centrally seems to be going on here” and/or “what are these data mainly about” (Punch, 2014). Axial coding is the process of interrelating the open codes with one another, adding a layer of abstraction to the open codes (Punch, 2014; Strauss & Glaser, 1967). Selective coding is summarizing the axial codes, similar to the axial coding being a summary of the open codes. Each of these three steps in the coding processes is done in an iterative manner until a provisional theory, or explanation, emerges from the data.

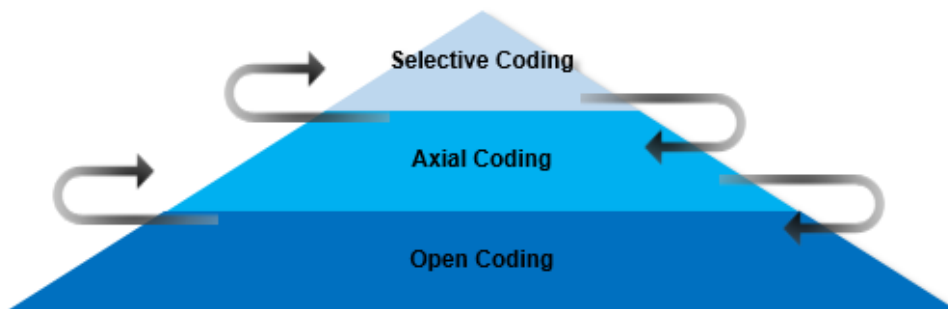


Figure 6. Grounded theory coding system

My Application of Grounded Theory

Once the FGD audio had been transcribed, I analyzed the data through a Grounded Theory approach utilizing NVIVO 11 Pro software. Each transcript was open coded in its entirety first, then axial coded, and finally selective coded⁸. The next transcript was not coded until the selective coding had been completed for the previous transcript as to avoid bias between transcripts.

First, I assigned open codes through a “thought by thought” process, summarizing the concept of a thought as closely to the exact wording of the participant as possible. This differs from the standard “line by line” approach because our transcripts were transcribed verbatim and many lines contained mostly verbal fillers such as “um”. Many of these open codes had “prefixes” within their names. These “prefixed” were predetermined by the team as many responses in the transcripts were direct responses to questions and could be sorted easier if they contained these “prefixes”. Examples of these “prefixes” include: personal experience, recreation, and two words. Examples of these include codes named “personal experience recreational fishing,” “recreation hiking,” and “two words beauty.”

After open coding was completed I reviewed the open codes and sorted emergent axial codes. These axial codes were named to reflect or summarize the open codes within it. This process of sorting open codes into axial codes was completed until all open codes were nestled into an axial code. In some cases, axials contained few open codes because the concept was unique, ambiguous, or not well discussed. In the cases of demographic information, these axials were later nestled into a selective code called “other” which was not utilized in the overall analysis of codes. During the sorting process, open codes were

⁸ The iterative nature of this method led to axials and selective codes continuously being re-named and shuffled around as themes emerged, it was not as straight-forward of a process as it may sound.

continually compared by inspecting source data (the quote from the transcript) and ensuring the code was sorted appropriately. For example the quote, “the marsh is calming” was open coded as “feel marsh is calming” and situated within the “restorative value” axial.

Selective coding is the last step within the coding process. I reviewed the axial codes and sorted into larger themes, adding layers of abstraction. Many of these selective codes emerged with the same names, a product of the three ES the questioning instrument was designed to discuss. To utilize the same example from above, the “restorative value” axial became situated within the “Cultural Ecosystem Services” selective code. The complete coding protocol can be found in Appendix C.

Coding Validation and Merging

Coding Validation

Each team member also coded each FGD transcript. We all coded the transcripts with minimal communication between us. This allowed for our codes to be unhindered by expectations of other coders. The team held twice-weekly meetings during the course of coding in which we discussed findings after everyone was finished coding, shared quotes we found particularly poignant, and suggested edits to the coding protocol. The coding protocol can be found in Appendix C.

After all team members completed their coding, which included open, axial, and selective coding, the three separate coding files were merged using the merge function in NVIVO. This was done for each FGD, accounting for nine files total (three files per FGD). The Coastal SEES team member (Vince Edwards) who is focusing on the three-state comparison did the majority of the merge actions. These actions were mostly

composed of identifying patterns across coders and sorting them as such, identifying unique codes and allowing them to stand independently, and re-sorting concepts within similar themes if the difference was not too great. This process is a continuation of the “constant comparison” notion of grounded theory analysis. To ensure that themes and concepts were being sorted in a manner so Georgia specific data was not being obscured in favor of the three-state comparison research questions, I also provided input and edits to Vince’s coding scheme and merge file. Similarly, I followed these same steps independently with the KII data. I coded these independently and merged the nine interviews together into one file. Once the files were merged, I sorted concepts the same way as described above.

Removing Duplicates

Merging three files together led to many duplicate codes. In order to produce accurate numbers from which to determine prominence these duplicates were removed. This process was done over the course of two weeks in which team members “cleaned up” the data files by reviewing all open codes and their references, deleting duplicative material when necessary to mitigate double-counting. The complete protocol for this process can be found in Appendix C.

RESULTS

Population Groups

Focus Group Discussions

Between June 19- 20, 2017 the FAU Coastal SEES team conducted three FGDs in the study area. Dr. Colin Polsky moderated all three FGDs. One FGD was held at the Brunswick Public Library on the 19th and two FGDs were held at the Sapelo Island Visitors Center in Meridian (McIntosh County) on the 20th. A total of 31 participants attended these focus group discussions. A summary of the demographics of each group was ascertained through a voluntary and anonymous survey at the end of each FGD (Table 2).

Table 2. Demographics of FGD Participants

Georgia Focus Group Demographics			
Characteristics	Focus Group Discussion 1 (Brunswick Library)	Focus Group Discussion 2 (Sapelo Island Visitors Center)	Focus Group Discussion 3 (Sapelo Island Visitors Center)
Number of Participants	10 participants	11 participants	10 Participants
Race/Ethnicity	6 White/Caucasian	10 White/Caucasian	7 White/Caucasian
	3 African-American/Black	1 African-American/Black	2 African-American/Black
	1 Native American		1 All of the above except other
Gender	6 Male	4 Male	3 Male
	4 Female	7 Female	5 Female
			1 other 1 Marked both Female and Prefer not to answer
Age	1 30-49 Years Old		1 30-49 Years Old
	3 50-64 Years Old	3 50-64 Years Old	4 50-64 Years Old
	6 65+	8 65+	5 65+
Educational Attainment		2 High School	
	4 Some College		3 Some College
	1 Some College and Trade/Technical/Vocational Training		
	3 College Graduate	3 College Graduate	3 College Graduate
	2 Post Graduate Degree	6 Post Graduate Degree	4 Post Graduate Degree
Median Household Income	\$40,000-\$49,000 per year	\$60,000 per year	\$75,000 per year
Location	9 Glynn County Residents	8 Glynn County Residents	6 Glynn County Residents
	1 McIntosh County Resident	3 McIntosh County Residents	4 McIntosh County Residents

Most participants belonged to the age group 65+ years old. We scheduled the FGDs between the two counties assuming participants would attend the closest group, yet more Glynn county residents attended each group regardless of the location. This unanticipated circumstance resulted in only 25.8% of participants hailing from McIntosh County. Race/ethnicity was distributed as follows: 74% of participants identified as white/Caucasian, 19% as African-American/black, and 3% as either Native American or all of the above in terms of race/ethnicity. One participant self-identified themselves as Gullah-Geechee throughout the course of discussion. Median household income ranged from \$40,000-\$75,000 annually⁹. FGD3 had the widest ranging income levels as three

⁹ This was calculated long-hand by writing down the ranges or circled income levels in high to low order and finding the median.

participants recorded earning less than \$10,000 per year and four participants earning more than \$90,000 per year.

Key Informant Interviews (KII)

I conducted nine interviews with local decision-makers and thought-leaders. I did not utilize the anonymous demographic survey within this population in order to protect participant identities. Despite this, one interview participant freely identified as Gullah-Geechee throughout our discussion. These interviews were done either in person during the week of June 18th-June 24, 2017 or they were conducted over the telephone between June 18-25, 2017. Interviews lasted between 30 minutes and 2 hours, depending on how much information the participants wanted to share. The makeup of the KII sample population is displayed below.

Table 3. Key Informant Interview Population

Key Informant Interview Make-Up	
Position within Community	Number of Participants
Elected Officials	2
Non-Elected Government Officials	2
Non-Profit Leaders	3
Business Owners	2

Emergent Themes

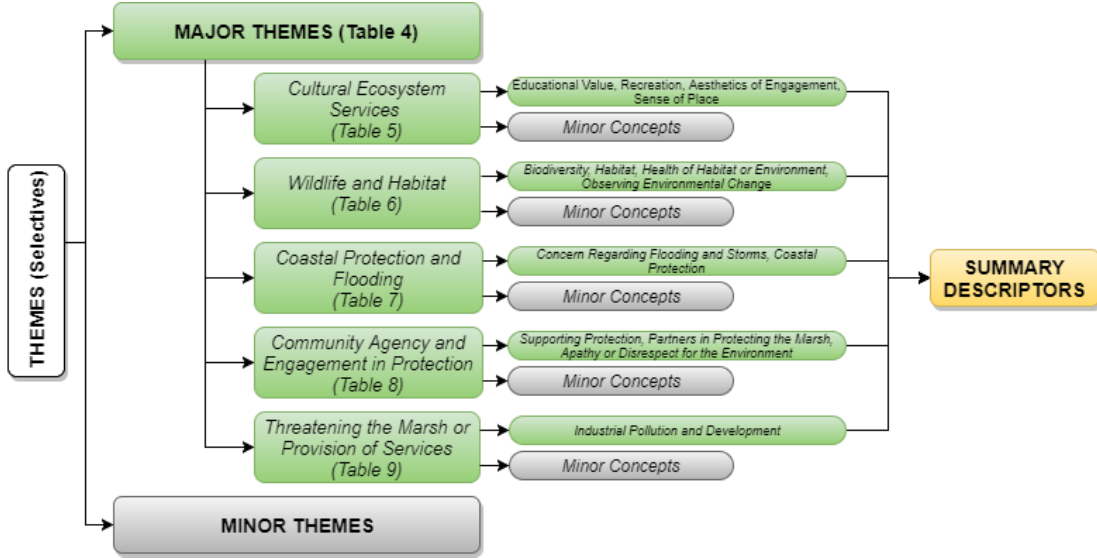


Figure 7. Thought process and table of contents for results tables below

Figure 7 displays both a concept map and a table of contents for FGD results in this chapter. Table 4 shows emergent themes across study populations, their percent prominence, a definition of the theme based in the data, and an illustrative quotation from the transcripts. Themes which ranked with 10% or greater prevalence are considered major and appear in red. Themes which ranked less than 10% prevalence were considered minor appear in yellow. I will primarily be discussing the results which arose from major themes.

Table 4. Percent Composition of Total References for all selective nodes, by sample population

Percent composition of total references for all selective nodes, by population				
<i>Selective Node</i>	<i>Definition</i>	<i>Focus Groups</i>	<i>Interviews</i>	<i>Illustrative Quotation</i>
COASTAL PROTECTION AND FLOODING	Concerns regarding flooding and storms, and appreciation of the coastal protection provided by the marsh.	9%	11%	FG1P.2: "You take the marsh away, you're gonna get more flooding."
COMMUNITY AGENCY AND ENGAGEMENT IN PROTECTION	The ways in which local communities or individuals are interested and/or active in protecting their local environment.	15%	14%	FG1P.2: "On a local level, we can continue to show up at the zoning board meetings and the committee meetings and let our voice be known."
CULTURAL ECOSYSTEM SERVICES	The marsh's contributions to the affectual benefits that arise from human-ecosystem relationships.	30%	31%	FG2P.4: "We drive along and look at it, and I really enjoy the view."
DEPENDENT ON THE MARSH ECONOMICALLY	Industries and livelihoods that are dependent on marsh, coast, and inland natural resources.	4%	7%	FG1P.7: "...if it's not for the marsh, these communities along the coast would be ghost towns. Literally."
FEELING DISAVOWED BY GOVERNMENT	Concern for indifference, corruption, or a lack of appropriate funding or support from federal, state, and local governments	8%	8%	FG1P.1: "Just like that gentlemen said though, with all the cutbacks that's goin' on in Washington DC now, we just spittin' in the wind."
KNOWLEDGE OF ECOSYSTEM FUNCTIONS	The ways in which the community understands provisioning, regulating, and supporting ecosystem services.	2%	4%	FG1P.7: "And the marsh helps filter those toxins out, and increases our groundwater [...]"
THREATENING THE MARSH OR PROVISION OF SERVICES	Anthropogenic factors contributing to a decline in marsh ecosystem health or provision of services.	16%	4%	FG1P.12: "It was a, kind of awakening to see the way they allowed paper mills to, to pollute the environment in this area, which...as you've said, was, there could be such pristine conditions and nature [...]"
WANTING PLANNED AND HONEST DEVELOPMENT	Desire for any new development to be within established law and restrictions and free of good ol' boy corruption.	—	6%	FG3P.6: "Well planned, but uh, also once it's planned it's somebody that makes the developer stick to the plan. The approved plan by the people that had the integrity at the start to begin with and do it correctly. Then everything works out."
WILDLIFE AND HABITAT	Presence, characteristics, and changes in wildlife and habitat.	16%	14%	FG3P.1: "Of course I know about the diamondback turtles and how endangered they are because I volunteer at the Turtle Center [...]"
<i>Total</i>		100%	100%	

Table 4 shows the emergent selective codes, referred to in the text as “themes”, their percent prominence per population, their classification as major (red) or minor (yellow) themes, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Focus Group Discussions

The coding process for the Focus Groups generated 2,658 total codes (open, axial, & selective) across 109 pages of transcript. Across all three FGDs, *Cultural ES* emerged with primary importance within the major themes. *Cultural ES* received 800 coding references, out of a total of 2,658, representing $800/2,658 = 30.09\%$, or 30%. *Threatening the Marsh or Provision of Services* ($418/2,658 = 16\%$), *Wildlife and Habitat* ($418/2,658 = 16\%$), and *Community Agency and Engagement in Protection* ($410/2,658 = 15\%$) make up a group of secondary importance within major themes, accounting for 47% of emergent themes. Together the two groups composed of *Cultural ES*, *Threatening the Marsh or Provision of Services*, *Wildlife and Habitat*, and *Community Agency and Engagement in Protection* account for 77% of emergent themes from the Georgia FGDs. The remaining 23% of emergent themes is made up of 4 minor themes: *Coastal Protection* ($249/2,658 = 9\%$), *Feeling Disavowed by Government* ($201/2,658 = 8\%$), *Depending on the Marsh Economically* ($115/2,658 = 4\%$), and *Knowledge of Ecosystem Functions* ($47/2,658 = 2\%$).

KIIs

The coding process for KIIs generated a total of 1,180 codes (open, axial, & selective) across 97 pages of transcript. *Cultural ES* emerged with primary importance and as a major theme within this population as well. *Cultural ES* received 367 coding references out of a total of 1,180, representing $367/1,180 = \sim 31\%$. *Community Agency and Engagement in Protection* ($165/1,180 = 14\%$), *Wildlife & Habitat* ($162/1,180 = 14\%$), and *Coastal Protection and Flooding* ($129/1,180 = 11\%$) make up a major theme group of secondary importance, accounting for 39% of emergent themes. Together the 4

major themes *Cultural ES, Community Agency and Engagement in Protection, Wildlife and Habitat, and Coastal Protection and Flooding* account for 70% of emergent themes from the KIIs. The remaining 30% of emergent themes is made up of 5 minor themes: *Feeling Disavowed by Government* (99/1,180 = 8%), *Depending on the Marsh Economically* (83/1,180 = 7%), *Wanting Planned and Honest Development* (76/1,180 = 6%), *Threatening the Marsh or Provision of Services* (51/1,180 = 4%), and *Knowledge of Ecosystem Functions* (48/1,180 = 4%).

