Understanding Stakeholders' Knowledge, Awareness, and Perception of Conservation Programs in South Carolina

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Abstract. The increasing population and economic growth of South Carolina make it attractive for landowners to convert their land to commercial and urbanized zones. However, since ecosystems are directly affected by land use, changes in these land uses directly impact the ecosystem services (ES). Therefore, efforts to conserve ecosystems are paramount and are often supported through conservation-incentive programs. One approach for conservation programs is to provide economic incentives for landowners to retain their land as forest or agricultural land. The success of these programs eventually affects the ES recipients or “end-users,” particularly the residents. Therefore, it is important to understand the stakeholders’ perceptions toward these programs. Understanding the landowners’ perception can provide information on how to engage them to join the conservation programs. Furthermore, knowing the residents’ perception could improve the “buy-in” or support from the public for promoting conservation within the community. The stakeholders’ perception can serve as a feedback mechanism and could provide key information for improving implementation strategies for conservation programs.

This study elicited the knowledge, awareness, and perception of South Carolina residents and landowners to conservation programs. Results show that while a majority are not aware of the conservation programs being implemented in the state, there is no doubt that residents and landowners know the importance of conservation and how it affects their well-being. However, since many conservation concepts use technical terminology, stakeholders have increased difficulty grasping these concepts. This poses a challenge for academics and conservation agencies to improve communication methods and better impart conservation messaging. The results also show that residents are willing to support the conservation programs; landowners are willing to participate in conservation activities, especially if they are compensated. Therefore, this emphasizes a good opportunity to establish stakeholder-driven strategies such as sustainable financing mechanisms for conservation programs.

INTRODUCTION

South Carolina (SC) has historically been heavily dependent on natural resources and the agribusiness industry as a primary driver of economic growth and development (Willis and Straka 2016). The agribusiness industry of SC yields a total annual economic impact of \$46.2 billion, which corresponds to 247,000 jobs and \$9.6 billion in labor income (Von Nessen 2020). The state is a major production hub for timber, corn, cotton, soybean, rice, and peanuts (USDA-NASS 2019). However, with the rising economic potential of other industries, the direct economic contribution from natural resource-based industries is declining dramatically. As of 2017, only 0.5% of South Carolina’s gross domestic product (GDP) comes from agribusiness and natural

resource-based industries, while 2.4% comes from utilities, which includes water distribution (SC Department of Employment and Workforce 2018). On the other hand, a larger amount of the state’s GDP comes from real estate (13%; SC Department of Employment and Workforce 2018). The increasing popularity of South Carolina as a place to relocate, own a second home, or invest increases housing prices within the state (South Carolina Realtors 2019). In addition, cities and developed areas are expanding to meet the growing demand of the economy and residential property needs. This makes it financially attractive for landowners to convert their land into commercial and urbanized zones. From 2001 to 2016, a gradual increase in urban areas can be observed in land-cover maps. Consequently, vegetated areas such as forest land, grassland, agricultural land, and pasture land are

noticeably declining (USGS “National Land Cover”). This trend of vegetated areas being converted to commercial and urban areas is expected to continue, along with population growth and increasing primary value of the land (Sohl and Sayler 2008).

While socioeconomic factors typically drive these land-cover changes, most often other benefits and attributed costs are not totally accounted for, including the impacts and benefits from ecosystems in the form of ecosystem services. Ecosystem services (ES) are processes and products provided by an environment that affects human well-being (Millenium Ecosystem Assessment 2005). While ES are mainly classified into four types—provisioning, regulating, supporting, and sociocultural ES—most often only the provisioning ecosystem services are accounted for in economic development (Wunder 2005). This leads to undervaluation of ecosystem resources across different land uses, eventually leading to a degradation of ES and ultimately producing irreversible damage to the environment (Wunder 2005). Declines in natural resource land cover and associated loss of environmental services poses a significant concern to society.

In the attempt to balance economic progress and ecological sustainability, conservation programs were developed. One approach is to provide incentives or financial support to attract landowners to conserve all or some portion of their land. These programs are actively promoted by the United States Department of Agriculture and Natural Resources Conservation Service (USDA—NRCS) in the form of conservation-incentive programs such as the Environmental Quality Incentives Program (EQIP), the Conservation Reserve Program (CRP), and the Agricultural Conservation Easement Program (ACEP) (Mercer et al. 2011). Other institutions such as The Nature Conservancy (TNC), South Carolina Conservation Bank, Ducks Unlimited, and numerous local and nonprofit land trust groups (Land Trust Alliance) also promote and support these programs.

Conservation programs are not new in South Carolina. For example, some landowners allocate parcels of their land as conservation easements while others participate by developing their land in accordance with the state’s conservation plans. These measures protect the ecosystems from degradation and contribute to continuous provision of ES in the process. While these conservation programs prevent the conversion of vegetated land to urban and developed areas, they could also be used for improving the ES. This could be done when landowners create more green and natural areas that contribute to habitat improvement (Chiavacci and Pindilli 2020; Barral 2020) however, by the quantification tools used to assess habitat quality and functionality. Of specific concern are the lack of transparency and standardization in tool development and gaps in tool availability. To address these issues, we collected information via internet and literature

searchers and through conversations with tool developers and users on tools used in U.S. conservation mechanisms, such as payments for ecosystem services (PES). In fact, news of habitat improvement in some areas has been reported (Moultrie News 2019), where farm and forestland protection are continuously promoted through conservation programs (SCDNR 2019).

Although vast areas of land have some form of protection, these protections only cover roughly 14% of the total area of the state (SCDNR 2019). Hence, additional landowners and farmers have yet to be engaged in conservation programs. Given the need for enhanced conservation of ES, there is an outstanding question of why landowners and farmers are not taking advantage of these programs. Tumpach et al. (2018) interviewed loggers and landowners to understand the barriers for implementing forestry best management practices in Georgia, USA. They found that landowners prioritize training as the main factor for deciding to implement forestry best management practices; education and information campaigns about the importance of sustainable forestry should be developed (Tumpach et al. 2018). Similarly, this could also apply to South Carolina landowners to encourage them to engage in conservation programs.

