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Public Attitudes about Private Forest Management and Government Involvement in the Southeastern United States

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Abstract: In the southern United States the country's top wood-producing region, factors such as intergenerational land transfer and population spillover from urban areas have resulted in forestland conversion and reduced production of critical ecosystem services associated with forest systems (e.g., timber, clean water supply, wildlife habitat). Public attitudes, which drive forestland policy prescriptions, may also be evolving due to the way people experience and perceive forests (e.g., recreation), and think about the role of government in private forest decisions. These changes have significant implications for forestland management and the forest-based economy, both locally and globally. We present the results of a regional survey ($n = 1669$) of residents in Florida, Georgia, Mississippi, and South Carolina, which assessed attitudes toward timber harvesting and government involvement on private lands. We found significant public support for timber harvesting with a somewhat stronger focus on ecosystem maintenance compared to timber production, and strong support for policies that empower landowners (e.g., assistance programs) over regulatory strategies. We conclude that existing government policies and programs are failing to help landowners meet public demand for ecosystem service provision on private forest lands in the southeastern US. Public attitudes appear conducive to innovative policy strategies such as market-based solutions and nudges. Perceptions of forest health will likely be the metric the public and landowners will use in assessing the value of policy alternatives, in addition to economic impact. Public ignorance and indifference towards forest management also appear to be growing.

Keywords: attitudes; education; timber harvest; government regulations; landowner incentives; forest policy

1. Introduction

Some of the most important issues within the United States (US) concern the acceptable management of natural resources and the environment [1]. With a few notable exceptions, public policy discourse about forestlands in the US has largely centered on managing public lands for the provision of public goods (e.g., spotted owl habitat) [2–4]. Given widespread changes in land use and habitat fragmentation on private lands, the role of private forestlands in providing and sustaining ecosystem services is of increasing concern to policy-makers [5]. Historically, forest policies that affect private lands have been built around the model of enhancing public welfare by propping up a robust timber economy; however, because of social pressure, forest policies have slowly been shifting toward a more ecologically sensitive direction [6]. Financial and technical assistance programs have long been the

primary platform for reaching non-industrial private forest owners, but these programs only reach a fraction of eligible landowners [7]. There is an urgent need to find new socially acceptable ways of helping landowners assume the responsibility of forest stewardship and conservation to protect and maintain public benefits. The goal of this study is to examine how public attitudes towards timber harvesting and government interventions can help provide insights into where forest policy should go, in light of changes in land ownership and increasing pressures on forests in the southeastern US. In the following sections, we outline the motivation for examining public attitudes and describe the policy context of southern US forests. Next, we describe our conceptual model illustrating the factors thought to drive public attitudes and preferences for harvesting, survey design and implementation, and data analysis. Then, we present and discuss our results and highlight their significance in the extant literature, with particular emphasis on landscape management and policy relevance. We conclude the paper by highlighting key findings and potential areas for future research endeavors.

1.1. Background

1.1.1. Public Attitudes and Private Lands

Globally, public preferences for the management of private lands has moved away from production and utilization outcomes and towards conservation related outcomes [8]. The role of forests in addressing larger social issues (e.g., climate change, human wellness) is also beginning to be recognized. For example, in Japan, there is large public support for merging forest policy with energy policy to help address climate change [9]. Examination of public attitudes and opinions is fundamental to supporting democratic governance strategies that seek to give citizens opportunities to participate in discussions about natural resource management decisions that affect them [10]. Assessing public opinion can also contribute to a redistribution of power, by allowing the general public to engage in decision-making through sharing of information, knowledge, and ideas [11]. In many cases, for a policy to be considered fair, it needs to give ethical consideration to how individuals affected by the policy are treated [11]. When people are treated fairly, this is often perceived as being good for both society as well as ecosystems [12]. Considering emerging trends in land use change and ecosystem service provision, an examination of public attitudes about resource management and government involvement continues to be necessary.

1.1.2. Forest Ecosystem Services in the Southeastern United States

The southern US is the top timber producing region in the country, with 210 million forested acres (40.3% of the country's 521 million timber acres) [13]. More than 57% of the forestland in the southern US is held by the family forest owners, with average tract size at just 29 acres [5]. Family forest owners include only private individuals and families and is not synonymous with the "nonindustrial private forest owners" (NIPF), which includes corporations, nongovernmental conservation organizations, associations and clubs, Native American tribes, and private individuals and families [14]. Over the past few decades, the number of nonindustrial private forest landowners in the United States has been increasing while the average size of parcels has been decreasing (e.g., intergenerational land transfer) [15]. Trends reported in the US Census Bureau also indicate a revival of suburbanization and movement to rural areas, especially in southern regions [16].