Areas of Interest across Populations

Threatening the Marsh or Provision of Services was four times as prominent in the FGD population as it was in the KII population. *Wanting Planned and Honest Development* emerged in the KII population as a theme where it is represented in the FGD population as a concept, or axial code.

Cultural ES Concepts (Axials)

Table 5 displays detailed results within the theme “Cultural ES” in terms of percent prominence (calculated the same way as described above), the definition for the concept based in the data, and an illustrative quotation from the transcripts. Major and minor levels of importance are similarly exhibited through the color scheme used for table 4.

Table 5. Percent composition of total references for the selective node Cultural Ecosystem Services, by population

Percent composition of total references for selective node -- CULTURAL ECOSYSTEM SERVICES, by population				
<i>Axial Node</i>	<i>Definition</i>	<i>Focus Groups</i>	<i>Interviews</i>	<i>Illustrative Quotation</i>
AESTHETICS OF ENGAGEMENT	Multisensory engagement or interaction with aesthetics.	16%	14%	FG1 P.12: "Every night is different, every sunset, it's just gorgeous. Sometimes you just look at all the different colors and it's amazing."
BEQUEST VALUE	Preserving the environment to future generations.	1%	1%	FG2 P.1: "It doesn't matter to me, protecting the environment for future generations, I'm willing to pay the price."
COMMENSALISM	Sharing space and resources with other organisms.	—	1%	KI 8: "...in addition to the landscape it is I would say almost equally beneficial to our, to humans just because of the um, just because of the experience of sharing in the where we live with other creatures other than ourselves."
CULTURAL HERITAGE	How local history and culture connects to the marsh.	8%	7%	KI 6: "The marshes, its home for us, we are buried it's part of our culture, we're buried near the water. Most of our rituals are near the water."
ECOSYSTEM DISSERVICES	Features of the ecosystem to which residents are averse.	3%	1%	FG3 P.7: "we've had to deal with alligators and having to get an alligator wrangler to come out and um, take a family of alligators away that were living real close [...]."
EDUCATIONAL VALUE	The importance of an educated community in order to be good stewards of the marsh and continue valuing it and treating it respectfully	20%	20%	FG2 P.8: "I think would think that the reason we're seeing a lot of what I would say, lack of concern, is because they're not educated and don't know why it's important."
FEELING SPIRITUAL, RELIGIOUS, OR A SENSE OF WONDER	Marshes inspiring transcendental feelings.	1%	2%	FG1 P.5: "I saw nature like it was from the beginning of creation."
INSPIRING OR APPRECIATING ARTISTIC EXPRESSION	Scenic landscapes inspiring creative expression through painting, poetry, or other forms of art.	1%	6%	KI 7: "I had this vision for a photo-shoot and um I wanted a picture of my ex-husband and me and my kids, like covered in mud crawling through the salt marsh and that's what I wanted for my birthday was to have professional photos taken like that."
INTERCONNECTEDNESS	The empathetic and holistic connection between residents and the marsh.	3%	—	FG2 P.6: "Um, if my grandfather hadn't instilled in me the importance of why, and I get an appreciation for the land, and appreciate the beauty of it, it would not make sense to me. I have friends that have moved away and declared that they're never comin' back. So they're not tied to the land. And I think that once that tie is connected, and they see that we're connected, then I think that makes a difference."

Table 5. Continued

INTRINSIC VALUE	The value of the marsh in and of itself.	4%	2%	KI 6: "It was there, it was beautiful, in my mind did not know of any other use of the marshes, didn't know what it meaning was, just figured just grew up out there was beautiful and that's fine, that's the purpose of it."
MEDICINAL VALUE	Emotional and physical healing provided by the marsh.	1%	—	FG2 P.1: "One of things, when I was growin' up, people used to say, go out in the salt water if you had an open sore, that's gonna help heal it."
RECREATIONAL VALUE	Spending time outdoors.	17%	18%	FG3 P.12: "Fishing, kayaking, um, boating, uh, trails, like at Hofwyl, our at the DNR spot on Jeckyll. You know if it's a trail, we're gonna take it."
RESEARCH VALUE	Opportunities afforded for research by the natural marsh ecosystem.	—	3%	KII 8: "I see it as uh just a an intellectual and data expanse of stuff that we need to know and understand and measure and model [...]"
RESTORATIVE VALUE	Feeling at peace, relieved of stress or troubles.	5%	6%	FG3 P.6: "I look at the marsh when I go by and that gives you a bit of serenity,"
SENSE OF IDENTITY	Forming one's identity as including the marsh	—	1%	KII 8: "Um and as a marine scientist um all of those identities like my professional identity, my um geographical identity as a Southern woman, a Southern Black Woman, and my spiritual identity as a Buddhist that is responsive and reactive to nature all kinda converge at the marsh."
SENSE OF PLACE	"Positive and affective bonds with places; beliefs about the relationship between self-definition and places" (Hausmann et al, 2016)	13%	13%	KI 8: "I we travel and we've stayed in um you know log cabins and mountain cabins where we've looked at the expanse of valley and its beautiful...but I've noticed and I've discussed with them that I just don't get the same state of peace and satisfaction that i get from seeing a broad expanse of uninterrupted marsh."
TRANSFORMATIVE VALUE	Experiences in the marsh that shape one's worldview or conceptualization of marsh value.	6%	5%	KI 6: "It gave us something to do, we didn't have all the Nintendo stuff and all of that fancy things that we have now so that's how we had fun. It was a ritual that we would go swim, we would go crab, and we would walk a mile! [...] And uh of course now, that I want to save the environment and stuff like that, do whatever we can to protect it and keep it [...]"
WILDERNESS VALUE	Positively conceptualizing nature as separate and distinct from civilization.	2%	—	FG3 P.6: "What I meant by being lost, is once you get out there, you get the feeling of where it is pristine out there, but as you get closer in it stops being that way, it becomes more of a, just, just people, people, people."
	Total	100%	100%	

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Table 5 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Cultural Ecosystem Services. Table 5 also shows their percent prominence per population, their classification as major (red) or minor (yellow) concepts, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Focus Group Discussions

Within the FGD population 800 axial and open codes emerged within the theme *Cultural ES*. Of these 800 codes, the major concept of *Educational Value* was most prominent and of highest assigned importance, making up 20% of mentions within this sub-theme. *Educational value* was coded 160 times ($160/800 = 20\%$). *Recreational Value* ($139/800 = 17\%$), *Aesthetics of Engagement*¹⁰ ($130/800 = 16\%$), and *Sense of Place* ($104/800 = 13\%$) emerged as the secondary major concepts. Together these 4 major concepts, *Educational Value*, *Recreational Value*, *Aesthetics of Engagement*, and *Sense of Place* account for 66% of the concepts mentioned within the major theme *Cultural ES*. The remaining 34% of emergent concepts within *Cultural ES* is composed of 11 minor concepts: *Cultural Heritage* ($62/800 = 8\%$), *Transformative Value* ($44/800 = 6\%$), *Restorative Value* ($42/800 = 5\%$), *Intrinsic Value* ($29/800 = 4\%$), *Interconnectedness* ($25/800 = 3\%$), *Ecosystem Disservices* ($20/800 = 3\%$), *Wilderness* ($17/800 = 2\%$), *Inspiring or Appreciating Artistic Expression* ($10/800 = 1\%$), *Medicinal Value* ($7/800 = 1\%$), *Feeling Spiritual, Religious, or a Sense of Wonder* ($6/800 = 1\%$), and *Bequest Value* ($5/800 = 1\%$).

KIIs

Within the KII sample 367 axial and open codes emerged within the major theme *Cultural ES*. Of these 376, the major concept of *Educational Value* was also the most prominent and of highest assigned importance, making up 20% of coding references within this major theme. *Educational Value* was coded 74 times ($74/367 = \sim 20\%$). *Recreational Value* ($67/367 = 18\%$), *Aesthetics of Engagement* ($52/367 = 14\%$), and

¹⁰ Aesthetics of Engagement describes a “holistic, unified aesthetic” which removes separations between the perceiver and aesthetic object as well as encompassing multisensory aesthetics (Berleant, 2003).

Sense of Place (49/367 = 13%) emerged as secondary major concepts. Together these 4 major concepts, *Educational Value*, *Recreational Value*, *Aesthetics of Engagement*, and *Sense of Place* account for 65% of the concepts mentioned within the theme *Cultural ES*. The remaining 35% of emergent concepts within *Cultural ES* is composed of 10 minor concepts: *Cultural Heritage* (27/367 = 7%), *Restorative Value* (23/367 = 6%), *Inspiring or Appreciating Artistic Expression* (21/367 = 6%), *Transformative Value* (17/367 = 5%), *Research Value* (10/367 = 3%), *Intrinsic Value* (8/367 = 2%), *Feeling Spiritual, Religious, or a Sense of Wonder* (7/367 = 2%), “Bequest Value” (4/367 = 1%), *Commensalism* (3/367 = 1%), and *Ecosystem Disservices* (2/367 = 1%).

Areas of Interest across Populations

While many of the concepts within *Cultural ES* are commonly grouped in terms of prominence, some arise in one population but not the other. For instance, *Commensalism* and *Research Value* did not emerge from the FGD population. Similarly, *Interconnectedness*, *Medicinal Value*, and *Wilderness Value* did not arise in the KII population. *Inspiring or Appreciating Artistic Expression* emerged 5% more in the KI population while *Intrinsic Value* arose 2% more in the FGD population. Otherwise, the numbers are very similar across the board.

Wildlife and Habitat Concepts (Axials)

The *Wildlife and Habitat* major theme emerged as being 16% of prominence for the FGD population and 14% of total prominence within the KII population. Table 6 displays each concept within this theme and its prominence within the theme itself.

Table 6. Percent composition of total references for selective node Wildlife and Habitat, by population

Percent composition of total references for selective node -- WILDLIFE AND HABITAT, by population				
<i>Axial Node</i>	<i>Definition</i>	<i>Focus Groups</i>	<i>Interviews</i>	<i>Illustrative Quotation</i>
BIODIVERSITY	The diversity of plants and animals present in the ecosystem	44%	76%	KI 3: "And then we have a um Yellow Crowned Night heron, so those are pretty cool to watch, he's come back probably every year for the last three or four years. He picks off the fiddler crabs (laughs)."
HABITAT	Ability of the marsh to provide shelter and nourishment to plants and animals.	17%	16%	FG1 P.1: "you can't judge the whole thing by it, but I do know that uh, without that marsh grass, we'd have a pitiful seafood industry."
HEALTH OF HABITAT OR ENVIRONMENT	Current health or conditions of the marshes and surrounding environment.	19%	2%	FG2 P.6: "my grandmother would tell me that was a sign of a healthy marsh when you could smell it, she would say that it's healthy."
MIGRATORY PATHWAYS	Importance of habitat as it pertains specifically to migrating wildlife.	1%	—	FG3 P.1: "Because we are in a migratory pathway, right here, and so the diversity of birds that, more so in the fall than in the spring, but not sure why that's the case, but um, the flocks of birds that come through, it's just a magnificent sight. And you can pretty much tell the day of the year if you keep a journal, like when they're coming, when they're comin'."
OBSERVING ENVIRONMENTAL CHANGE	Observing changes in the ecosystem, or changes to ecosystem's health over time.	16%	6%	FG1 P.4: "We used to have a house over on Joyner Island over here on when you go to Jekyll, we're on the right hand side. Plenty of oysters you go over there now, and everything muddied in, they've cut that river off. There used to be a river runnin' in front of Joyner across 17 and went up back into Brunswick."
RESILIENCY OF THE MARSH	Ability of the marsh to naturally resist change, or rebound after detrimental externalities.	3%	—	FG1 P.4: "Glynn County on the marsh I know but one thing that will keep the marsh, where it won't come back, 'cause marsh will come back, it will regenerate, it will come back, like you talkin' about, is fresh water."
<i>Total</i>		100%	100%	

Table 6 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Wildlife and Habitat. Table 6 also shows their percent prominence per population, their classification as major (red) or minor (yellow) concepts, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote

Focus Group Discussion Population

Within the FGD population 418 open and axial codes emerged within the *Wildlife and Habitat* major theme. Of these 418 codes the major concept of *Biodiversity* arose as the most prominent, accounting for 44% of codes within *Wildlife and Habitat*. *Biodiversity* was mentioned 183 times ($183/418 = 44\%$). *Health of Habitat or Environment* ($80/418 = 19\%$), *Habitat* ($70/418 = 17\%$), and *Observing Environmental Change* ($68/418 = 16\%$) emerged as secondary major concepts within *Wildlife and Habitat*. Together, *Biodiversity*, *Health of Habitat or Environment*, *Habitat*, and *Observing Environmental Change* account for 96% of the concepts within the theme. The remaining 4% is composed of 2 minor concepts: *Resiliency of the Marsh* ($13/418 = 3\%$) and *Migratory Pathways* ($4/418 = 1\%$).

KII Population

Within the KII population 162 open and axial codes emerged within the *Wildlife and Habitat* major theme. Of these 162, the major concept of *Biodiversity* arose as the most prominent, accounting for 76% of coding references within *Wildlife and Habitat*. *Biodiversity* was mentioned 123 times ($123/162 = 75.9\%$ or 76% when rounded to the nearest whole number). *Habitat* arose as a secondary major concept, accounting for 16% ($26/162 = 16\%$). Together, *Biodiversity* and *Habitat* account for 92% of the concepts within the theme. The remaining 8% is composed of 2 minor concepts: *Observing Environmental Change* ($10/162 = 6\%$) and *Health of Habitat or Environment* ($3/162 = 2\%$).

Areas of interest across Populations

Migratory Pathways and *Resiliency of the Marsh* did not emerge in the KII population. *Observing Environmental Change* and *Health of Habitat or Environment* were more prominent in the FGD population.

Coastal Protection and Flooding Concepts (Axials)

The *Coastal Protection and Flooding* theme emerged with 9% prominence within themes in the FGD population and 11% prominence within the KII population. Table 7 displays the concepts within the “Coastal Protection and Flooding” theme and those concepts’ prominence within the FGD population and KII population.