On the other hand, since conservation programs are expected to improve the overall quality of the environment, this improves the ES enjoyed by the residents. While residents do not have the direct capability to implement conservation strategies, they are typically the final recipients of the ES. Support from the general public can generate significant influence for implementing conservation strategies and managing protected areas (Weaver and Lawton 2008; Calderon et al. 2012; Ureta et al. 2016; Thompson 2018). Therefore, it is important to understand the residents’ perception toward these programs. Weaver and Lawton (2008) investigated the perception of residents in Columbia, South Carolina, toward the protection of Congaree National Park. Their results showed that a majority of the residents perceived that the national park is an asset and that they have a responsibility to ensure that the park is protected. Furthermore, residents also expressed that they should have an opportunity to participate in the protection of the park and provide planning inputs (Weaver and Lawton 2008). Although there could be a difference in the perception toward conserving a national park as compared to other conserved land, the results still indicate that residents would be willing to participate in protecting land that was deemed to be an asset and contributes to their well-being. Therefore, in terms of conservation programs, feedback from residents could provide critical insights for successful implementation.

To understand the feasibility, potential gaps, and possible strategies of implementing conservation programs in South Carolina, we elicited the knowledge, awareness, and perception of forest landowners and residents toward

conservation and conservation programs. We focused on the landowners' and residents' perception as they primarily represent the ES provider and the ES final recipient, respectively. The data collected by this study could function as a baseline of the perception of both groups toward conservation program implementation. Furthermore, this study could be used as a feedback mechanism of stakeholders to provide their insights toward conservation programs.

BACKGROUND

Intentional efforts to incorporate stakeholders' buy-in is one approach that is becoming prevalent to conservation program planning as it adds a "human well-being" dimension to the planning process. Stakeholders are any group or individual that can affect or be affected by the ecosystem and ecosystem services (Hein et al., 2006). Analysis of perceptions and preferences is common in business, social, and psychological studies (Printezis and Grebitus 2018; Soley et al. 2019; Richard and Pivarnik 2020). Likewise, this analysis is slowly becoming more common in community-development research and social aspects of environmental studies (Tesso et al. 2012; Schattman et al. 2017; Elwell et al. 2018; Quintas-Soriano et al. 2018; Ricart et al. 2018; Khan et al. 2019). Furthermore, community perspectives and individual preferences are becoming a critical part in environmental decision-making and management planning (Elwell et al. 2018; Ouko et al. 2018; Raum 2018). Studies have made use of stakeholder involvement for strategically crafting and implementing conservation practices (Asah et al. 2012; Raum, 2018). Since conservation programs directly enhance ecosystems and ES (The Economics of Ecosystems and Biodiversity [TEEB] 2010; United Nations 2014; Díaz et al. 2015), stakeholder involvement plays a critical role in ES approaches to landscape sustainability management.

Ecosystem service-based approaches to conservation management emphasize the direct link between ecosystem enhancement and societal improvement. Apart from improvement to chemical and biophysical characteristics of an ecosystem, ES approaches consider the effectiveness of interventions and programs based on how it will benefit the stakeholders (Noe et al. 2017). Although there is a growing interest in adopting an ES-based management approach (Daily et al. 2009), it is not without its challenges. Since landowners may have full control in managing their properties, following a proposed conservation program that enhances ES provision on the land is only a prerogative for the landowner. Therefore, approaches to attract the landowners through incentives have become the main market-based driver (Goldman et al. 2007; Zanella et al. 2014; Vedel et al. 2015; Thompson 2018). On the other hand, since conservation program interventions are directed toward improving ecosystems, the effects on society are usually through indirect

benefits from ES. Indirect benefits typically have no market values and are deemed free by the recipients (Wunder 2005). This leads to undervaluation and underappreciation of the impacts of the conservation programs to the ES (Liu et al. 2010; Calderon et al. 2012; Doherty et al. 2014; Ureta et al. 2016; Khan and Zhao 2019). However, since ES transcend private and political boundaries, conservation across the landscape is a prerequisite for sustainability and continuous provision of ES. Therefore, for effective implementation of an ES-based approach, stakeholder buy-in is an important factor (Goldman et al. 2007; Pascual et al. 2014; Thompson 2018). Implementation of conservation programs concerns both landowners and residents as major stakeholders. It is for these reasons that diverse stakeholder engagement may play an important role in planning and evaluating ES strategic interventions.

On the one hand, landowners are concerned with how they will directly benefit from the program or how they can access resources for the conservation program(s); it may even be that farmers and landowners are not even aware of these programs (Lackstrom et al. 2018; Ricart et al. 2018; Tumpach et al. 2018). On the other hand, residents are also concerned with whether these programs will be effective and eventually affect their well-being, how these programs affect the overall state of ES and the environment they live in, if they have enough information about these programs, or if these programs will be acceptable to the general public (Weaver and Lawton 2008; Elwell et al. 2018; Thompson 2018). These perspectives from stakeholders could help define the most appropriate and strategic conservation programs for implementation as well as provide information on necessary adjustments for policymaking.

However, literature and information related to understanding the knowledge, perceptions, and acceptability of conservation programs are scarce. Moreover, there are very few, if any, feedback mechanisms specifically coming from South Carolina stakeholders, whether landowners or residents, to express acceptance or contention of these programs. It becomes difficult to understand the stakeholders' position on these important issues. To the best of our knowledge, aside from Weaver and Lawton (2008) and Tumpach et al. (2018), there are very few studies regarding residents' and landowners' perceptions toward the environment, conservation, and conservation programs. Therefore, the objective of this study is to elicit and analyze the residents' and landowners' knowledge, awareness, and perceptions about conservation programs. While Tumpach et al. (2018) made a comprehensive Strengths, Weakness, Opportunities, Threats (SWOT) analysis for landowner's perception in Georgia, it was focused on best management practices rather than on ecosystems and ecosystem services. Hence, this study could complement their findings in terms of landowners' perception toward ES conservation

programs. This type of stakeholder-driven natural-resource management allows for conservation programs and policies to be strategically tailored toward addressing priority ES accounting for a wider community benefit.