Table 7. Percent composition of total references for selective node Coastal Protection and Flooding, by sample

Percent composition of total references for selective node -- COASTAL PROTECTION AND FLOODING, by sample				
<i>Axial Node</i>	<i>Definition</i>	<i>Focus Groups</i>	<i>Interviews</i>	<i>Illustrative Quotation</i>
ADAPTING TO FLOODING	Measures taken to adapt to the impacts of flooding.	—	15%	KII 3: "Actually [McIntosh County is] doing their hazard mitigation plan update right now and they are including sea-level rise into that."
ADDRESSING FLOODING ISSUES	Measures being taken to mitigate flooding	—	12%	KII 1: "we have now finally joined arms with the county as a joint venture to come in and completely address those flooding issues because while most of the property is in the city and the homes are in the city, the um wastewater or the storm water treatment and all of that that's kind of under the ground, um is in the county, so we are now joining together to use some SPLOST funding to really address that issue with those residents."
COASTAL PROTECTION	The marsh acting as a buffer against flooding and storms.	16%	12%	KII 9: "Um, a lot of the people that I know talk about the ecological benefits of the salt marshes. They um, they're buffers for storms."
CONCERN REGARDING FLOODING AND STORMS	Concern regarding flooding and storms.	57%	51%	FG2 P.12: "we dodged a bullet with Matthew. It was far enough off shore, it was low tide. I don't know what would of happened if it had been 50 miles closer and high tide."
DRAINAGE PROBLEMS	Flooding exacerbated by poor condition of drainage infrastructure.	8%	—	FG2 P.4: "Flooding is an issue but it's an issue primarily because the counties don't do a proper job of drainage. And if you throw a lot of junk in the, in the side of the road, it clogs up the ditches."
FEMA FLOODMAPS MISLEADING AND PERVERSE	FEMA floodmaps being re-drawn to downplay risks yet decrease flood insurance cost	—	6%	KII 2: "that [updating FEMA Floodmaps] is being done for political reasons to reduce the highly heated (inaudible) coffers of the increased risks and then increased cost of flood insurance so it's a way to reduce flood insurance is to create a false impression of the risk and at a time when risks are increasing they're portraying them as decreasing! Which is couldn't be more perverse in terms of public policy."
FLOOD INSURANCE	Feelings regarding mandatory flood insurance	8%	5%	FG1 P.1: "the flood insurance you got to have it if you live so-and-so below, you got to have flood insurance, and it's almost like you're bein' held hostage. It's legalized extortion. But you gotta have that."
FLOODING NOT AN ISSUE IN CERTAIN AREAS	Indications that flooding is not uniformly problematic.	6%	—	FG2 P.3: "Where we live has never, it's unbelievable, has never flooded."
LACK OF FLOODING MITIGATION	Measures which residents identify should be taken to mitigate flooding that governments have not embraced yet	6%	—	FG2 P.4: "And if you don't keep the ditches clean, it's gonna flood. So it's a maintenance problem more than a flooding problem."
<i>Total</i>		100%	100%	

Table 7 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Coastal Protection and Flooding. Table 7 also shows their percent prominence per population, their classification as major (red) or minor (yellow) concepts, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Focus Group Discussions

Within the FGD population 249 open and axial codes emerged within the *Coastal Protection and Flooding* minor theme. *Concern Regarding Flooding and Storms* emerged as most prominent within the FGD population, accounting for 57% of concepts within the theme. *Concern Regarding Flooding and Storms* was coded 141 times within the theme ($141/249 = 57\%$). *Coastal Protection* arose as the second most prominent concept at 16% of codes ($39/249 = 16\%$) within the theme. Together these 2 major concepts account for 73% of concepts within this minor theme. The remaining 27% is composed of 3 additional concepts: *Drainage Problems* ($21/249 = 8\%$), *Flood Insurance* ($19/249 = 8\%$), and *Flooding not an issue in certain areas* ($14/249 = 6\%$).

KIIs

Within the KII population 129 open and axial codes emerged within the *Coastal Protection and Flooding* theme. *Concern Regarding Flooding and Storms* emerged as the most prominent concept, accounting for 51% of concepts within the theme. *Concern Regarding Flooding and Storms* was coded 66 times ($66/129 = 51\%$). *Adapting to Flooding* ($19/129 = 15\%$), *Addressing Flooding Issues* ($15/129 = 12\%$), and *Coastal Protection* ($15/129 = 12\%$) emerged as secondary major concepts within the theme. Together, *Concern Regarding Flooding and Storms*, *Adapting to Flooding*, *Addressing Flooding Issues*, and *Coastal Protection* account for 90% of concepts within this minor theme. The remaining 10% is composed of 2 minor concepts: *FEMA Floodmaps Misleading and Perverse* ($8/129 = 6\%$) and *Flood Insurance* ($6/129 = 5\%$).

Areas of Interest across Populations

Neither *Adapting to Flooding*, *Addressing Flooding Issues*, nor *FEMA Floodmaps Misleading and Perverse* emerged within the FGD population. Similarly, *Drainage Problems* and *Flooding Not an Issue in Certain Areas* did not emerge within the KII.

Other Emergent Themes

While this study was designed to elicit responses on the three above topics, the semi-structured and open-ended nature allowed for other themes and thoughts to emerge through discussion.

Community Agency and Engagement in Protection

The most prominent of these other emergent themes is *Community Agency and Engagement in Protection*.

Areas of Interest across Populations

Both populations emerged with *Partners in Protecting the Marsh* (22% FGD, 28% KII) and *Supporting Protection* (23% FGD, 26% KII) as major concepts within the theme. Other major themes emerged in distinct populations: *Apathy or Disrespect for the Environment* (11%) with the FGD population and *Community Activism and Engagement* (27%) in the KII population. Other minor concepts emerged within this theme as shown below in the yellow cells.

Table 8. Percent composition of total references for selective node Community Agency and Engagement in Protection, by population

Percent composition of total references for selective node --COMMUNITY AGENCY AND ENGAGEMENT IN PROTECTION, by population				
<i>Axial Node</i>	<i>Definition</i>	<i>Focus Groups</i>	<i>Interviews</i>	<i>Illustrative Quotation</i>
APATHY OR DISRESPECT FOR THE ENVIRONMENT	Disregard for the marsh's health by some in the community.	11%	—	FG1 P.1: "We're dumping so much stuff and people hide to do it, and you know, if I was a shrimp fisherman, I would worship the marsh and the river, if it came to that, but they don't."
COMMUNITY ACTIVISM AND ENGAGEMENT	Community involvement in stewardship and local marsh-related issues or events.	10%	27%	KII 3: "we would get phone calls constantly of reports when the marsh was not healthy."
ENGAGING LEADERS IN EDUCATION AND STEWARDSHIP	Desire for leaders to be active and educated in regards to marsh topics and/or issues	—	10%	KII 6: "I was totally ignorant and our community leaders, as many community leaders, we know very little about [the marsh]."
FORGING CONNECTIONS WITH THE MARSH TO VALUE IT	Establishing an understanding and realization of benefits from the marsh in order to fully appreciate its value	4%	1%	FG3 P.5: "teaching them the importance of where they live and how that connects with them and, and educating them about how it can, but the time they grow up how it can be gone or look completely different or, they need an awareness growing up."
GULLAH GEECHEE GENTRIFICATION	The process through with Gullah-Geechee land is lost	—	4%	KII 6: "We put them in a bind, we're saying keep it so we have this beautiful marsh that's been there since your slavery days, but how do you keep it when I'm broke, so you start selling pieces and before you know it you sell it all...and the great-grands they don't give a crap about it, they just want the money."
HOLDING BIG INDUSTRY ACCOUNTABLE	Support for greater supervision and regulation of industries that have been deemed to be harmful for marsh health.	3%	—	FG1 P.7: "More filtration regulations for these companies up and down the coast. Because these corporations, it cuts into their bottom dollar, yes, but they're still makin' a profit. And like some of these companies kill the marsh, they're killin' the people; they're killin' the people, they're killin' their own business."
LACK OF INFORMATION AND AWARENESS	A lack of engagement in marsh-related issues within the community.	4%	—	FG3 P.11: "Probably a lot of people here are unaware of the part the marsh might play in their lives, we take so for granted, it was just, it was part of uh Georgia."
PARTNERS IN PROTECTING THE MARSH	Organizations, governments, or other groups that are actively involved in marsh issues.	22%	28%	KII 2: "The Georgia Water Coalition as the name implies, interested primarily in Georgia law as it affects the water resources in one kind or another, water quality, and uh ecosystems that are water dependent [...]"

Table 8. Continued

RECYCLING	Recycling as a means of environmental support	4%	—	FG1 P.1: "there very few people do it, because most people when they're finished with their oyster shells they just go and dump 'em in the trash."
REQUESTING DEVELOPMENT BE PLANNED AND HONEST	Support for greater supervision and regulation of development that have been deemed to be harmful for marsh health.	5%	—	FG3 P.6: "Well planned, but uh, also once it's planned it's somebody that makes the developer stick to the plan. The approved plan by the people that had the integrity at the start to begin with and do it correctly. Then everything works out."
RESTORATION EFFORTS	Interest in marsh restoration.	2%	—	FG1 P.1: "they save oyster shells and they come in and put 'em just offshore, like half mile offshore. And what that does is allow the sand to build, to build the marshes."
RESTRICTIONS OR SUPPORT FOR RESTRICTIONS	General support for marsh protection.	11%	—	FG1 P.1: "We just came up with a new, uh, what's it called, the buffer rule? Where you gotta drop back 25 feet from the... which I think is a good deal, I just hope everybody will adhere to it [...]"
SUPPORTING PROTECTION	General support for marsh protection.	23%	26%	KII 8: "the stance that the State of Georgia has taken for quite a long time is that thankfully um...due to the work of Lindsey Graham and other legislators um in the late '80's or actually late '70's um through the '80's um they paid attention to the policies that were being passed in other states that would have allowed development and as advocated for conservation and preservation in coastal Georgia [...]"
WHAT THE MARSH NEEDS	Identifying what the marsh needs in order to thrive or survive	—	5%	KII 3: "Um and so I think you know that there is obviously multiple theories of why [marsh dieback] happened um but I think that the best one we have seen so far is the drought so I think that it has to have that good combination of freshwater and saltwater um mostly freshwater in-flow to be able to survive, so."
Total		100%	100%	

Table 8 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Community Agency and Engagement in Protection. Table 8 also shows their percent prominence per population, their classification as major (red) or minor (yellow) concepts, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Threatening the Marsh or Provision of Services

Areas of Interest across Populations

Threatening the marsh or provision of services emerged as a major theme within the FGD population and as a minor theme with the KII population. Within the FGD population major concepts within this major theme includes: *Pollution* (33%) and *Development* (31%).

Table 9. Percent composition of total references for selective node Threatening the Marsh or Provision of Services, by population

Percent composition of total references for selective node --THREATENING THE MARSH OR PROVISION OF SERVICES, by population				
<i>Axial Node</i>	<i>Definition</i>	<i>Focus Groups</i>	<i>Interviews</i>	<i>Illustrative Quotation</i>
CLIMATE CHANGE AND SEA-LEVEL RISE	Concerns regarding climate change and sea-level rise.	9%	45%	KII2: "Anyway, so that that's uh become uh a great source of confusion and through that confusion and objections to what's going on its not just buffers but it's about the avid push for and profit making from shorefront development so would say given all that there's very low acceptance of or concern for sea-level rise and coastal flooding in Georgia."
DDT, DOT, AND DIESEL HARMING THE MARSH	Past distinct and traceable pollution issues which have been resolved	2%	—	FG1 P.1: "I've seen bad things happen here like uh I remember once we had a big diesel spill up when they were building I-95 that killed 30,000 acres of marshland, marsh grass land, that kinda freaked everybody out, and uh, and I saw the government kinda try to cover that up."
DEVELOPMENT	Impending or existing development's impact or perceived impact on the marsh	31%	—	FG3 P.5: "To me, protection of the marshes looks like no development [...]"
ECOLOGICAL IMPLICATIONS OF CLEARCUTTING	Damage to the marsh ecosystem as a result of timber industry.	5%	—	FG1 P.4: "Salt water marsh cannot stand fresh water over, you know. Timber companies or whatever, developers, they cut, they go under and they drain the hardwood swamps, buffalo swamp up there, swamp out there off Kate Road, that swamp would hold water in it all year-round and gradually release it back into the creeks. Now it rains, and it just, it got a ditch cut through there on the side of 95, and all the fresh water just runs out the hardwoods in there, and ride on out the river."
LITTER	Concern about debris and garbage left in the environment by careless humans	9%	24%	KII7: "I feel like the trash is like a huge issue, um for our oceans as well as, well just every area, but specifically the marsh and the ocean."
POACHING	Illegal hunting or capture of wildlife in the marsh and offshore.	7%	—	FG1 P.4: "I've eat turtle eggs, I've dug turtle eggs, I've rode turtles on the beach, I've sat there and watched 'em lay and catch their eggs and put 'em in a sack, haul 'em off....."
POLLUTION	Concerns about industrial pollution's damage to the marsh.	33%	31%	FG2 P.3: "Particularly for Brunswick, industrial, all the mills that are built on the marsh, and uh, that they dumped all their pollutants into the marsh."
SALTWATER INTRUSION	Concern for increased salinity in water sources.	1%	—	FG3 P.6: "I get a report back, and the salt levels are goin' up in some of the, some of the wells"
SEAFOOD ADVISORY	Pollution leading to contaminated fish populations and thus a danger eating caught seafood	4%	—	FG2 P.10: "Yeah, yeah it's changed so much, I mean, I haven't fished it in, 40-5, 45 years probably now. But um, I'm with you, they're uh, Plant McManus is uh really, you know, they say you can eat one or two fish, but I don't want to eat none of 'em."
<i>Total</i>		100%	100%	

Table 9 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Community Agency or Engagement in Protection. Table 9 also shows their percent prominence per population, their classification as major (red) or minor (yellow) concepts, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Minor Emergent Themes

Other themes which emerged yet achieved only minor prominence include:

Feeling Disavowed by Government, Depending on Marsh Economically, Knowledge of Ecosystem Functions, and Wanting Planned and Honest Development. These themes, while important enough for the participants across populations to mention, will not be the focus of this thesis. Rather, these emergent themes will be used to add context to the major themes as they were perceived as being part of the bigger story of the Georgia marsh.

Rural versus Urban Valuation of Marsh Ecosystem Services

Emergent Themes

Table 10 exhibits percent prominence of themes, calculated like the above tables, per county for the FGD population only. Recall that Glynn County is more urban while McIntosh County is very rural.

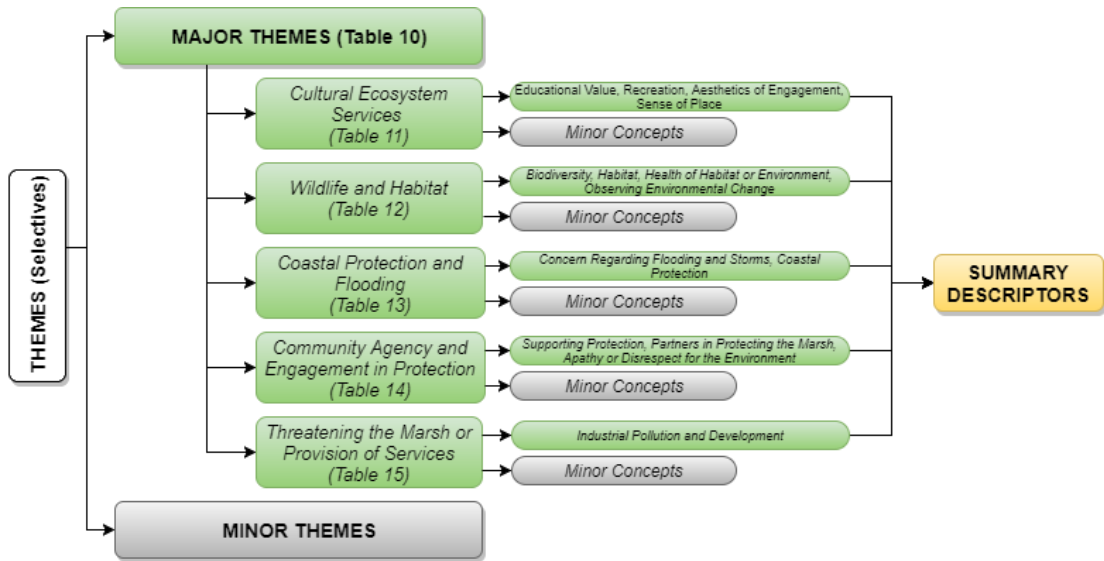


Figure 8. Thought process and table of contents for county comparison tables

Figure 8:

Table 10. Percent Composition of Themes by county

Percent composition of Themes by county		
<i>Selective Node</i>	<i>Glynn</i>	<i>McIntosh</i>
COASTAL PROTECTION AND FLOODING	11%	9%
COMMUNITY AGENCY AND ENGAGEMENT IN PROTECTION	19%	17%
CULTURAL ECOSYSTEM SERVICES	26%	26%
DEPENDING ON THE MARSH ECONOMICALLY	4%	6%
FEELING DISAVOWED BY GOVERNMENT	8%	6%
KNOWLEDGE OF ECOSYSTEM FUNCTIONS	2%	2%
THREATENING THE MARSH OR PROVISION OF SERVICES	14%	16%
WILDLIFE AND HABITAT	16%	18%
	100%	100%

Table 10 shows the emergent selective codes, referred to in the text as “themes”. Table 10 also shows their percent prominence per population, their classification as major (red) or minor (yellow) themes, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Glynn County

Cultural ES emerged as the most prominent major theme within Glynn County, making up 26% of total prominence within the county. Secondary major themes include: *Community Engagement in Protection* (19%), *Wildlife and Habitat* (16%), *Threatening the Marsh or Provision of Services* (14%), and *Coastal Protection and Flooding* (11%). Together these 5 major themes account for 86% of themes within Glynn County. The remaining 14% is made up of 3 minor themes: *Felling Disavowed by Government* (8%), *Depending on the Marsh Economically* (4%), and *Knowledge of Ecosystem Functions* (2%).