METHODOLOGY

The research team used a focus group discussion workshop to elicit qualitative insights from key participants, and a survey was conducted to ensure a broader representation of the state's residents' and landowners' perceptions and preferences. The survey was tabulated and summarized for a detailed, quantitative description of stakeholders' views on these important issues.

FOCUS GROUP DISCUSSION

As an initial step for developing the survey instrument, we conducted a focus group discussion (FGD) workshop in June 2018 entitled "Conversation on Ecosystem Services Valuation and Payment for Ecosystem Services" featuring different state and local agencies as key participants. Agencies who attended the workshop include State Government (South Carolina Department of Health and Environmental Control [SC DHEC], SCNRCS, SC Forestry Commission, and SC Forestry Association), Federal Government (USDA), Academia (Clemson University), and Nongovernment Organizations (TNC, Conservation Voters of SC, and land trust groups). We presented key conservation concepts, possible conservation programs, and sustainable practices that have been adopted both nationally and globally. Furthermore, we inquired if these programs and best practices exist within South Carolina and if stakeholders would be interested in engaging in these programs. Moreover, we facilitated discussions between key participants on the possibility of improving the implementation of conservation programs across the state.

The outcome of the FGD workshop provided key inputs to design the survey questionnaire for the primary data-gathering activity, eliciting the respondents' priority ecosystem services and perceptions toward conservation programs. Furthermore, qualitative insights from key participants were documented as perspectives of institutions and agencies regarding conservation concepts and programs.

STAKEHOLDERS' SURVEY

Since there is very limited information on South Carolina stakeholders' perception toward conservation programs, ecosystems, and ES concepts, it is imperative for us to use primary data in this study. We used a survey questionnaire, distributed to household residents and landowners by email, using the Qualtrics electronic platform. To identify between landowners and residents, landowners are respondents who indicated that they own a secondary property apart from the land where they currently reside. The electronic platform was

used since the majority (79%) of residents in South Carolina have online access (US Department of Commerce Census Bureau 2019). However, since there are still substantial numbers of residents who do not have access to the Internet, the results of this study are only representative of the 79% of the population that has access to the Internet.

A simple random sampling technique was used in the South Carolina residents' email database of Qualtrics to collect responses of 1,500 residents. However, we obtained from the focus group workshop an email list of 2,000 landowners in South Carolina. A link of the Qualtrics survey was sent to those who were in the list as the landowner respondents.

The survey (Appendix 1) had five sections: (1) introduction; (2) knowledge and awareness toward ecosystems, ecosystem services, and conservation programs; (3) conservation infographic; (4) perception toward ecosystems, ecosystem services, and conservation programs; and (5) respondents' demographic profile.

Section 1 of the survey conveyed the background, main objectives, and intention of the study. Section 2 focused on respondents' current knowledge of environmental terminologies and issues. This is critical information, as it establishes the knowledge and awareness of the respondents' conservation concepts. Section 3 provided a comprehensive but concise explanation of environmental terminologies and different conservation programs to ensure that respondents have the minimum information required to answer the succeeding questions, as this will elicit their choices and decision-making criteria. Section 4 elicited the respondents' perceptions toward the conservation programs. Finally, Section 5 asked residents about demographics including age, income bracket, household size, and length of residency in South Carolina.

RESULTS

The study used the insights of the FGD as inputs to the survey questionnaire, while qualitative accounts from the workshop were used to cross-reference against survey results. The survey results were summarized descriptively to provide information on the types and distribution of responses.

FOCUS GROUP DISCUSSION RESULTS

The workshop introduced the concepts of conservation programs, ecosystem, and ecosystem services to participants. This was done through a series of presentations of concepts as well as through a story map accessible here: <https://arcg.is/1i4abf>.

The participants agreed that conservation programs are very important. Although there have been ongoing conservation programs in the state, such as the Environmental Quality Incentives Program (EQIP), the Wetlands Reserve

Figure 1. Story map of the focus group discussion.

Program (WRP), the Conservation Reserve Program (CRP), and conservation easements through the South Carolina Conservation Bank, these programs are not fully utilized across the state. Furthermore, there have not been any studies or evaluation(s) related to why this might be the case. The focus group participants provided expert opinion on why conservation programs are not fully utilized by stakeholders. Workshop participants indicated that the low implementation rate of these programs could be associated with the fact that applications for these conservation programs are often extensive and difficult to understand. In addition, the logistical difficulty of accessing and implementing conservation programs is also a significant challenge, as stated by landowners who are already part of these programs. Some farmers and landowners are hesitant to participate due to the impression that their land management will be strictly regulated. The result of the workshop provided a baseline impression on the status of conservation programs within the state.

SURVEY RESULTS

In collecting the survey responses, while the total number of surveys distributed was not disclosed by Qualtrics, the 1,500 responses were met by sending out multiple batches of randomly selected residents from their database using the simple random sampling method. Out of the 1,500 accomplished responses, 72 were dropped due to missing data and presence of outliers. Therefore, 1,428 responses were used in the analysis of residents' knowledge, awareness, and perceptions toward conservation. Additionally, out of the list of 2,000 landowners obtained from the landowner groups in

the focus group workshop, only 228 (11%) responses were received and used in the analysis.

Demographic Profile of Respondents

Table 1 shows that some of the demographic characteristics of our respondents are comparable with the state and national data.

The mean age of the respondents is 47 for the residents and 52 for the landowners, with the average number of years living in South Carolina at 21 years and 31 years, respectively. The average household size in both groups is three persons, which is similar to the state and national mean household size (United States Census Bureau 2019). While 75% percent of the resident respondents are female and 25% are male, the landowner respondents are split evenly at 50% each. The high number of female resident respondents is not uncommon for survey-based studies (Smith 2008; Mulder and de Bruijne 2019). Also, while the opportunities for females have increased in recent years, there is still a traditional notion that female household decision-makers tend to be focused in household management and stay in the house (Calderon et al. 2012; Ureta et al. 2016).

In regard to highest educational attainment, the majority of resident respondents (54%) had some college, an associate degree, or lower, which follows the distribution in the state and national data. On the other hand, the majority of the landowner respondents (66%) have a bachelor's degree or higher. In terms of the employment status, both resident and landowner respondents have similar distribution with the state and national census data where a majority of the population is employed. Finally, in terms of income

Table 1. Demographic characteristics of survey respondents.

Demographic Characteristic	Residents	Landowners	SC	US
Median age	47	52	40	38
Mean length of residency	21	31		
Mean household size	3	3	3	3
Respondent gender				
Male	26%	50%		
Female	74%	50%		
Educational attainment				
Some college or associate degree	54%	34%	73%	69%
Bachelor's degree or higher	46%	66%	27%	31%
Employment status				
Employed	50%	58%	56%	60%
Unemployed	24%	10%	3%	3%
Retired	24%	30%	40%	37%
Students	2%	2%		
Income distribution				
Less than \$10,000	9%	6%	8%	6%
\$10,000–50,000	44%	27%	40%	35%
\$50,000–100,000	32%	32%	31%	30%
\$100,000–150,000	11%	18%	12%	15%
more than \$150,000	4%	17%	9%	14%

Source: SC and US data from United States Census Bureau, 2019.

distribution, resident respondents have a similar distribution with state and national data, while landowner respondents showed an opposite trend. Overall, 47% of the resident respondents have an income equal to or higher than the state's median household income of \$51,015, while at least 9% of the respondents fall under the poverty threshold of \$20,212 for a family of 3 people (United States Census Bureau 2019). On the other hand, 67% of landowner respondents have an income equal to or higher than the state's median household income, while at least 6% fall under the poverty threshold. Overall, results show that the demographic characteristics of the residents in this survey are comparable to the state and national statistics. This indicates that the respondent profiles are representative of the overall resident population in SC.

UNDERSTANDING RESIDENTS' PERCEPTIONS

Residents' Knowledge and Awareness of Conservation Concepts

We asked a series of questions pertaining to conservation concepts and conservation programs to assess residents' awareness and baseline knowledge of the topic. The results are shown in Table 2.

Results show that respondents understand how the environment is providing environmental services and

how it improves their well-being. This is evident from the high "yes" response rate on the awareness and perception questions, particularly from descriptive statements. However, when asked about similar concepts using relatively technical terminology, such as familiarity with the meaning of a watershed, ecosystem services, or natural resource conservation, only around half of the respondents answered "yes" to these questions. It is interesting to note that although only 47% of the respondents are familiar with the term "ecosystem services," almost everyone perceives that a healthy environment is necessary for the provision of water and maintaining good quality of life. This emphasizes the disconnect between the use of technical terminology and the level of understanding of the residents about the importance of these concepts. Moreover, when asked to differentiate between the concepts of preservation and conservation, the majority of respondents (63%) indicated that these concepts are similar. Only 9% said the two concepts are different, and the remaining 28% were not able to determine if they are similar or different. Finally, when asked if they are aware of conservation programs, only 39% said "yes," indicating that a majority of the residents are not aware of these programs.

Table 2. Residents' knowledge and awareness to environmental concepts.

N = 1428	Yes %	No %
Familiarity with natural resource conservation	59%	41%
Familiarity with meaning of a watershed	54%	46%
Familiarity with ecosystem services	47%	53%
Awareness that air, water, and food come from nature	93%	7%
Awareness that different land uses affect the value of the residence	84%	16%
Awareness that ecosystems affect human well-being	87%	13%
Perception if healthy environment is important	97%	3%
Perception if healthy environment includes good quality of water	96%	4%
Perception if healthy environment contributes to abundance of usable water	88%	12%
Perception if healthy environment provides good quality of life in general	97%	3%
Is the term "conservation" the same as the term "preservation"?	63%	9%
Awareness about conservation programs	40%	60%

We also showed them a list of different conservation programs that are currently funded by the US Department of Agriculture (USDA). The distribution of residents who are aware of these conservation programs within the 39% who said "yes" are shown in Figure 2 (see Appendix 2).

The low awareness of conservation programs is likely attributed to not having a direct connection between the programs and the residents. Hence, the information about conservation programs is not disseminated to the public. This is also reflected in anecdotal evidence from survey respondents stating that they did not have any idea that conservation programs exist and, moreover, that they do not know how to access this information. This implies that many of the respondents are either simply not aware of conservation program initiatives implemented throughout

the state, or they do not completely understand conservation programs and where to access information about them. When inquired about if they are aware of the existence of institutions that host conservation programs such as the South Carolina Conservation Bank, results show that only 33% responded "yes." This indicates that many SC residents are not aware of local and state conservation program initiatives. While this is expected since conservation program interventions do not have direct interaction with residents but rather are more involved with landowners, exposing the residents to conservation concepts will attract their attention and improve their awareness to conservation. Increased information for the residents could eventually translate into more public support for these programs.

Figure 2. Residents' awareness of conservation programs.

When asked if they think it will be beneficial for the state's overall environment and human well-being to have conservation programs, the majority of the respondents answered "yes" with 86% and 83% distribution, respectively. Furthermore, the majority of the respondents, 90% and 92%, agree that the state should lead conservation efforts and that the public has a significant role in conservation, respectively. Additionally, when asked which level of government should be responsible for managing conservation areas, 38% said this should be a shared responsibility between federal, state, and local government, as well as the public, while 28% believe this should be the sole responsibility of the state government. A small group (13%) said conservation should be the responsibility of private institutions, 7% said it should be the sole responsibility of the local government, 5% indicated the federal government should be responsible, and the remaining respondents said nongovernmental organizations should have this role.