McIntosh County

Cultural ES also emerged as the most prominent major theme within McIntosh County, making up 26% of total prominence within the county. Secondary major themes include: *Wildlife and Habitat* (18%), *Community Agency and Engagement in Protection* (17%), and *Threatening the Marsh or Provision of Services* (16%). Together these 4 major themes account for 77% of themes within McIntosh County. The remaining 23% is made up of 4 minor themes: *Coastal Protection and Flooding* (9%), *Depending on the Marsh Economically* (6%), *Feeling Disavowed by Government* (6%), and *Knowledge of Ecosystem Functions* (2%).

Areas of Interest across Populations

Coastal Protection and Flooding emerged as a major theme in Glynn County and as a minor theme in McIntosh County. *Depending on the Marsh Economically* was 2% more prominent in McIntosh County than in Glynn. Similarly, *Feeling Disavowed by Government* was 2% more prominent in Glynn County than in McIntosh.

Cultural ES

Table 11. Percent composition of Cultural Ecosystem Services by County

Percent composition of --CULTURAL ECOSYSTEM SERVICES by county		
<i>Axial Node</i>	<i>Glynn</i>	<i>McIntosh</i>
AESTHETICS OF ENGAGEMENT	19%	15%
BEQUEST VALUE	1%	1%
CULTURAL HERITAGE	8%	10%
ECOSYSTEM DISSERVICES	5%	4%
EDUCATIONAL VALUE	15%	12%
FEELING SPIRITUAL, RELIGIOUS, OR A SENSE OF WONDER	1%	1%
INSPIRING OR APPRECIATING ARTISTIC EXPRESSION	1%	—
INTERCONNECTEDNESS	3%	4%
INTRINSIC VALUE	5%	6%
MEDICINAL VALUE	1%	1%
RECREATIONAL VALUE	14%	17%
RESTORATIVE VALUE	7%	3%
SENSE OF PLACE	13%	18%
TRANSFORMATIVE	4%	6%
WILDERNESS	3%	2%
	100%	100%

Table 11 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Cultural Ecosystem Services. Table 11 also shows their percent prominence per population, their classification as major (red) or minor (yellow) themes, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Glynn County

Aesthetics of Engagement emerged as the most prominent major concept within Glynn County’s *Cultural ES* theme, accounting for 19% of total prominence. Secondary major concepts include: *Educational Value* (15%), *Recreational Value* (14%), and *Sense of Place* (13%). Together these 4 major concepts make up 61% of the concepts within Glynn County’s *Cultural ES* theme. The remaining 39% is composed of 11 minor

concepts: *Cultural Heritage* (8%), *Restorative* (7%), *Ecosystem Disservices* (5%), *Intrinsic Value* (5%), *Transformative* (4%), *Interconnectedness* (3%), *Wilderness* (3%), *Bequest Value* (1%), *Feeling Spiritual, Religious or a Sense of Wonder* (1%), *Inspiring or Appreciating Artistic Expression* (1%), and *Medicinal Value* (1%).

McIntosh County

Sense of Place emerged as the most prominent major concept within McIntosh County's *Cultural ES* theme, accounting for 18% of total prominence. Secondary major concepts include: *Recreational* (17%), *Aesthetics of Engagement* (15%), *Educational Value* (12%), and *Cultural Heritage* (10%). Together these 5 major concepts make up 72% of McIntosh's *Cultural ES* theme. The remaining 28% is composed of 9 minor concepts: *Intrinsic Value* (6%), *Transformative* (6%), *Ecosystem Disservices* (4%), *Interconnectedness* (4%), *Restorative Value* (3%), *Wilderness* (2%), *Bequest Value* (1%), *Feeling Spiritual, Religious, or a Sense of Wonder* (1%), and *Medicinal Value* (1%).

Areas of Interest Across Populations

Inspiring or Appreciating Artistic Expression only emerged in Glynn County. *Cultural Heritage* emerged as a major concept in McIntosh County and as a minor concept in Glynn County. The most prominent major concept differed between the two counties. *Restorative value* was more prominent in Glynn while *Transformative* was more prominent in McIntosh.

Wildlife and Habitat

Table 12. Percent composition of wildlife and habitat by county

Percent composition of --WILDLIFE AND HABITAT by county		
<i>Axial Node</i>	<i>Glynn</i>	<i>McIntosh</i>
BIODIVERSITY	35%	32%
HABITAT	21%	23%
HEALTH OF HABITAT OR ENVIRONMENT	21%	24%
MIGRATORY PATHWAYS	1%	1%
OBSERVING ENVIRONMENTAL CHANGE	18%	18%
RESILIENCY OF THE MARSH	4%	3%
	100%	100%

Table 12 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Wildlife and Habitat. Table 12 also shows their percent prominence per population, their classification as major (red) or minor (yellow) themes, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Glynn County

Biodiversity emerged as the most prominent major concept in Glynn County, making up 35% of total prominence within the *Wildlife and Habitat* major theme. Secondary major concepts include: *Habitat* (21%), *Health of Habitat or Environment* (21%), and *Observing Environmental Change* (18%). Together these 4 major concepts make up 95% of concepts within the *Wildlife and Habitat* major theme for Glynn County. The remaining 5% is composed of 2 minor concepts: *Resiliency of the Marsh* (4%) and *Migratory Pathways* (1%).

McIntosh County

Similarly, *Biodiversity* emerged as the most prominent major concept in McIntosh County, making up 32% of total prominence within the *Wildlife and Habitat* major theme. Secondary major concepts include: *Health of Habitat or Environment* (24%), *Habitat* (23%), and *Observing Environmental Change* (18%). Together these 4 major

concepts make up 96% of concepts within the *Wildlife and Habitat* major theme for McIntosh County. The remaining 4% is composed of 2 minor concepts: *Resiliency of the Marsh* (3%) and *Migratory Pathways* (1%).

Areas of Interest across Populations

The prominence of these concepts is very similar across populations for this theme, with McIntosh County showing slightly more prominence for *Habitat* and *Health of Habitat or Environment* while slightly smaller prominence for *Biodiversity*.

Coastal Protection and Flooding

Table 13. Percent composition of Coastal Protection and Flooding by County

Percent composition of --COASTAL PROTECTION AND FLOODING by county		
<i>Axial Node</i>	<i>Glynn</i>	<i>McIntosh</i>
COASTAL PROTECTION	17%	28%
CONCERN REGARDING FLOODING AND STORMS	55%	40%
DRAINAGE PROBLEMS	9%	9%
FLOOD INSURANCE	5%	9%
FLOODING NOT AN ISSUE IN CERTAIN AREAS	5%	7%
LACK OF FLOODING MITIGATION	9%	9%
	100%	100%

Table 13 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Coastal Protection and Flooding. Table 13 also shows their percent prominence per population, their classification as major (red) or minor (yellow) themes, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Glynn County

This theme emerged as a major theme within Glynn County. *Concern Regarding Flooding and Storms* emerged as the most prominent major concept in Glynn County, accounting for 55% of total prominence within the *Coastal Protection and Flooding* major theme. *Coastal Protection* (17%) emerged as the only secondary major concept. Together these two major concepts make up 72% of concepts within this major theme in

Glynn County. The remaining 28% of concepts are comprised of 4 minor themes:

Drainage Problems (9%), Lack of Flooding Mitigation (9%), Flood Insurance (5%), and Flooding not an issue in certain areas (5%).

McIntosh County

This theme emerged as minor within McIntosh County. *Concern Regarding Flooding and Storms* emerged as the most prominent major concept within this minor theme in McIntosh County. *Coastal Protection (28%)* emerged as the only secondary major concept within this minor theme. Together these 2 major concepts make up 68% of concepts within this minor theme for McIntosh County. The remaining 32% is comprised of 4 minor concepts: *Drainage Problems (9%), Flood Insurance (9%), Lack of Flooding Mitigation (9%), and Flooding Not an Issue in certain areas (7%).*

Areas of Interest across Populations

Coastal Protection and Flooding emerged as a major theme in Glynn County and as a minor theme in McIntosh County.

Community Agency and Engagement in Protection

Table 14. Percent composition of Community Agency and Engagement in Protection by county

Percent composition of --COMMUNITY AGENCY AND ENGAGEMENT IN PROTECTION by county		
<i>Axial Node</i>	<i>Glynn</i>	<i>McIntosh</i>
APATHY OR DISRESPECT FOR THE ENVIRONMENT	10%	10%
COMMUNITY ACTIVISM AND ENGAGEMENT	12%	12%
FORGING CONNECTIONS WITH THE MARSH TO VALUE IT	6%	2%
HOLDING BIG INDUSTRY ACCOUNTABLE	4%	1%
LACK OF INFORMATION AND AWARENESS	4%	6%
PARTNERS IN PROTECTING THE MARSH	21%	19%
RECYCLING	2%	3%
REQUESTING DEVELOPMENT BE PLANNED AND HONEST	5%	1%
RESTORATION EFFORTS	2%	4%
RESTRICTIONS OR SUPPORT FOR RESTRICTIONS	9%	17%
SUPPORTING PROTECTION	26%	26%
	100%	100%

Table 14 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Community Agency and Engagement in Protection. Table 14 also shows their percent prominence per population, their classification as major (red) or minor (yellow) themes, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Glynn County

Supporting Protection emerged as the most prominent concept within this theme for Glynn County, accounting for 26% of total prominence within *Community Agency and Engagement in Protection*. Secondary major concepts include: *Partners in Protecting the Marsh* (21%), *Community Activism and Engagement* (12%), and *Apathy or Disrespect for the Environment* (10%). Together these 4 major concepts account for 69% of total prominence within *Community Agency and Engagement in Protection*. The remaining 31% is made up of 7 minor concepts: *Restrictions or Support for Restrictions*

(9%), *Forging Connections with the Marsh to Value it* (6%), *Requesting Development be Planned and Honest* (5%), *Holding Big Industry Accountable* (4%), *Lack of Information and Awareness* (4%), *Recycling* (2%), and *Restoration Efforts* (2%).

McIntosh County

Similarly, *Supporting Protection* emerged as the most prominent concept within this theme for McIntosh County, accounting for 26% of total prominence within *Community Agency and Engagement in Protection*. Secondary major concepts include: *Partners in Protecting the Marsh* (19%), *Restrictions or Support for Restrictions* (17%), *Community Activism and Engagement* (12%), and *Apathy or Disrespect for the Environment* (10%). Together these 5 major concepts account for 84% of total prominence within *Community Agency and Engagement in Protection*. The remaining 16% is made up of 6 minor concepts: *Lack of Information and Awareness* (6%), *Restoration Efforts* (4%), *Recycling* (3%), *Forging Connections with the Marsh to Value it* (2%), *Holding Big Industry Accountable* (1%), and *Requesting Development be Planned and Honest* (1%).

Areas of Interest across Populations

The concept of *Restrictions or Support for Restrictions* gained major prominence in McIntosh but only minor prominence in Glynn. Concerns regarding Development and Big Industry had higher prominence in Glynn County than in McIntosh.

Threatening the Marsh or Provision of Services

Table 15. Percent composition of Threatening the Marsh or Provision of Services by county

Percent composition of --THREATENING THE MARSH OR PROVISION OF SERVICES by county		
<i>Axial Node</i>	<i>Glynn</i>	<i>McIntosh</i>
CLIMATE CHANGE AND SEA-LEVEL RISE	10%	6%
DDT, DOT, AND DIESEL HARMING THE MARSH	1%	4%
DEVELOPMENT CONCERN OR OPPOSITION	39%	33%
ECOLOGICAL IMPLICATIONS OF CLEARCUTTING	6%	5%
LITTER	7%	15%
POACHING	10%	4%
POLLUTION	23%	29%
SALTWATER INTRUSION	1%	—
SEAFOOD ADVISORY	3%	3%
	100%	100%

Table 15 shows the emergent axial codes, referred to in the text as “concepts”, of the theme Threatening the Marsh or Provision of Services. Table 15 also shows their percent prominence per population, their classification as major (red) or minor (yellow) themes, a definition based in the data and an illustrative quotation with source material cited as a prefix to the quote.

Glynn County

Development Concern of Opposition emerged as the most prominent major concept within *Threatening the Marsh or Provision of Services* theme in Glynn County, accounting for 39% of total prominence. Secondary major concepts include: *Pollution* (23%), *Poaching* (10%), and *Climate Change and Sea-Level Rise* (10%). Together these 4 major concepts account for 82% of concepts within this theme for Glynn County. The remaining 18% is made up of 5 minor concepts: *Litter* (7%), *Ecological Implications of Clearcutting* (6%), *Seafood Advisory* (3%), and *Saltwater Intrusion* (1%).

McIntosh County

Development emerged as the most prominent major concept within the *Threatening the Marsh or Provision of Services* in McIntosh County, accounting for 33% of total prominence. Secondary major concepts include: *Pollution* (29%) and *Litter* (15%). Together these 3 major concepts account for 77% of concepts within McIntosh's *Threatening the Marsh or Provision of Services* theme. The remaining 23% is made up of 5 minor concepts: *Climate Change and Sea-Level Rise* (6%), *Ecological Implications of Clearcutting* (5%), *Poaching* (4%), and *Seafood Advisory* (3%).

Areas of Interest across Populations

Saltwater Intrusion did not emerge as a concept within *Threatening the Marsh or Provision of Services* for McIntosh County. *Climate Change and Sea-Level Rise* and *Poaching* emerged as major concepts in Glynn County and as minor concepts in McIntosh. *Litter* emerged as a major concept in McIntosh County with more than double the percent prominence.

DISCUSSION

Here I discuss the outcomes of our investigation, how these outcomes relate to current literature, and conclude by describing my suggestions for further research. Four principal ES were found, 3 were Cultural ES (educational value, recreational value, & aesthetics of engagement), and the remaining ES was Wildlife/Habitat. First, I describe the answer to my overarching research question: What, how and why do the communities of the Central Georgia coast value in their local marshland ecosystem? Next, I answer how public perception/valuation of marshes differ from that of local decision-makers and thought leaders. I then explore how these results relate to the results from Kaplowitz et al.'s (2001) study investigating the differences between data from individual interviews and FGDs. Lastly, I address how perception differs between Glynn and McIntosh Counties.

What ES do the participants value?

Cultural ES

Educational Value

Educational value arose as the most prominent and thus valued cultural ES. Over the past decade many scholars have created specific cultural ES typologies, with education occurring in approximately half of these typologies (Gould & Lincoln, 2017). Despite its allocation within these typologies, the cultural ES of education has been rarely defined, being roughly described as “a tool that enhances the ability of human educators to teach about ecology” (Gould & Lincoln, 2017). Gould & Lincoln (2017), along with

Chan et al. (2012), have expanded the education ES to include concepts like “life teaching¹¹”, “ingenuity¹²”, “research” and “perspective¹³”. Our results regarding *educational value* elicited a unique definition, from which we borrow some aspects from Gould & Lincoln’s (2017) concept of “perspective”: the importance of cultivating an educated community in order to be good stewards of the marsh and continue valuing it and treating it respectfully. Participants defined *education* as both positive and normative: Positive through their lived educational experiences in and around the marsh; normative through their desire for future generations to learn the importance of stewardship through education. Participants’ educational experiences surfaced through exploring the marshes as children, learning about the marsh from others, and cultural heritage:

Just the joy on playing in the water, and um, you know, what the elders taught us to respect the marshes, and um, learn what uh the natural reason why they were here. So, that’s my experience [...] bringing those memories from childhood so that I’d be able to connect it, that has to happen. Um, if my grandfather hadn’t instilled in me the importance of why, and I get an appreciation for the land, and appreciate the beauty of it, it would not make sense to me. I have friends that have moved away and declared that they’re never comin’ back. So they’re not tied to the land. And I think that once that tie is connected, and they see that we’re connected, then I think that makes a difference, and that’s why I said education is important (FGD2 P.8).

We would go out into it to the Hammocks, that’s what they call them little islands out there, Hammocks, and play, build forts and um, got stuck out there, at a tide one time and uh, (laughs) it was interesting but uh, there were many Hammocks out by the marsh behind where we lived, and we went to every one of them, and there was something different on each one (FGD2 P.3).

¹¹ “occurring when an ecosystem provides opportunities for learning life lessons and personal values” (Gould & Lincoln, 2017).

¹² “ecosystems’ aid in developing innovative ideas, approaches, or practices” (Gould & Lincoln, 2017).

¹³ “when ecosystems help people to gain perspective on their place in the world, to see where they fit, or to “put things back into perspective” (this idea was introduced in Gould et al., 2014)” (Gould & Lincoln, 2017).

Participants lamented about how younger generations' lack of those kinds of experiences in the marsh due to parents' concerns about safety, alluding to nature-deficit disorder (NDD) (Louv, 2005). However, some participants with children noted how their children were still given those experiences:

My children like to play in the marsh, and it's a wonder they made it to the age they are now. I know we lost some brand new shoes in the marsh, and they would come, and they would get stuck and I guess they got each other out okay, they're still alive. They loved it, and um, learned a lot about, and saw a lot of nature up close, just wandering around (FGD2 P.6).

To combat NDD, participants suggested an increase in field trips for students, expanding environmental curriculum to all grades, and taking kids to the local educational event "CoastFest." Some participants were hesitant to agree that education of youths was a "silver bullet," and rather suggested that people "have a heart for the environment." They felt educating adults, including local leaders, was imperative. Participant 8 from FGD2 noted "if people know better, they tend to do better." It was through education that participants identified a way to cultivate stewardship that would ensure the marsh would be protected by and for future generations.

Recreation and Aesthetics of Engagement

Recreation and Aesthetics of Engagement emerged as two interconnected major concepts. While these services are the non-use ES often included in economic ES valuation studies, their enigmatic nature leads them to be better fully understood through deliberative and narrative processes (Chan, Guerry, et al., 2012; Gould et al., 2014; Milcu et al., 2013). In the case of this study, participants listed partaking in activities such as: fishing, boating, recreational shrimping, kayaking, bird-watching, etc. Participants partook in these activities with family and friends on public lands and waters via personal

boats or guided eco-tours. Given the adult age of the participants, many waxed nostalgic on their childhood experiences in and alongside the marsh:

Well I guess when I was probably around six, seven, eight, my mother and I would go and uhm, in the woods I guess and dig for worms, and we would go fishing, and where Oak Grove is, would catch crabs there, and, cause I live on highway 341, so, uh, there was a railroad track out there, that we would go walk down the railroad track and we would catch fish (FGD1 P.6).

Many participants also noted having family members who depended on the marsh economically:

My brother is a hunting and fishing guide, so he has skin in the game, he really cares a lot about the marshes, the rivers, and the ocean because it's his livelihood (FGD3 P.7).

Oftentimes, participants described their aesthetic experience within the context of recreational activities:

I had a moment on a kayak tour, the last one I went on. My son, before he left, he took us out just for, just for, just us, and we went out and went down and when we got into that little cove with the turtles and everything, sun was goin' down, gettin' close, and it was really beautiful, I mean watching all the turtles comin' up all at the same time, and it just really struck out, because *that* was nature (FGD3 P.6).

Regardless, participants noted the benefits they garner from passively viewing the marsh:

Every night is different, every sunset, it's just gorgeous. Sometimes you just look at all the different colors and it's amazing (FGD1 P.1).

Participants used the terms “beauty” or “beautiful” to describe their experiences in or alongside the marsh almost as if they had no better way to describe it. Participants also noted other aspects of *aesthetics of engagement* such as the smell of marsh mud, the sound of insects in the spring, and the feeling of being stuck in marsh mud.

Wildlife and Habitat

Wildlife and Habitat emerged as the second most prominent major theme, with most references situated within the *Biodiversity* concept. Participants noted many species of plants and animals that they observe or have relationships with such as: diamondback terrapins, hawks, marsh bunnies, a variety of egrets, heron, fish, *Spartina*, and even gnats and bats. Many of these species are non-market species and would be overlooked by traditional ES valuation methods. Participants prided themselves on having intricate knowledge of animals and their associated habitats:

“...that’s a mating area for [turtles], and you don’t see that until you get in the marsh and you go to that spot...” (Participant 6, FGD3).

Because we are in a migratory pathway, right here, and so the diversity of birds that, more so in the fall than in the spring, but not sure why that’s the case, but um, the flocks of birds that come through, it’s just a magnificent sight (FGD3 P.1).

[A] lot of bats in the area, I’ve walked, gone out in the early morning hours, walk my dog, and you look up and you can see ‘em, just over your head, maybe hundreds of ‘em, depending on where you are. If you’re in the wooded area, something like this, you can see ‘em flying all over the place eatin’ mosquitoes, which get really bad here after the rains and everything sits stagnant... (FGD3 P.6).

When the discussion took a turn to ecosystem disservices provided by nuisance organisms-notably sand gnats- participants were quick to note those organisms’ importance within ecosystem as a whole:

They pollinate the marsh grass. Without those sand gnats, we wouldn’t have any shrimp. So we gotta put up with them (FGD1 P.1).

Overall, all participants had at least a cursory education in regards to marsh ecosystems and their benefits to humans. They identified their most valued ES themes through their discussion content (measured by percent prominence) to be *cultural ES* and

wildlife and habitat.

How and why do participants value these ES?

Relational Values

Chan et al. (2016), the Intergovernmental Platform on Biodiversity (IPBES), and Pascual et al. (2017) have suggested the concept of “relational values” to add to the existing focus on instrumental and intrinsic values of ES. As described in the Literature Review, relational values describes “a relational interaction between environmental spaces and cultural practices, dependent on the biophysical domain and generating benefits in terms of experiences, identities, and capabilities” (Fish, Church, & Winter, 2016; Stalhammar & Pedersen, 2017).

The relational values of our FGD results are: childhood experiences in expansive marshes inspire stewardship cultivation in the context of industrial pollution and residential development, leading to regulatory enforcement needs (Figure 9). The term “childhood experiences” serves as a proxy for *education* and *recreation* ES. “Expansive marshes” speaks to the *aesthetics of engagement* as well as the underlying preservation of Georgia marshes through the Coastal Marshlands Protection Act. The outcome “inspire stewardship cultivation” is composed of many concepts within the theme *Community Agency and Engagement in Protection* as well as the normative aspects of the *education* concept within *cultural ES*. The underlying driver for this outcome is “industrial pollution and residential development.” All of these components together form the summary descriptor of the research, “regulatory enforcement needs” which was identified by the participants as being a need the area has in order to maintain and protect the

marshes. These described ES are valued in relation to this area’s population and their salt marshes, including the divers for human action in support of the marshes.

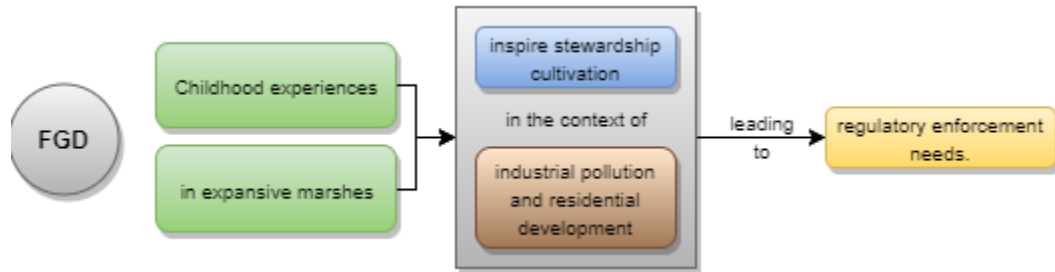


Figure 9. Relational Values of FGD

Regulatory Enforcement Needs.

Local author Charles Seabrook, notes that “if the area was famous for anything, it was for corrupt politics, shady businesses, and racial injustice” (Seabrook, 2012).

Participants mentioned observing environmental changes over the course of their residency which included: lacking enforcement of regulations, shifting baselines (Pauly, 1995), and “good ol’ boy” political corruption.

Accountability, because we have some laws in place, and people keep getting around ‘em (FGD2 P.6).

[B]ack when I was a kid, I would see my dad and my uncles and all, they would go out in a daytime and catch a hundred trout, you know, a hundred trout. Had to have a string as long as from, (gestures at arm’s length) here to, to this guy. And now, you go out and if you catch six or eight, boy you’ve had a pretty good day, you know, I mean if if they’re a good size (FGD1 P.1).

Yeah, there, there the good ol’ boy is something that we say, we don’t say out loud (FGD3 P.3).

Participants expressed that regulatory enforcement is unlikely to come from government and that they would rather depend on local organizations such as non-profits. Participants identified the following organizations to whom they would reach out to for

support in protecting the marsh: County Extension Agencies and the Georgia Department of Natural Resources (DNR) within the government; Altamaha River Keepers, Glynn Environmental Coalition, 100 Miles, Nature Conservancy, Friends of Sapelo Island, and St. Simon's Land Trust in terms of private organizations. In the case of the government agencies included in that list, participants had comments in regards to their inability or unwillingness to assist citizens:

You know I know a lot of DNR guys, and I swear, and some of them are my friends, [name], I've known him my whole life, I love him to death, but [name]'s got a government job, and he can't wait 'til retirement. You know, and he don't... if the marsh turned brown tomorrow he'd say, "hey, man four more years...(laughs) (FGD1 P.1).

I think the problem with that though is the extensions services are so desperately underfunded, that where they used to have a county agent in each and every county, now there's a county agent that runs six counties or something like that, I mean spread all over the place, and it's very difficult to, to utilize that as they were originally planned to be used (FGD3 P.6).

Participants described DNR as "toothless" and most shared a feeling of being disavowed by government. Some participants extended their disavowed feelings beyond the local offices of agencies and towards proposed budget cuts for environmental programs by the federal and state governments:

Just like that gentlemen said though, with all the cutbacks that's goin' on in Washington DC now, we just spittin' in the wind (FGD1 P1).

Funding for anything, especially coming from the state level, you know, people throughout the state could care less about coastal Georgia you know, when they don't live here, and I worked for the government for 32 years, for state government, and never heard anything about coastal Georgia and funding for different things down here, but if it comes to the local community having to pony up to do things to improve the area like that, for the marshes, I just can't imagine you'd find very much support anywhere for it because unless it affects them they could care less as well (FGD3 P.12).

A lot of it has to do with economics. The city of Brunswick has no money. Uh, the tax base is low, the millage rate is low. They don't have the funds to fix what needs to be fixed (FGD2 P.3).

Threats to the Marsh

Within the context of the perceived disinterest and underfunding of their government, participants identified distinct threats to their salt marshes. The threats most notably include industrial pollution and residential development. Glynn county is described as “one of the most contaminated places in the South” (Seabrook, 2012). Glynn County alone is home to 16 identified hazardous waste sites, eight brownfields, six actively polluting industries, and three superfund sites (EPA, 2017). One of the superfund sites, “LCP Chemicals”, which runs along Turtle River and Pervis Creek is regarded as “the worst superfund site in the South and one of the worst in the entire nation” (Baker, 1997). Many participants noted how the LCP chemical’s historical pollution still affects their recreational fishing:

Yeah I’ve fished Turtle River when I was six years old until I was 10 [...] I mean I enjoy catching ‘em out there now because I’ve caught some nice fish outta there, but uh, as far as eating them? It’s catch and release (laughs) (FGD 1, P.10).

Other participants noted that the fish from these polluted areas do not stay in one place:

“so I don’t eat fish from that part,” and so I was sitting there thinking, “I wonder if those fish know not to swim out of that area...? (FGD1 P.1)”

Pollutants and contaminants, in most cases, do move through the water column and food webs. McIntosh County faces similar challenges. A recent study regarding a specific PCB from the LCP Chemicals site sought to use a dolphin population found off of Sapelo Island as a control group to compare accumulated levels against Brunswick populations, however the Sapelo population was also highly affected (Balmer et al., 2011).

Participants also complained about the pollution from local paper mills as well as

impending pollution inland from a proposed coal ash disposal site along the Satilla River.

In terms of development as a threat, participants identified increased building of homes and roads to be major issues:

And one of the things that I find with the people that come here, they come here because of the beauty, but they want the amenities of where they left. And like, it doesn't match like those folks that have built all that housing, houses on the north end of McIntosh County on the water, when you got all the septic tanks and the, you don't think about those things, but it impacts the marsh. (FGD2 P.8).

I've been here 74 years, what y'all talkin' bout is happening... living here, I've been on the water since I was six years old, over here on, daddy, my granddaddy used to be the bridge tender on (inaudible bridge name) a wooden bridge, and we fished, and I have watched the marshes fill in, the creeks cut off, there was a road cutting rivers off... We used to have a house over on Joyner Island over here on when you go to Jekyll, we're on the right hand side. Plenty of oysters you go over there now, and everything muddied in, they've cut that river off. There used to be a river runnin' in front of Joyner across 17 and went up back into Brunswick. Used to haul liquor there during prohibition (FGD1 P.4).

Studies show that “minimal development- just 10% of a watershed- may do measurable harm to streams” and marshes (Beach, 2002). The Altamaha River is the largest relatively pristine and clean estuary system on the eastern seaboard, providing the third largest quantity of fresh water for the area. The Pew Oceans' Coastal Sprawl report notes that “if today's land consumption trends continue, more than 25% of the [US] coast's acreage will be developed by 2025 [...] a prescription for severe ecological damage” (Beach, 2002; Seabrook, 2012). Glynn and McIntosh Counties are both expecting a boom in population, mostly from retirees in the coming decades (Hauer et al., 2011). This forthcoming influx will require increased development. As far as our participants were concerned, this was not a welcome change. Participants demanded that future development be free from “good ol' boy” corruption, and that all regulations, mainly buffers and restrictions to build on marshes, are upheld without exception.

Civic Ecology and Sense of Place

Aside from recognizing the threats and changes to the salt marsh over time, residents take action to clean up, restore, or work to protect the marsh.

Where we live, it's trash daily in the marsh, and several of us will get together on the weekends and go out and pick it up (FGD2 P.3).

Many participants identified the local oyster shell recycling program as a great yet under-used resource:

There's a couple companies, that are, there's one in Savannah, there's one in Jacksonville that they've been doing from Jacksonville to Savannah. And they go along and the beach re-nourishment programs, where they have 'em, they come in and they, they save oyster shells and they come in and put 'em just offshore, like half mile offshore. And what that does is allow the sand to build, to build the marshes (FGD1 P.1).