RESIDENTS' PERCEPTION AND WILLINGNESS TO SUPPORT CONSERVATION PROGRAMS

The respondents were also asked about their willingness to support the conservation programs. Results show that 76% affirmed that they are willing to support these programs, while only 24% said they are not willing. Figure 3 shows the distribution of how people would likely support the conservation programs (see Appendix 2). Among the 76% willing to support, most (77%) will do so through volunteering activities such as tree-planting activities or hosting and participating in workshops for conservation programs. Some (25%) would be willing to support through financial contributions or "in-kind" (12%) such as providing for materials and lending of equipment. This shows potential resources that can be tapped to support conservation programs.

For the 24% unwilling to support conservation efforts, Figure 4 shows the reasons identified for this (see Appendix 2). The majority of the respondents (52%) said they do not have an idea on how to support, which confirms the knowledge gap between the public and the information about conservation programs, specifically on how the public can participate.

Finally, we also asked respondents if they would agree for the state to fund conservation programs using state funding. A large majority of the respondents (76%) agreed, while very few (7%) disagreed and the remaining (17%) chose not to respond. This indicates that, if given enough information, residents could be willing to support conservation programs in the state. While the residents do not necessarily have control over how the state funds are spent, their willingness to support the programs could be used as leverage to encourage representatives and policymakers in increasing the available

funds for supporting the implementation of conservation programs.

UNDERSTANDING LANDOWNERS' PERSPECTIVE

Landowners' Knowledge and Awareness of Conservation Concepts

Similar to the residents, landowners were also asked a series of questions pertaining to their knowledge of conservation concepts and conservation programs (Table 3).

Likewise, landowners have high "yes" response rates when asked if they are aware of the effect of the environment on their well-being and the importance of conserving the environment. Furthermore, compared to the residents, landowners have a higher familiarity with technical definitions of conservation concepts. While landowners mostly answered that they are familiar and aware of the environmental characteristics, it is interesting to note that using the term "Ecosystem Services" is still relatively uncommon, since only 62% of landowner respondents answered that they are familiar with ES. This indicates that although landowners are more familiar with the technical jargon used in conservation concepts, effectively communicating conservation concepts is still a high priority, particularly concepts that are emerging and relatively new. Furthermore, when asked if they are aware of conservation programs, the majority (69%) said they are.

LANDOWNERS' PERCEPTION ON CONSERVATION PROGRAMS AND ITS MANAGEMENT

We also showed the landowners a list of federal government conservation programs to know how many of them are familiar with these. Results in Figure 5 show that even with the landowner respondent groups who are aware that there are conservation programs available, the majority are still not aware of these specific listed federal programs (see Appendix 2).

Similar to the residents, landowners have limited information on accessing these conservation programs. Furthermore, anecdotal evidence from the respondents' comments particularly said that they do not know the specifics on how to access these conservation programs. However, when asked if they are aware of the SC Conservation Bank, the majority (59%) responded "yes." This indicates that landowners may be more familiar with local conservation programs such as conservation easements rather than federal programs.

Landowners were also asked if they think conservation programs are beneficial for the state's overall environment and human well-being. Overall, 89% of the respondents indicated that they are beneficial for the state, while 81% acknowledged that they are beneficial to human well-being.

When asked about the appropriate conservation program managers, 85% indicated that the state should take leadership in conserving its natural resources. Yet,

Table 3. Landowners' knowledge and awareness to environmental concepts.

N = 228	Yes %	No %
Familiarity with natural resource conservation	83%	17%
Familiarity with meaning of a watershed	79%	21%
Familiarity with ecosystem services	62%	38%
Awareness that air, water, and food come from nature	94%	6%
Awareness that different land uses affect the value of the residence	92%	8%
Awareness that ecosystems affect human well-being	92%	8%
Perception if healthy environment is important	96%	4%
Perception if healthy environment includes good quality of water	94%	6%
Perception if healthy environment contributes to abundance of usable water	84%	16%
Perception if healthy environment provides good quality of life in general	95%	5%
Awareness about conservation programs	69%	31%

Figure 3. Distribution of kind of support respondents are willing to make.

Figure 4. Distribution of the respondents' reasons why they are not willing to provide support.

Figure 5. Distribution of landowners' awareness to conservation programs.

Figure 6. Perception on the effectiveness of incentives.

when asked which institution should primarily support the conservation programs, 29% said it should be a shared responsibility between federal, state, and local government. Furthermore, 26% said it should be a private responsibility, 18% said it should be the state government alone, 11% prefer the federal government alone, and the rest prefer nonprofit organizations and local governments. However, when asked if they think the public has a role in conservation, 91% of the respondents answered “yes.” This suggests that respondents know they have a sense of responsibility in taking care of the environment.

LANDOWNERS' WILLINGNESS TO PARTICIPATE IN CONSERVATION PROGRAMS

Specifically, for the landowners, they were asked if they would be willing to support and participate in conservation

programs. The majority (85%) of the landowners are willing to support the implementation of conservation programs within the state. However, while a substantial amount (46%) are willing to participate in conservation programs even without compensation, this improves significantly (75%) when there is an option to support the programs and get compensated at the same time.

Finally, we elicited their perception on the effectiveness of different types of incentives to encourage landowners to enter into conservation easement (Figure 6).

Results show that tangible incentives, particularly financial incentives or tax credits, are perceived to be the most effective mechanisms to encourage landowners to engage in conservation programs. This highlights the potential for developing sustainable financing mechanisms to improve the implementation of conservation programs across the

landscape. On the other hand, although perceived to have lower effectiveness than financial incentives, harnessing the altruistic values and principles could still be utilized for encouraging landowners to utilize conservation programs. However, values and principles must be rooted in proper information related to conservation and sustainability concepts.

Finally, the landowners were asked an open-ended question about their thoughts on how to encourage more landowners to get involved in conservation programs. The top suggestion was to improve education about the programs and provide more information to the landowners. Some also suggested partnering with community organizations such as local churches and clubs as venues for disseminating the information. Additionally, some also suggested having proper and transparent planning for implementing the conservation programs. A common contention among landowners' responses was the impression that getting involved in the conservation programs allows the government to dictate and control what can be done in the land. Therefore, working closely with landowners, especially by including them in the decision-making process and in crafting the conservation plans, could improve their engagement in the programs.

DISCUSSION

This study assessed the knowledge, awareness, and perception of South Carolina stakeholders toward conservation concepts, conservation programs, and concepts of ecosystems and ecosystem services. A summary of survey results highlights that residents have a high awareness and knowledge of ecosystems and ecosystem services concepts, particularly if discussed using widely common terminologies such as nature, food, air, water, and environment. Residents mostly agree that proper management of ecosystems and ecosystem services through conservation programs are important. However, this affirmation declines when jargon and technical terminology such as "watershed" and "ecosystem services" are used when communicating with residents. Furthermore, while landowners seem to have more familiarity with conservation concepts, the use of technical terminology, particularly "ecosystem services," revealed difficulty in understanding conservation concepts. However, since these are key terminologies in conservation concepts and sustainable development, there appears to be a need to improve stakeholder communication and information dissemination to ensure that messages about conservation are properly relayed to stakeholders. A lack of understanding and knowledge of key concepts reinforces the potential for information disconnect within stakeholders' current understanding of conservation concepts. This poses a potential issue where there is a communication deficiency between the scientific community and the stakeholders

that are present. One way to address this is to focus on conservation program information outreach. Using different mediums such as infographics and video advertisements to promote conservation concepts will attract stakeholders and increase their familiarity with these programs. Furthermore, it is also possible that with targeted communication and information, stakeholders can gain the knowledge they need to make informed decisions. Since many conservation concepts use technical jargons, there is a need to improve this aspect of the challenge.

Furthermore, the study also showed that although stakeholders have a high appreciation for conservation and improvement of the environment, awareness of conservation programs is limited for both the residents and the landowners. Specifically, federally instituted conservation programs seem to have difficulty in reaching the landowners. Therefore, the accessibility to information on conservation programs and sustainable practices should be improved for both the landowners and the residents. While residents do not have a direct implementation or operational capacity for the conservation programs, it will still be beneficial in order to garner support from the public. This could be an opportunity for conservation agencies in promoting conservation programs and strategies that can gather support from stakeholders, since there is already a high awareness on the importance of a healthy environment.

Contrary to the impression of conservation managers that stakeholders are hesitant to adopt conservation programs, the survey results show that the disconnect is likely due to insufficient information communicated to stakeholders. In fact, the majority of landowners and residents agreed and responded that they are willing to support conservation programs, since these programs are perceived to have a positive impact on their well-being. However, the percentage of stakeholders who are aware of the specific conservation programs is low. Hence, this could be an opportunity for improvement for promoting and implementing conservation programs.

Finally, specifically on the perception of the landowners, a majority of the landowners are willing to support and participate the conservation programs. The results show that in order to encourage more landowners to be involved, tangible incentives such as financial compensation and tax credits could be used as financing mechanisms. However, while incentives are the best way to encourage landowners to join the program, their values and outlook toward the importance of the conservation concepts and ecological integrity could still be used to promote the movement. A substantial factor for developing values and principles is to have proper and correct information about the subject, hence the need to improve the communication of conservation concepts to stakeholders.

RECOMMENDATIONS FOR FUTURE WORK

The use of perception surveys to evaluate stakeholders' knowledge, perceptions, and preferences toward conservation concepts and programs could serve as a critical feedback mechanism for strategizing effective creation and implementation of conservation programs. Moreover, future work could improve this study by eliciting the perception of stakeholders that do not have Internet access. Utilizing the stakeholders' perception to develop applied research efforts related to improving effective information and communication appears to be most critical first step. Furthermore, the initial insights from these surveys could be a step toward developing more advanced economic studies such as valuation to support policymaking and development of sustainable financing mechanisms for conservation. Working closely with scientists, environmental managers, and policymakers to develop strategic planning initiatives that improve the implementation and success of conservation programs is important for the state's environmental health and overall quality of life.

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APPENDIX 1: SURVEY QUESTIONNAIRE (REDACTED VERSION TO INCLUDE ONLY THE QUESTIONS THAT WERE UTILIZED FOR THIS PAPER)

Landowners' and Residents' Perception of Conservation in South Carolina

Section I: Introduction

You have been randomly selected to participate in a survey being conducted by researchers at Clemson University, Baruch Institute of Coastal Ecology and Forest Science.

You will be asked to respond to questions on your perception, views, and satisfaction towards environmental and resource conservation, activities, and potential or actual impacts brought about by these types of intervention. You are free to NOT ANSWER any of the questions.

Conservation is the act of preserving, protecting, or restoring the environment, ecosystems, vegetation, and wildlife. Policies and best management practices are implemented to sustain the state's significant natural resource lands, wetlands, historical properties, archeological sites, and urban parks. Resource conservation in SC provides jobs in areas of agribusiness, forestry, tourism, and other sectors. As a matter of fact, tourism supports one-tenth of the state's jobs and generates about \$ 1.9 billion annually in the state's economy. To further improve the implementation and management of these practices for its citizens' well-being, this survey intends to evaluate perceptions, satisfaction, and understanding of stakeholders towards environmental conservation and natural resource management in South Carolina. A deeper understanding of the citizens' view point would definitely lead to better policies, conservation efforts, and best management practices of South Carolina's abundant natural resources.