Through their close relationship with the marsh, either through appreciating its scenic qualities, being involved in fisheries, or simply passing it on their daily commute, the marsh has established a formative value in their lives:

some of our best friends grew up here, and have lived there all their lives, and their culture is very much one of fishing and crabbing and we've been, um, very lucky to be invited to, um, Friday night fish fries, which happen because people fish, or um in the season they get crabs, and then they have to be eaten, so lots of people come together on the riverbanks or at their homes and um, I think that the marsh has inspired a kind of culture here that is, uh, very friendly (FGD3 P.1).

Yeah, I mean, healthy, continued healthy food that comes out of, you know, it's all, it's, it's all connected to a thriving, that ecosystem affects our lives (FGD3 P.5).

It's been such a major part of, of life here for a long, long time, and so many people are connected to the marsh, many shrimpers... (FGD3 P.11).

A myriad of aspects of the Georgia salt marsh permeate our participants' lives and construct their socio-cultural value to this area. In this sense, the ES we learned about through the course of this study were not simply one-way benefits provided to humans from ecosystems, but a highly interconnected and complex set of relationships.

What were the differences or similarities of ES valuation between FGDs (the general public) and KIIs (decision-makers and thought-leaders)?

Relational Values

Many results emerged with the same major or minor prominence between the two samples and methods. *Cultural ES* emerged as the most prominent major theme across methods and samples with *Wildlife and Habitat* as the second most prominent major theme. Within *Cultural ES*, the same concepts, *educational value*, *recreation*, *aesthetics of engagement*, and *sense of place* emerged with prominence in the same order as in the FGDs. *Biodiversity* was the most prominent major concept within *Wildlife and Habitat*, albeit much more prominent in the KII sample than the FGD sample.

The relational values of our KII results are: recreational and research experiences in expansive salt marshes inspire political action in the context of climate change/sea-level rise and industrial pollution, leading to cooperative conservation (Figure 10). The terms “recreational and research experience” serves as a proxy for *education*, *recreation*, and *research value* ES. “Expansive marshes” speaks to the *aesthetics of engagement* as well as the underlying preservation of Georgia marshes through the Coastal Marshlands Protection Act. The outcome “inspire political action” is composed of many concepts within the theme *Community Agency and Engagement in Protection*. The underlying driver for this outcome is “climate change/sea-level rise and industrial pollution.” All of these components together form the summary descriptor of the research, “cooperative conservation,” which was identified by the participants as being a desire to work together in order to maintain and protect the marshes. These described ES are valued in relation to

the leadership of this area and their salt marshes, including the drivers for human action in support of the marshes.

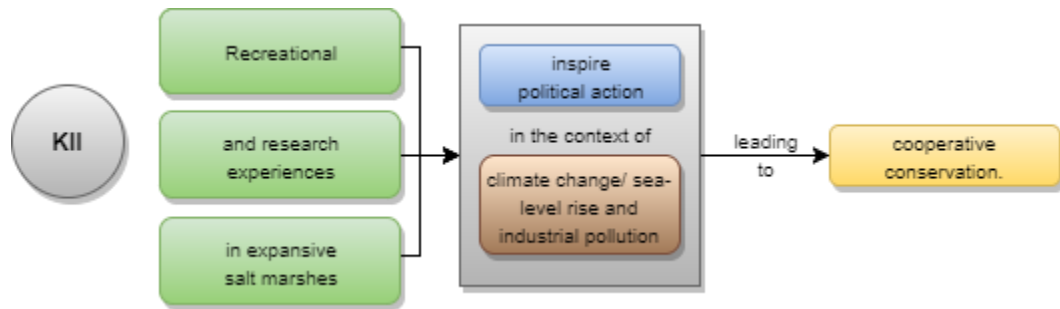


Figure 10. Relational values of KII

Cultural ES

KII participants noted the importance of education:

I think it is education at broad level. I think its uh um I think its informed voters. So when you say education sometimes people think about little people and aquaria. I don't think it's just that, I think it's having an informed citizenry at all ages and education level so that when someone funds a resource protection commission that it's able to continue to perform. So that when a little person says they want to be a marine scientist, the parents don't say "well don't you want to be a doctor instead?" Um, so that when someone tells a legislator that the marine environment is important to tourism, that they're not that legislator that's experience with the coastal environment may be limited isn't thinking it's just fishing tournaments. So I think that education across multiple levels that has individuals appreciate the salt marsh right where they sit, rather than imagining what the benefit is for somebody other than them, but understanding it right where they sit, I think that's the challenge of education and stewardship that we continually face (KII 8).

Education, they made sure to note, was not only for the benefit of the general public but

also for other leaders and law-enforcement:

It needs to be a living in the community, living type of conversation that everybody knows what's good and bad, like the drugs everybody is familiar with that now, people know to make a phone call if there's a drug addict here, nobody knows even know which number to call about the marshes you know. There's still this, you know call the police you know

and they try to fight other crime, "oh yeah we'll try to get somebody on that...somebody calling me about some freaking marsh" (laughs) and we got people here trying to robbing the houses, and I hate to say it my police officer friends will probably be upset with me but you know what's their motive? We got other problems "you need to call Riverkeepers" that's probably what they would say "phew, got them off our backs, here's a phone number" but there is no real concern here, it's not in any community meeting, it's not talked about in our churches, it's not at any of the uh educational forums, it's not a major topic even at the library (KII 6).

Participants noted the importance of marsh aesthetics in terms of their iconic qualities and draw for ecotourism:

Um I think I think special, especially here it's very iconic and so... um people do value our salt marsh here because it's very visible. Um, and I think they hold, they you know, they value it, because it is um it is iconic, it draws people here for ecotourism. Um, we we are considered one of the most pristine States as a Coastal State because we do protect it, um and that's one of the benefits of the Georgia's salt marsh (KII 3).

One KII participant noted about the marsh's value to them as a Gullah-Geechee:

[B]ecause the cultural aspect, for the Gullah Geechee culture its, [the marsh is] a part of our soul, it's a part of who we are and especially most people don't know it and don't know much about the Gullah-Geechees in that sense, I mean you know but only on the grand scheme even we know. I'm deep in the trenches so in my world it's like everybody knows, but at a professional level in this there are very few people who know about the culture and how its tied to to the land and to the marshes, [...] its the marshes, its home for us, we are buried it's part of our culture, we're buried near the water. Most of our rituals are near the water, if you go to George Washington and Martha where they're buried and I have cause I do a lot of research and his enslaved people he had uh they're buried near the marshes, near the water. It's a part of our inner being (KII 6).

Threats

The main differences between KII and FGD were in the *Threatening the Marsh or Provision of Services* theme. KII participants made no mention of *holding big industry accountable, enforcement issues, or development* as a threat as the FGD population did. KII participants however, identified climate change and sea-level rise as the most prominent major threat:

[T]he data from the station there at the ferry dock suggest that sea-level has come up 2 or 3 inches in the last 15 years. Uh we had uh a King Tide, a predicted King Tide in October of 2015 that flooded the main ferry dock here on the island. I happened to be out of town at the time but people were wading through 3 or 4 inches of Duplin River water that was unprecedented to everyone's knowledge including people that have lived here on the Island all their lives (KII 5).

Uh so our our program actually is charged with trying to improve uh the awareness and the uh activities of local communities for dealing with with uh sea-level rise and storm surge and nuisance flooding and so on. I would say at the moment they the the county including Hog Hammock here on Sapelo is...uh...not thinking about the issue and not doing too much to deal with the issue. Uh it's not it's not uh a topic that local people uh pay much attention to [...] So, in general I think the local community is is not informed, not active, not concerned and not doing much of anything. That's not true along the entire Georgia coast because our partners like the Marine Extension Service are out there working with some of the local communities on the uh adaptation plans and improving their Community Rating System, you know CRS, community rating, what the hell is the S....score (KII 5).

Pollution also emerged as a major threat:

It's a new normal, the pollution from those pulp mills have made a new normal and people have just don't know what things used to be like, or how productive they could be so, and I'm afraid that we're, if we keep doing what we're doing and not dealing with pollution issues that we will have a new normal and we will, we may never know how productive our systems and rivers and marshes can be (KII 9).

I believe the non-designation of development as a threat by KIIs speaks to their positions as decision-makers for the community, which requires a pro-development perspective given population projections. KII participants, instead of identifying development as a threat designated *wanting planned and honest development* as a major theme which only emerged within the KII population. Instead of a threat, it is a necessary evil, and they want it done in a way which "honors the marsh," accounts for sea-level rise and flood risks, and is situated within existing regulations on development.

I mean, I think the thing I know most about is the marine debris. Um...but I think keeping it as unbuilt-upon as possible, like the thing that is most breathtaking and magical about this area is being able to look out and see

uninterrupted um marsh for you know as far as the eye can see and anytime you're building upon that its disrupting that and I say that also knowing that we're seeing it from bridges that had to be built and had to interrupt it but I feel like there's like a really precarious balance of being overbuilt and then being built for use which benefits it and like I said honors it or makes it so that you can marvel at the beauty of how just being um without disrupting it (KII 7).

Um, I, I would I would be in favor of um carefully planned development, taking it to consideration you know the changing um...flood, sea-water levels and the flood levels and things like that. I'm not gonna say no development but there's a lot of ways you can develop in some areas that are more sensitive than others (KII 9).

Coastal Protection and Flooding

Lastly, the KII population was able to identify flooding adaptation and mitigation measures being put in place where FGD participants were not.

I think...most communities are now participating in the Community Rating System. Um...I would like to say some um some local governments, are trying to persuade their citizens to build low-impact development for flooding, you know, native vegetation...um...elevating their house when they can...um...those different steps its um, elevating your house has probably been a practice a little bit bigger in our area so, that's really good (KII 3).

We we uh we have the first two living shorelines in Georgia uh right here. One's right out in front of the building and the other is about 200 yards up the up the uh creek. So so erosion was taking out the uh bank along the front of where our office sits here on Sapelo and then up next to one of the DNR residences and uh a consortium of a partnership of multiple interests (KII 5).

We do have some low lying areas so we know where those low lying areas are and we knew we would end up with some flooding issues, there's one particular neighborhood in the city called "College Park" and it it always always has flooding issues, so we have now finally joined arms with the county as a joint venture to come in and completely address those flooding issues because while most of the property is in the city and the homes are in the city, the um wastewater or the storm water treatment and all of that that's kind of under the ground, um is in the county, so we are now joining together to use some SPLOST funding to really address that issue with those residents (KII 1).

FGD participants simply assumed these adaptations and mitigation efforts weren't being considered, and that they would simply have to suffer from improperly maintained

drainage ditches forever. Local leaders acknowledged the issues of the drainage ditch maintenance and attributed this shortcoming to a long-standing disagreement between cities and counties as to who must maintain them.

Summary of Differences and Similarities

Both FGD and KII participants noted that their peers and children needed to be better educated about marsh ecosystems and their benefits to humans. Perhaps discussing identified threats and their context within ecology would be a great start for these two populations to reconcile their different versions of reality and move forward to address threats more efficiently for the needs of the population and the marsh.

How did our results relate to Kaplowitz & Hoehn (2001)?

Kaplowitz & Hoehn (2001) conclude that “focus groups and individual interviews are not substitutes” and that they “revealed significantly different ecosystem service information” (Kaplowitz & Hoehn, 2001). They found that non-consumptive services were discussed more frequently in FGDs, and that controversial information was more freely shared in interviews as opposed to the public setting of a FGD (Kaplowitz & Hoehn, 2001). These results suggest that FGDs and interviews reveal different information and thus should be used together instead of researchers utilizing one or the other (Kaplowitz & Hoehn, 2001).

Our results differ from the results of Kaplowitz & Hoehn, despite using almost identical methods¹⁴. Our results show that similar information was brought up between the two populations/methods. In terms of non-consumptive ES, which is situated within *Cultural ES*, parts of *Wildlife and Habitat* and *Coastal Protection and Flooding*, our

¹⁴ Our methods differ in that the FGD participants were randomly selected from the public and KIIs were purposefully selected based on their role in the community. Kaplowitz & Hoehn purposefully selected all of their participants.

results between the two populations only differed by no more than 2% prominence. Controversial information emerged through both methods: FGDs brought up purposeful diesel spills and KIIs brought up dumping trash in the marshes for decades.

Regardless of the overwhelming similarities between the results, there were indeed differences. This could be attributed to either the different population or the different method of data collection. Do our results mean that these two methods may be used interchangeably? I argue that the difference between my results and Kaplowitz & Hoehn's (2001) calls for further research before conclusions can be made about the information these two methods elicit. Regardless, I assert that including the general public in the form of a deliberative method is an essential part of any ES valuation study.

What are the differences or similarities between Glynn County and McIntosh County ES values?

Cultural ES

Our two-county comparison yielded similar results, yet there were some important differences. *Cultural ES* remained the highest valued ES across the two counties. However, within *Cultural ES* the concept of *cultural heritage* arose for the first time as major within McIntosh County. We define *cultural heritage* as: how local history and culture connects to the marsh. McIntosh county resident participants noted aspects of their history and culture:

I used to bottle on antique bottles, and I'm familiar with all these Hammocks around here, all these little islands like you see right there, 99 percent of 'em were made from the ballast where they'd dump their ballast out and then stuff would start growin' on 'em (FGD 2 P.10).

[The marsh has] been such a major part of, of life here for a long, long time, and so many people are connected to the marsh, many shrimpers... (FGD3 P.11).

Sense of Place also emerged 5% higher in McIntosh County, which can be related to the higher prominence of the *transformative* minor theme. By in large the residents of McIntosh County were long established residents of the area, many living their entire lives in McIntosh County. They expressed *sense of place* as follows:

And um, the smell of the salt, um, I knew I was near salt water, had the opportunity to go to Beaufort, up in those areas, and to Sierra Leone, West Africa, and had the same experience when I got around salt, so I knew I was home, so, those are my experiences (FGD2 P.8).

My memories of the marshes is that was our playing field, and we would watch the, um, crickets, and the...Crabs, and um, as I said, that was where we played, and so um, I enjoy it as I got older because I like the peace and quiet to have that opportunity to hear everything, all the sounds that come out of the marsh, and it's comforting to me (FGD 2 P.8).

Coastal Protection and Flooding

McIntosh County residents did not discuss the theme of *Coastal Protection and Flooding* with the same level of prominence which emerged from Glynn County residents. McIntosh County's prominence rated 15% lower *concern regarding flooding and storms* concept and 9% higher for the concept *coastal protection*. This can be attributed to McIntosh County's elevation on a series of bluffs and history allegedly free from flooding:

I haven't uh, I haven't seen that much flooding in Darien area, but it's my understanding that the marshes actually control the floods and helps out with that (FGD 3 P.8).

[F]inally we got FEMA to meet us here in Darien, and now they're gonna rezone it, because they had zoned it to where it was terrible flood zone, and when we looked back, I got the inspector to go back and look and as long as they'd been keepin' records, there had never been a flood in this area (FGD 2, P.10).

Restrictions and Support for Restrictions.

McIntosh County held *restrictions or support for restrictions* in higher regard than Glynn County. In many cases this was in relation to fisheries restrictions. Given

McIntosh County's dependence on the fishing industry, this makes sense. Participants observed shifting baselines and exuded thanks for fishing regulations for the long-term sustainability of the fisheries economy.

Well it keeps that seafood industry alive, and that's the backbone of our neighborhood. I think it's the backbone of our neighborhood 'cause I'm kinda partial. I live in Little Crescent, Georgia, where our only industry is shrimpin' and crabbin', you know, we don't have any office workers, and uh, and as long as that marsh is healthy, it'll keep putting 'em out there (FGD1 P.1).

Well there's fines, but you gotta catch em to do it. And you gotta have enforcement to do that (FGD 1 P.1).