Your participation in the interview will be VOLUNTARY. Your refusal to participate in or to withdraw from the study carries no penalty or loss of any benefits. The information that you provide will be kept CONFIDENTIAL and will not be released to any other entity that is not involved in the study. No one will know your answers but our research team, and your identity will be protected in any report based on the data.

Your participation in the survey is critical and the results could be used to further improve the conservation efforts for our natural resources while also helping to improve the welfare of residents of SC. We hope you can help us by participating in this survey. If you do agree to participate in this survey, please answer the questions as best you can.

If you are willing to participate, please proceed to the succeeding questions.

I.1 What county do you live in?

I.2 What is your zip code?

Section 2: Knowledge and Awareness Towards Ecosystems,
Ecosystem Services, and Conservation Programs

- A1 Are you familiar with natural resource conservation? (Yes / No)
- A2 Are you aware of what a watershed is? (Yes / No)
- A3 Are you familiar with ecosystem services? (Yes / No)
- A4 Are you aware that the air we breathe, water we drink and use for household chores, and the food we eat comes from nature (e.g., fruits, vegetables, cheese)? (Yes / No)
- A5 Are you aware that there is a connection between our forests, agricultural land, mountains, and other land uses to the value of your current residence? (Yes / No)
- A6 Are you aware that there is a connection between our forests, agricultural land, mountains, and other land uses to your general well-being? (Yes / No)
- A7 Do you think that natural resource “conservation” is similar with natural resource “preservation”? (Yes / No)
- A8 Do you think it is important to maintain a healthy environment? (Yes / No)
- A9 Do you think a healthy environment means good quality of water? (Yes / No)
- A10 Do you think a healthy environment contributes to the abundance of water? (Yes / No)
- A11 Do you think a healthy environment will provide good quality of life in general? (Yes / No)
- B1 Are you aware about conservation programs (e.g. Environmental Quality Incentives Program (EQIP), Wetlands Reserve Program (WRP), Conservation Reserve Program (CRP), Farm and Ranch Lands Protection Program (FRPP), Grassland Reserve Program (GRP))? (Yes / No)
- B2 Which of the conservation programs are you aware of? (check all that apply)
- Environmental Quality Incentives Program (EQIP)
 - Wetlands Reserve Program (WRP)
 - Conservation Reserve Program (CRP)
 - Farm and Ranch Lands Protection Program (FRPP)
 - Agricultural Conservation Easement Program (ACEP)
 - Healthy Forests Reserve Program (HFRP)
 - Grassland Reserve Program (GRP)

Section 3: Conservation Infographic

Conservation Infographics

"A **watershed** is the area of land where all of the water that drains off of it goes into the same place—a river, stream or lake."

Retrieved from: <https://www.pca.state.mn.us/water/what-watershed>

WHAT DO WE GET FROM **ECOSYSTEMS**?

"**Ecosystem services** are the benefits people obtain from ecosystems, including those benefits that people perceive and those they do not perceive."

Retrieved from:

<http://www.ehu.es/cdsea/web/index.php/research/ecosystem-services-basque-country/results/definition-of-ecosystem-services-and-typology/?lang=en>

"**Conservation of the environment** - the environment and its resources should be used by humans and managed in a responsible manner."

"**Preservation of the environment** - lands and their natural resources should not be consumed by humans and should instead be maintained in their pristine form."

Retrieved from: <https://study.com/academy/lesson/conservationists-vs-preservationists-definition-differences.html>

CONSERVATION PROGRAMS:

"**Environmental Quality Incentives Program (EQIP)** - provides agricultural producers with financial resources and one-on-one help to plan and implement conservation practices. Producers invest in solutions that conserve natural resources for the future while also improving agricultural operations. Using these practices can lead to cleaner water and air, healthier soil and better wildlife habitat, all while improving agricultural operations."

Retrieved from:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>

"**Wetlands Reserve Program (WRP)** - a voluntary program that offered landowners technical and financial support to protect, restore, and enhance wetlands on their property for long-term conservation and wildlife practices and protection."

Retrieved from:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands/>

"**Conservation Reserve Program (CRP)** - a land conservation program wherein farmers agree to remove environmentally sensitive land from agricultural production while planting species that will improve environmental health and quality in exchange for a yearly rental payment."

Retrieved from:

<https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/>

"Farm and Ranch Lands Protection Program (FRPP) - matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses."

Retrieved from:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/farmranch/>

"Agricultural Conservation Easement Program (ACEP) - provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. To protect working agricultural lands and limit non-agricultural uses of the land. To protect agricultural use and conservation values of eligible land."

Retrieved from:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/>

"Healthy Forests Reserve Program (HFRP) - helps landowners restore, enhance and protect forestland resources on private lands through easements and financial assistance. HFRP aids the recovery of endangered and threatened species under the Endangered Species Act, improves plant and animal biodiversity and enhances carbon sequestration. HFRP provides landowners with 10-year restoration agreements and 30-year or permanent easements for specific conservation actions."

Retrieved from:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/forests/>

"Grassland Reserve Program (GRP) - a voluntary conservation program that emphasizes support for working grazing operations, enhancement of plant and animal biodiversity, and protection of grassland under threat of conversion to other uses."

Retrieved from:

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/mn/programs/?cid=nrcs142p2_023520

SOUTH CAROLINA Conservation Bank ACT

Mission Statement:

"To improve the quality of life in South Carolina through the conservation of significant natural resource lands, wetlands, historical properties, archeological sites, and urban parks."
<http://sccbank.sc.gov/about/Pages/Mission.aspx>

"The SC CB is an organization which fund conservation easement agreements or purchase real estate from willing sellers to conserve areas and natural landscapes critical for continuous provision of

Image retrived from: <http://sccbank.sc.gov/news/Pages/PhotoAlbum2.aspx>

Section 4: Perception Towards Ecosystems, Ecosystem Services, and Conservation Programs

- C1 Are you aware of any institution that promote or support conservation programs such as SC Conservation Bank? (Yes / No / No response)
- C2 Do you think that conservation programs (e.g., EQIP, CRP, WRP, etc.) will be beneficial to South Carolina's environment? (Yes / No / No response)
- C3 Do you think that conservation programs (e.g., EQIP, CRP, WRP, etc.) will be beneficial to your well-being? (Yes / No / No response)
- C4 Would you support conservation programs (e.g., EQIP, WRP, CRP, etc.) implemented within the state? (Yes / No)

C4Y If yes, please check how you would support conservation programs? (check all that apply)

- financial contribution
- in-kind / material sponsorship
- volunteer in activities (e.g., tree planting, livelihood workshop)
- others, please specify _____

C4N If no, please check any statements as possible reasons: (check all that apply)

- Conservation is not my responsibility.
- The state should be the one supporting conservation programs, not me.
- I do not think there is a need to maintain a good environment.
- I think the quality of the environment is already good and need not be improved, hence there's no need for support.
- I have no idea how to possibly provide support.
- others, please specify _____

C5 Who do you think should be primarily responsible for conserving SC's natural resources?

- private owners/citizens
- federal government
- state government
- local government
- non-governmental organizations
- shared federal, state, and/or local government
- others, please specify _____

C6 Would you support state funding in conserving natural resources? (Yes / No)

D1 Do you own any other properties (e.g. forestland, farmland, agricultural, wetland, commercial) apart from your residential land? (Yes / No)

Skip to Section 5 if No

D2 Suppose you have a property **eligible to be in a conservation program** but **without compensation**, would you be willing to participate? (Yes / No)

D3 Suppose you have a property **eligible to be in a conservation program** and **with compensation**, would you be willing to participate? (Yes / No)

D4 In order to encourage more landowners to enter into conservation easement agreements, how effective do you think the listed approaches will be?

	Extremely effective	Very effective	Moderately effective	Slightly effective	Not effective at all
Financial incentives	☐	☐	☐	☐	☐
Tax credits	☐	☐	☐	☐	☐
Opportunity to develop green infrastructures	☐	☐	☐	☐	☐
Opportunity to preserve the area	☐	☐	☐	☐	☐
Opportunity to contribute to better environment	☐	☐	☐	☐	☐
Opportunity to contribute to improvement of society's welfare	☐	☐	☐	☐	☐

D5 Please write if you have other suggestions that you think would encourage land owners to enter into conservation programs.

Section 5: Respondents' Demographic Profile

E1 Age

E2 Gender

E3 Number of household members

E4 Do you own/rent your current dwelling/residence?

E5 How long (in years) have you lived in this area of SC?

E6 Highest educational attainment

- Less than high school
- High school graduate
- Some college
- 2 year degree
- 4 year degree
- Professional degree
- Doctorate

E7 Total household income before taxes

- Less than \$10,000
- \$10,000–\$19,999
- \$20,000–\$29,999
- \$30,000–\$39,999
- \$40,000–\$49,999
- \$50,000–\$59,999
- \$60,000–\$69,999
- \$70,000–\$79,999
- \$80,000–\$89,999
- \$90,000–\$99,999
- \$100,000–\$149,999
- More than \$150,000

End of Survey

APPENDIX 2: SUMMARY STATISTICS OF RESIDENTS' KNOWLEDGE, AWARENESS, AND PERCEPTIONS FOR CONSERVATION

Question	Residents			Landowners					
	N	Yes	% Yes	N	Yes	% Yes			
Are you aware about conservation programs (e.g., EQIP, WRP, CRP, FRPP, ACEP, HFRP, GRP)?	1,428	561	39%	228	157	69%			
Environmental Quality Incentives Program (EQIP)	561	214	15%	157	19	12%			
Wetlands Reserve Program (WRP)		398	28%		38	24%			
Conservation Reserve Program (CRP)		262	18%		28	18%			
Farm and Ranch Lands Protection Program (FRPP)		225	16%		24	15%			
Agricultural Conservation Easement Program (ACEP)		225	16%		23	15%			
Healthy Forests Reserve Program (HFRP)		238	17%		21	13%			
Grassland Reserve Program (GRP)		175	12%		12	8%			
Are you aware of any institution that promote or support conservation programs such as SC Conservation Bank?	1,428	476	33%	228	134	59%			
Do you think that conservation programs will be beneficial to SC's environment?		1,232	86%		202	89%			
Do you think that conservation programs will be beneficial to your well-being?		1,179	83%		185	81%			
Perception that state should lead conservation		1,283	90%		194	85%			
Perception that public has a role in conservation		1,313	92%		208	91%			
Would you support conservation programs implemented within the state?		1,159	81%		196	86%			
Yes: Financial contribution	1,159	292	25%						
Yes: In-kind/material		142	12%						
Yes: Volunteer activities		890	77%						
Yes: Others		67	6%						
No: Conservation is not my responsibility	269	30	11%						
No: The state should support conservation programs		49	18%						
No: Don't think there's a need to maintain a good environment		41	15%						
No: No need to improve hence no need for support		30	11%						
No: I have no idea how to support		139	52%						
No: Others		13	5%						
Who do you think should be primarily responsible for conserving SC's natural resources?									
Private owners/citizens	1,428	184	13%				228	59	26%
Federal government		76	5%	24	11%				
State government		405	28%	41	18%				
Local government		106	7%	9	4%				
Nongovernmental organizations		62	4%	17	7%				
Shared federal, state, and/or local governments		548	38%	67	29%				
Others		51	4%	11	5%				
Would you support state funding in conserving natural resources?	1,428	1,081	76%	228	193	85%			
Landowners only									
Suppose you have a property eligible to be in a conservation program but without compensation, would you be willing to participate?				228	105	46%			
Suppose you have a property eligible to be in a conservation program but with compensation, would you be willing to participate?					171	75%			