This McIntosh County participant noted having observed an interesting style of poaching or skirting fishing regulations on large sport fish to achieve a maximum payout from Japanese interests:

I've been on a boat who was doin' it, you say you catch like, swordfish or yellowfin, you catch two. That's all you're allowed to have so when you catch the third one, you throw the smallest one back, and when you catch the fourth one, you throw the smallest one back, and so on until you got a couple of fish that cost a hundred thousand dollars apiece. You know, like the swordfish it's all goin' to Japan. But a 400, 500 pound swordfish, you're lookin' at \$100,000, those things are \$30 a pound. But in the meantime, they've wasted all this fish that they threw back. You know but you can't, it'd take all the Coast Guard and the Navy and everything in the world to enforce that, because you can't be on every one of those boats watchin' what they're doin' (FGD 1 P.1).

That same participant also spoke out against the level of regulated discharge from a local paper mill:

over in Jessup, which is like 30-40 miles inland from here, we got a big gigantic mill over called Rayonier Pulp and Paper, and their discharge and, what they, what they call "red water," it's just a, just a pollutant, they just dump it into the Altamaha River, the largest fresh water river estuary east of the Mississippi River in the United States, and they dump it in, and for a couple of miles down the stream, the water is actually just red, and and just nasty, and it smells. But... they employ everybody in Jessup, and so they say "it won't hurt you, it's good for you," you know, "take another whiff!" (FGD1 P.1)

The two counties also differed in their major threat identification with Glynn County identifying climate change and sea-level rise as a major threat, whilst McIntosh deemed it minor (probably due to their elevation and lack of flood experience). One Glynn County participant noted:

Well NOAA I guess a year ago, maybe two, issued their projection for the next, I think it was the next 100 years, and how the coastlines would shift, and would, you know, the water levels would move inland, and if I remember correctly, St. Simon's in 100 years there would only be about half of it still above water, just as an example. And Sea Island probably gone and so forth but, you know, these are computer projections and you can accept them or not, but uh, they know more than I know, I tell you that much (FGD 3 P.1).

Summary and Future Research

Overall, the participants from McIntosh and Glynn counties emerged as fierce protectors of their marsh. They want the coastal marshes of Georgia to be preserved and protected for and by future generations. They value the marsh for its *educational value*, *recreational value*, *aesthetics of engagement*, *sense of place*, and *biodiversity*. Together the FGD and KII populations have identified threats and parts of their community which need improvement to properly address those threats.

Given that my results were different from Kaplowitz & Hoehn (2001), further inquiry and study into the differences of information brought up between discursive qualitative methods is needed. Furthermore, research into the different ES valuation of rural versus urban communities would also be beneficial. The overarching work of the Coastal SEES project to incorporate qualitative and ethnographic methods of ES valuation with economic ES valuation is still yet to be finished. Advances in these three areas would help formulate basic methods which could be applied for cultural ES valuation. Since many cultural ES are place-based, these would be a guideline to be

altered and not a hard and fast protocol.

CONCLUSION

Georgia's coast encompasses the largest salt marsh ecosystem on the Eastern US seaboard. Despite being preserved by the state in 1970, these spaces are heavily polluted as well as subject to land-use change from development and sea-level rise. ES are a valuable tool for attributing value to ecosystems for decision-making. ES valuation, for decades, has focused on easy to measure (market goods) and tangible ES. To ensure that cultural ES are included in value assessments for coastal Georgia, we conducted FGDs and KII to gather this information. Results show that participants from this area value cultural ES most prominently, namely the *educational value*, *recreational value*, *aesthetics of engagement*, and *sense of place* provided by the marsh. Participants also highly value *biodiversity*. These ES are under threat from the above-mentioned sources which inspires participants to cultivate stewardship and participate in political action to protect their local salt marsh ecosystem. The results from this study exhibit how valuable cultural ES are and how imperative it is to include them in any ES valuation study. The method displayed in this study is the main contribution of this thesis. By casting a wide net for deliberation, utilizing FGDs, including the general-public, and the application of grounded theory resulted in easily communicated relational values for the purpose of decision-making on a local scale. Also, this study stands as one of the first cultural ES assessments for salt marsh ecosystems in the United States. Future studies into ES valuation must include deliberative methods from the general public in order to help fully

realize how specific groups of humans and ecosystems interact and relate to one another beyond the bottom line.

APPENDICES

Appendix A: Fau – Coastal Sees Focus Group Screener

[INTRODUCTION]

Hello, may I speak with _____? My name is _____, and I'm calling from GreatBlue Research, Inc., a professional market research firm. We are looking for a limited number of people to join us for a focus group research session sponsored by Florida Atlantic University and Clark University to be held in your local area. The goal is to learn about how local residents like you think about and use the environment along the coast, and how coastal areas should be managed.

If you qualify to take part in the study and choose to participate, you will be joining a 90-minute, in-person focus group at a facility in LOCATION TBD on DATE/TIME TBD. All participants will receive \$85 for their time.

Would be interested in answering a few questions to see if you qualify? This is not a sales contact – no one will attempt to sell you anything. The only purpose of the focus group is to learn your opinions.

SCREENING QUESTIONS: [RECRUITER READ]

When was the last time, if ever, you participated in a market research discussion at a research facility?

- Less than 6 months () Thank and terminate
- 6 months to less than 1 year () Continue
- 1 to less than 5 years () Continue
- 5 or more years () Continue
- Never () Continue

What category best describes your age:

[RECRUITER NOTE: RECRUIT A MIX]

- 18 to 24 () Continue
(Recruit 1-3)
- 25 to 34 () Continue
(Recruit 1-3)
- 35 to 44 () Continue
(Recruit 1-3)
- 45 to 54 () Continue
(Recruit 1-3)
- 55 to 64 () Continue
(Recruit 1-3)
- 65 or older () Continue (Recruit 1-

3)What is your gender?

[RECRUITER NOTE: RECRUIT A 50/50 MIX]

- Male () Continue (Recruit 6 for each group)

each group)

Female
Other

() Continue (Recruit 6 for

What town do you live in? [RECORD AND RECRUIT A MIX OF TOWNS]

And, what county do you live in? [RECORD AND RECRUIT A MIX OF COUNTIES]

[RECRUITER NOTE, IN GEORGIA – Recruit 2-3 from McIntosh County, Recruit 2-3 from Glynn County]

[RECRUITER NOTE, IN VIRGINIA – Recruit 2-3 from Northampton County, Recruit 2-3 from Accomack County (southern part)]

Based on your answers, you do qualify! We'd like to ask you to participate in a 90-minute focus group at LOCATION TBD on DATE/TIME TBD. This research seeks to gain an understanding of people's uses, purposes, and perceptions of marshlands in your area. Participation is voluntary, and as a token of appreciation for participating, you will receive an \$85.00 cash incentive. No one will attempt to sell you anything at all, and you may decline to answer any question that you do not wish to answer. All responses will be confidential, and your name will not appear on any of the focus group recordings or transcripts. Before the focus group begins, you will be given a consent form that includes additional information and light refreshments will be provided.

There's nothing to prepare or bring except for your own opinions. Most people find these groups to be interesting and fun – I'm sure you'll enjoy it. --

Would you be willing to participate in this focus group?

(CHECK SCHEDULE FOR QUOTAS AND AVAILABILITY)

1. YES —————> RECORD RESPONDENT INFORMATION ON NEXT PAGE
2. NO —————> THANK AND TERMINATE

DATE: TBD

TIME: TBD

PROVIDE PARTICIPANT WITH INFORMATION BELOW:

LOCATION: [READ] As I mentioned, we will be conducting the focus group at TBD.

[READ] Please plan on arriving about 15 minutes before your scheduled interview time so that we may begin promptly at TBD.

START TIME: TBD

APPROXIMATE LENGTH OF INTERVIEW: [READ] The focus group should take about 90 mins to complete.

READ:

We will send you directions to the focus group location and confirmation of these arrangements via e-mail and we will also call to remind you about your participation a few days before your scheduled group. So that we can send you the directions and confirmation, please provide me with your contact information. May I have your...

NAME

PRIMARY PHONE _____

SECONDARY PHONE _____

EMAIL

TOWN _____

ZIP CODE _____

Appendix B: Focus Group Instrument

Introductory Questions:

1. What experiences do you have with the marshes in your local area? What can you tell me about these areas?
2. When people in your community talk about the marsh, what types of things do they say?

Key Questions:

1. What brings you to the marshes? How much time each year do you spend there?
 - a. Do you use the marsh for recreation or other purposes? If so, please describe those uses.
 - b. How and why are recreation or other uses important to you or your community?
 - c. What types of plants and animals do you encounter near the marsh?
 - d. How does the marsh or its wildlife make you feel?
2. What are any other reasons why you or others value marshes in this area, particularly compared to other potential uses for the land?
 - a. What natural features come to mind when you think about the marsh in the area?
 - b. Please write down the first two or more words or feelings that come to mind when you think about your local marshes.
 - c. Think back to the most memorable experience you've had at or alongside the marsh. Please share this experience with us.
3. Is the quality or condition of the marsh important to you or the general community?
 - a. How do you know if these areas are healthy or not?
 - b. What are the benefits associated with healthy marshes in the region? Do you benefit personally?
 - c. Have you noticed any changes to these environments?
 - d. Do you think the health of these environments and your own well-being are connected in any way? If so, can you describe that link?
4. In your experience, is this area frequently threatened by storms or flooding? What effects have occurred as a result of these floods?
 - a. How frequently do storms or flooding occur?
 - b. How concerned is your community about storms or flooding? Do people take these storms and floods seriously and how do they respond?
 - c. What does your community do to prevent flood damage and how effective do you think it is?
 - d. Do you see storm or flooding events as being related in any way to the marsh in the area?
5. Are you aware of any actions being taken in your area to protect natural areas such as marshes—for example, from loss due to flooding or erosion?
 - a. Can you explain what actions have been taken to protect these natural areas?

- b. From what you can see, have these actions been effective? What have the effects been?
- c. Do you favor actions to protect the marsh?
- d. Would you favor restrictions on development or your community spending money to protect marshes? Can you think of other *tradeoffs* like this?
- e. How high a priority is the protection of coastal areas such as marshes to you?

Wrap-Up Questions:

- 1. If you were interested in receiving support in your community for managing the marshes, who would you reach out to? Non-profits, small business, large industry, local government, faith based organizations, universities or other groups?
- 2. Of all the things we discussed, what do you think is the most important?
 - a. Is there anything additional you'd like to share with us about marshes in your area that you think we have not discussed this evening?

Closing Statement

That's all the questions we have for you, we appreciate you setting aside some of your time today and sharing your thoughts and opinions with us.

Appendix C: Coastal Sees Protocol Full

Focus Group Discussion General Protocol

1. Ensure that all paperwork (consent forms, demographic forms, and receipts for Clark, FG instrument, introduction, and blank paper for participants) is copied and present for each FGD.
2. Double check the number of copies printed (24 Focus Group Instruments, 75 consent forms, 75 receipts, 75 demographic forms). Split the paperwork between two people's luggage as a precautionary measure.
3. Withdraw \$1,020 for payment. Ensure that this is made up of \$60 worth of \$5 bills and \$960 in \$20 bills.
4. Whenever possible, paper clip \$85 stacks for easy disbursement.
5. Visit the venues as soon as humanly possible. Scope it out for tables, chairs, any major issues which may need to be resolved throughout the course of the day in preparation.
6. Have food (quiet food such as sub-rings & bananas) and supplies (paper, (non-clicking) pens, both hot and cold beverages, nametags, sharpies, folders and clips for forms) present and set up at least 45 minutes prior to FGD start time.
7. Assign roles to students such as welcome committee, note taker, snack chaperone, and who is responsible for gathering forms and keeping them in particular piles/folders at the end of the FGD.
8. When checking participants in welcome them in a friendly manner, bring them to the nametags and instruct they write down their first name ONLY, tell them where the restrooms are, and show them to the snacks. Reassure them we will be getting started shortly.
9. Consent forms must be signed before the line of questioning begins. Moderator will describe the consent form and hand them out. The assigned helper should pick up the signed consent forms and store them in a safe and dry location for the duration of the FGD.
10. While the consent form process is occurring, students will draw a "participant map" of the table, numbering seats counterclockwise from the moderator with numbers 1-12 and make notes regarding the person's voice or other characteristics as to jog our memory while transcribing. It helps if each student does this on their own to ensure we have the greatest number of characteristics noted.
11. FGD ensues.
12. Upon wrapping up questioning, the moderator will pass out the demographic form (noting that it is voluntary) and the receipt form for Clark. Upon picking up the receipt form the moderator will hand the participant their (hopefully pre-clipped) \$85.
13. Either the moderator or a student will pick up the demographic forms, ensuring that they are kept in neat stacks per group and no mixing occurs. Clip these surveys per group immediately and store in a clean, dry place. Label each

demographic survey with FGD1, FGD2, or FGD3 immediately to ensure no mixing occurs ever.

14. Ask participants for their name tags back, note that we are recycling. They can keep their name part, we just need the sleeve back.
15. Once all participants have left, have a 5-20 minute debrief and discuss interesting results, modifications needed before next FGD, etc. This debrief should be recorded.
16. Once the space is cleaned up and food is placed in a fridge or wherever it needs to go, a student should immediately upload the audio from the FGD and any notes into the confidential “onedrive” account for safe keeping.
17. All SEES data (audio and transcripts) should be backed up onto the sharedrive folder “Don’t screw with this folder its backup”.

Transcribing

1. Access the audio file through the secure onedrive and upload into ExpressScribePro.
2. Upload to ExpressScribePro.
3. We are transcribing verbatim- we are including any sounds including uhs, ums, repeated words, etc. If someone “um”s more than 4 times, just include 4 times.
4. Laughing is noted (laughing), the same rule applies for other kinds of sounds other than uhs, ums, etc.
5. If something is inaudible we note (inaudible)
6. If something is said in unison the speaker for that is noted as “ALL:”
7. Names are replaced within the transcript with [name]
8. Listen to introduction (when available) and familiarize yourself with voices and seat maps.
9. Utilize the participant seat map to attribute a voice to a participant number for transcription. Numbers should be counterclockwise from the moderator.
10. Transcribe first listening to the audio between 50%-60% speed.
11. After the first transcription has been done, listen to the transcript at full speed and review typed transcript. Make changes where necessary.
12. Always back up the transcripts into onedrive and sharedrive.

Validating the Transcripts

Research Assistants will peer review each another transcript by reading the transcript and listening to the audio at full speed, making note (as track changes) of any edits or irregularities and discuss after words to correct and finalize the transcript. This process will be done twice by two different students.

Coding

Coding is done by using NVivo 11 Pro.

Adding Data Sources

1. Open NVIVO, either a new NVIVO document or an existing one where you would like to add new source data (i.e. pictures, audio, transcripts)
2. Click on the Data tab on the top toolbar.
3. Click on the type of data you'd like to import (i.e. "Documents", "PDFs", "Survey", "Audios" etc.) via their icon below the main toolbar.
4. Use the file explorer pop up to find the data's location within your computer's memory and click "open"
5. A smaller pop-up window will appear to verify your file location and the import. This window has a title "Import Internals". Click OK once you've verified that you're importing the correct file and file location into NVIVO.
6. NVIVO will turn grey for a moment while the file is loading.
7. A new pop-up will appear titled "Document Properties". You can add a description, change the title, and assign a color to the source within the first tab in this pop-up labeled "General". You can also click the second tab, "Attribute Values", to assign attributes (via an existing and uploaded excel file) to the data. You can also not add anything and simply click "OK" when you're ready to move on. You can always access the "Document Properties" again if you need.
8. Click on the "Sources" bar at the bottom left of the screen to confirm that you have imported your file correctly. Once clicking on this you should see all the sources uploaded into your NVIVO file. You can double click your new source to view it in the pane to the right.

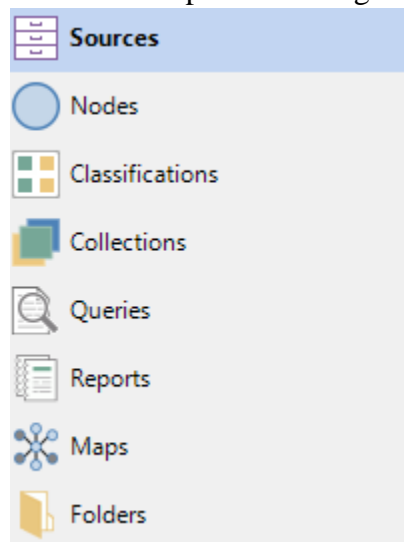


Figure 11. Viewing sources

9. To delete this source if you have imported the wrong one, simply right click the source title and click delete.

Coding using Nodes

1. Click on “Nodes” in the bottom left corner of your open NVIVO file. This should open all existing nodes in the middle pane of your screen display.
2. Ensure that you have an imported source also open and selected on the right-most pane of your screen display. This should be the source you are going to code.
3. Read over your transcript slowly, depending on the stage of coding you’re in (Open, Axial, or Selective) you will be coding at different levels of abstraction. When you come across a piece of text that you would like to code, highlight it using your mouse.
4. Right click the highlighted text and click the “code” option in the menu which drops down.
5. If it is a new node, click the button at the bottom of the new pop-up window. This will create a new node in the window above within the pop-up. Name the node accordingly and then click “OK”.
6. If you are coding something within an existing node, simply select that node from the options shown and click “OK”.

Creating Node Hierarchies

1. Click on the “Nodes” bar on the bottom left of your display.
2. Right click within the middle-pane of your display, which should be “Nodes”. Click “New Node” and rename that node accordingly. This node will be higher in the hierarchy and will need to be titled at a higher level of abstraction.
3. Highlight all relevant open codes, or nodes, which should be below the new, more abstract node. Cut and paste those selected underneath the new node. There should be a new plus sign icon beside the new node title, which when clicked is a drop down display of all the related codes below it in the hierarchy.
4. Right click the higher level code and select “Aggregate coding from child nodes”.
5. Do this as many times as you need and add new code titles to add higher levels of abstraction.

Cases

1. Cases are useful to identify individuals, members of certain social groups or groupings (age, location, gender, etc.) to chunks of text. These are then related to the nodes that the text is also coded with.
2. Highlight text you would like to assign to a case.
3. Click “create” in the upper toolbox.
4. Click the “Case” icon.
5. A pop-up will appear titled “New Case”. Give your case all the relevant information via filling out any or all of the options within the pop-up. At the very least give the case a name like “Participant 1”, “Female”, or “Glynn County

resident”. Click “OK” when you’ve filled out the information to the extent you need.

When coding look for ecosystem services as an outcome and also how those ES are produced/generated.

Those who are coding on laptops should always code on laptops to reduce the number of file copies and room for error with past versions of files.

Open Coding

1. Open coding is done by meaning unit or “incident to incident”.
2. Capture the thought in the open code.
3. All open codes should be entirely lower case.
4. Demographic data will only be coded in section 1 of the transcript unless a town name refers to an experience or story.

Wording for open coding:

- Lived in_____
- Occupation _____
- Personal Experience _____
- Problem _____
- Other people’s experience _____
- Concerned about _____
- Animal _____
- Plant _____
- Fungi _____
- Reach out _____
- Two Words _____

Axial/Focused Coding

1. Done by grouping themes from the open coding.
2. Include a gerund in the code name.
3. ALL CAPS FOR AXIAL CODES
4. Axial codes must be relative to each individual transcript, not other transcripts.

Selective Coding

1. Team has extensive discussion regarding axial/focused codes while also referring to open codes.
2. *ALL CAPS AND ASTERISK FOR SELECTIVE CODING, --ALL CAPS AS BACKUP IF * DOESN’T WORK

3. Selective coding must be relative to each individual transcript, not other transcripts.

Group Merge

1. Merge all individual .nvp files (Nvivo project files).
2. Identify near-identical selective codes. Identical selective codes will have automatically merged, dropping unique axial codes from each individual project underneath.
 - a. Example: *Coastal Protection* and *Providing Coastal Protection*
3. Choose one of the near-identical selective codes to retain. Cut the axial codes from the others and paste underneath.
 - a. Example: Axial codes from *Coastal Protection* get pasted under *Providing Coastal Protection*.
4. Any axial codes that had identical names will merge. All open codes will be retained underneath.
5. If at any point during the merging and rearranging process described, two or more identical open codes (the open code name and the section in the source are identical) are merged into the same axial code, both of the open codes will be retained, and a (2), (3), etc. will be added to subsequent copies. This usually occurs when the same open code is originally placed in two separate axial codes, and then those axials are later merged or other rearrangements are made. This is to indicate to the user that double-counting may be taking place.
 - a. Example: *memory relaxing digging clams*, and *memory relaxing digging clams (2)*
 - b. In this case, the same original open code may have been placed in a RECREATION axial code and a RESTORATIVE axial code. Later, these axial codes may be merged, resulting in the addition of a (2) to indicate an identical copy of the open code within the newly merged axial code.
6. If at any point open codes with the same name, but *different* source tags, are merged into the same axial code, the open codes will merge, and will only show on one line. To account for this, the number of references for the open code will increase (shown in the “References” column of the “Nodes” table), and double clicking on the merged open code will show both of the unique source tags.
7. Since identical axial codes automatically merge, move on to manually merging near-identical axial codes.
 - a. Example: *buffering and surge dampening* and *surge reduction*
8. After near identical axial codes have been merged, move on to merging similar axials codes. As less similar axial codes are merged, the user must utilize increasing amounts of discretion. Choices are made based on similarity of underlying open codes and the goals of the investigation.
 - a. Example: *surge reduction* and *flood reduction*. For some investigations, these two may be very similar. For other investigations, they may be distinct themes, and should be left separate.

9. While axial code merging is taking place, it's important to constantly refer to the underlying open codes. Axial names may appear similar at first glance, however the underlying open codes may actually be more distinct. It is important to refer to a codebook while completing this process; updating the codebooks, or creating a new version and adding updated explanations, is important.
10. Once the axial codes underneath a given selective code have been unified or left separate as necessary based on the goals of the investigation,
11. After completing the above steps for an initial selective code, move on to the next selective code, performing the same process. Do not worry about perfecting selective or axial code names, or perfectly grouping every open code. These will likely change as sorting continues through the remaining selective and axial codes. New themes may emerge and groupings may change, requiring additional fine tuning and renaming. The first round of merging and editing described above should only be considered a "first pass."
12. Move on to the next it is usually easier to begin with more straightforward selective codes, working toward more complex selective codes where individual users may interpret concepts differently or prioritize some concepts more highly than others.
 - a. For example: concepts related to flooding may be very straightforward, however factors that influence human well-being may be more abstract, allow for a greater deal of interpretation, and require the end user to make judgement calls based on the goals of the investigation. These specific themes are examples, and will vary from investigation to investigation.

Code Editing Protocol

1. Open NVIVO file and select one axial at a time to review the list of opens under it.
2. Note that you cannot delete codes while the source material or reference is open. Ticking off or otherwise marking the codes you need to delete on your written list of codes created in step 7 is a useful tool for designating the codes to delete once you've closed the source material.
3. First, click and expand the transcript source of all opens codes that have a code name and the same code name with a parenthesized number(s) (exhibited below).



Figure 12. An example of transcript codes with the same names

4. Compare the source material between the two or more codes.
5. Duplicates are defined as selected text that is open coded from the transcript that are similar or mostly similar. For example, the text “But then again it’s kinda nice to hear the animals at night” was coded by coder #1 as “peaceful hearing the animals,” by coder #2 as “nice to hear animals at night.”
6. If there are duplicate open codes, then keep the code without the “(number)” to reduce necessary code name edits and delete the duplicate codes. To be clear, this means that if all three coders coded the same quote from the transcript in a similar way, only one code will remain to avoid double or triple counting the thought and code. If there is a nuanced perception to a duplicate code that is not included in the others which you find important, keep both the nuanced code and one of the duplicate codes, deleting the remaining duplicated code which is identical to the one that is being retained.
7. If the open codes are not duplicates—meaning similarly phrased open codes refer to different participant quotes/thoughts or sources—then rename the similarly phrased code to something original, yet illustrative. For example, if “marsh is relaxing” just refers simply to the marsh being relaxing and “marsh is relaxing (2)” refers to the sounds of the marsh, rename the latter “marsh sounds relaxing” or something similar to distinguish the code and add more specificity.
8. After reviewing all open codes with “(number),” quickly scan through the rest of the codes. Write down common terms in the codes that seem to keep appearing to

review later. For example, the codes with red arrows have common terminology related to “well-being”:

<input type="radio"/>	health marsh linked to personal well-being	←
<input type="radio"/>	health marsh promotes mental health	
<input type="radio"/>	health marsh promotes personal quality of life	
<input type="radio"/>	healthy marsh good for mental health	
<input type="radio"/>	important quality of life	
<input type="radio"/>	interconnectedness of health of marsh and own he	
<input type="radio"/>	link marsh relieves stress	
<input type="radio"/>	link marsh to personal well-being	←
<input type="radio"/>	love beauty marsh brings their lives	
<input type="radio"/>	love beauty marsh brings their lives (2)	
<input type="radio"/>	marsh affects personal well-being	←
<input type="radio"/>	marsh as de stressor	
<input type="radio"/>	marsh for contemplation	
<input type="radio"/>	marsh gives sense of contentment and peace of mi	
<input type="radio"/>	marsh health matters because mental health	
<input type="radio"/>	marsh health matters because relaxing	
<input type="radio"/>	marsh health matters quality of life	
<input type="radio"/>	marsh helps quality of life	
<input type="radio"/>	marsh helps with sense of wellbeing	←

Figure 13. Codes with common related terminology

Often these common terms are strewn about throughout the list and are hard to keep track of, so writing them down will help you find them later when you have to open them and review.

- When you have scanned and written down the common terms in the codes, start opening all codes associated with a repeated term (again, for example “well-being:” “health marsh linked to personal well-being,” link “marsh” to “well-being, marsh affects personal well-being,” “marsh helps with well-being,” “marsh linked with well-being,” “marshes linked to own well-being”).

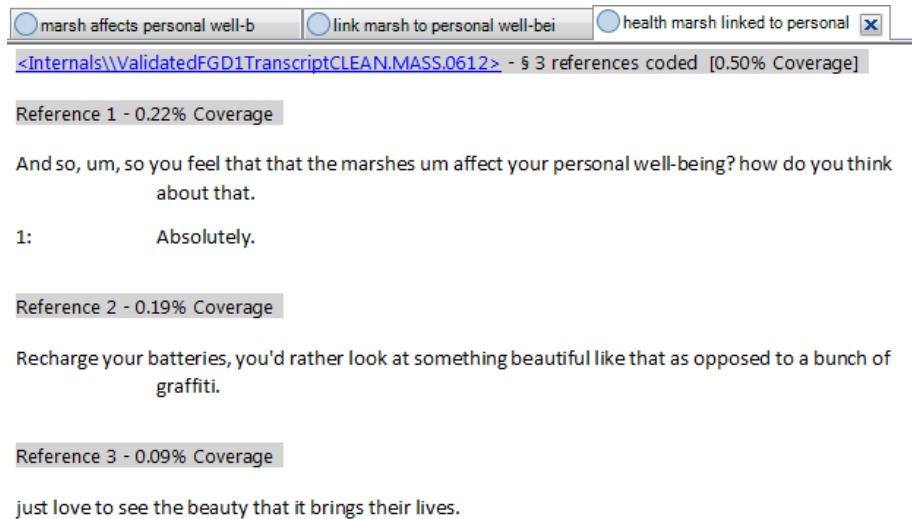


Figure 14. Opening codes with repeated terms

Click on each open tab and review and compare the source material or reference.

This can be cumbersome when there are 2 or more codes to compare as the window will collapse to show only two or three at a time with a tool to scroll through the many open tabs.

10. Again, note that you cannot delete codes while the source material or reference is open. Ticking off or otherwise marking the codes you need to delete on your written list of codes created in step 7 is a useful tool for designating the codes to delete once you've closed the source material.
11. Using the "uncode" feature can be helpful for tackling these kinds of duplicates. Open the source material for similarly named codes, highlight the source material, right click, and select "uncode". The uncode feature will open a new dialog box which shows all codes the source material has been coded as. You can unselect, or "uncode" source material to duplicate codes this way after reviewing the code and source data.

12. Review each of these codes and investigate if they are based on the same source material or quote. If so, keep the code that is most illustrative of the quote and delete the other open codes that use the same source material.
13. If the source material is not the same for the various seemingly related open codes, do nothing. It may be tempting to try to group them together somehow, but this will take too much time and does not really benefit the project at the open code level. Examples below:

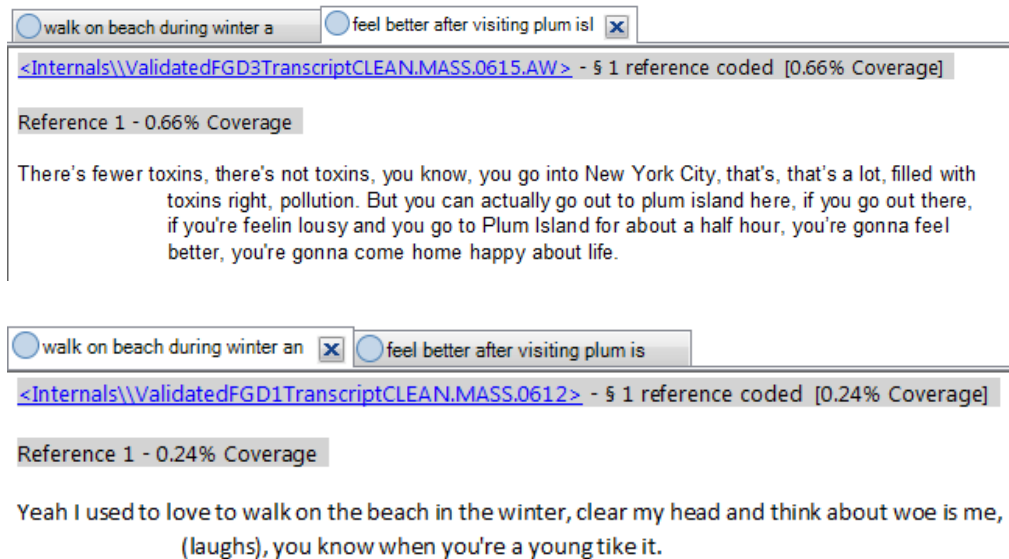


Figure 15. Source material that is not the same for related open codes

Both of these quotes speak to a therapeutic walk or experience on the beach, yet there are significant differences between the two quotes and codes. These codes should remain just as they are.

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Services	Comments and Examples
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Fuel and fuel	production of logs, firewood, peat, balsa
Biochemical	extraction of medicines and other materials from plants
Genetic materials	genetic resistance to plant pathogens, ornamental species, and so on
Regulating	
Climate regulation	storage of and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
Water regulation (hydrological flow)	groundwater recharge/exchange
Water purification and waste treatment	nutrient, sediment, and removal of excess nutrients and other pollutants
Flood regulation	retention of sediments and sediments
Risk of harmful events	flood control, storm protection
Pollution	habitat for collectors
Cultural	
Spiritual and recreational	source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
Recreational	opportunities for recreational activities
Aesthetic	many people find beauty or aesthetic value in aspects of wetland ecosystems
Educational	recreational for formal and informal education and training
Supporting	
Soil formation	nutrient retention and accumulation of organic matter
Nutrient cycling	storage, recycling, processing, and excretion of nutrients

Table 1, page 2:

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