While new owners and exurban migrants may express greater concern about environmental protection, the associated changes in land use and forest management have important implications for forest-based ecosystem services within the region [17]. The south is estimated to lose between 7–12% of its forestland by 2060 as well as > 10% of habitat for one-quarter of modeled species [18,19]. These changes are expected to have a significant negative impact on important regulating services, which helps protect environmental quality (i.e., water, climate), and biodiversity. For example, the carbon storage capacity of forests in the Lower Suwannee and urban Pensacola Bay watersheds of Florida is predicted to be reduced by 16–26% by 2060 due to increased urbanization [20]. Some of the

most threatened areas of biodiversity significance are located in the Eastern half of the US, primarily due to land use change [21]. Changes in forest management are also expected to influence current levels of provisioning and cultural services. For example, as more land is owned by individuals and families, as compared to industry, timber production is expected to become less efficient and the quality of wood products more variable [22,23]. As parcels become smaller, economies of scale issues may also result in some management actions becoming cost prohibitive (e.g., invasive species control) [23]. In order to significantly alter underlying land-use trends and to shift the declining trajectory of ecosystem services provision, more innovative policy solutions will likely be needed from the local to the federal level.

Timber harvesting is an essential management tool that can be used by owners to achieve restoration, conservation, and/or income objectives. The economic value of harvesting in the south is most often understood in relation to the provision of important timber benefits. The economic impacts of timber harvests from southern US forestlands—an area known as the “fiber basket of the US”—are notably large. In 2013, the forest products industry contributed \$230 billion to the southeastern US economy, generated 1.1 million jobs, and paid \$48 billion in wages and salaries [24]. Forest management activities can also affect important recreational benefits. In the southeast, outdoor recreation contributes more than \$53.6 billion annually to the southeastern economy through direct expenditures or indirect multiplier effects [25]. These timber and recreation values, while significant, largely underestimate of the total economic value of forest management, which is only partially captured by markets (e.g., biodiversity, cultural values) [26–29]. Given that there are many positive or negative externalities associated with forest management, as well as lack of management, the optimal provision of ecosystem services and public goods are still not well understood [30,31]. A better understanding of the social value of forest management is needed to inform forest policy instruments that improve our ability to protect common pool and collective goods [32].

1.1.3. Public Choice and Timber Harvesting

Social welfare is the dominant economic metric used to assess the success of policies that affect resource use and impacts. Now squarely entrenched as a canon of microeconomic theory, it is assumed that interpersonal comparisons of utility can be made by observing the underlying preferences of citizens [33]. Psychological constructs of human behavior indicate that a person’s knowledge and attitudes towards a particular outcome often underpins their preferences and latent utility for that outcome. The ways the people experience forests can also play an important role in shaping people’s knowledge and attitudes for forest management and ecosystem value [34–36]. These experiences often include the activities, practices, skills, and events that occur in the forest [37] which for most people in the US, tend to be recreational [38]. An important part of the recreational experience is often associated with the aesthetic quality of the landscape [39]. The forest landscape in the southeastern US often contains plantation-style forests, which are typically harvested using clear-cut harvesting methods. While the right to harvest trees on private lands has consistently enjoyed public support throughout the US [40], public aversion to clear-cutting harvesting practices is not uncommon and is thought to signal the emergence of a post-material society [31,41,42]. The potential for the recreational amenity benefits conflicting with timber production objectives in the southeast is not well understood.

When expressing preferences for forest management, researchers often assume that people have enough information to determine meaningful changes in their own utility associated with changes in environmental outcomes. However, tourist awareness of the recreational environment tends to be ephemeral [43]. Since forest succession occurs over many years, recreational experiences alone may not give rise to a sophisticated understanding of forest management [41]. In many cases, preconceptions about silvicultural activities do not correspond with visual assessments of the forest condition [44]. Citizens who move near and into rural areas have opportunity to become more aware of forest management issues because they are more often exposed to natural events (e.g., floods, wildfire, conflicts with wildlife, pollution) and local timber harvesting activities. However, these migrants tend to own smaller parcels and place a greater priority on amenity values [45]. Landowners increasingly

see the role of timber harvesting as a way to support forest health outcomes, and not just a means for meeting timber production goals [46,47].

Individuals who are naive about timber harvesting and forest management are required to seek out alternative sources of information when compelled to express an opinion. It is not uncommon for individuals to use group identity and ideology positions as a heuristic strategy for making complex decisions about environmental issues. Individuals often rely on social knowledge to help inform preferences for choices that have larger social implications [48]. In some cases, ideological positions are tied to the attributes of the land and people in local regions [34]. In the southeastern US, the majority of voters in most states have conservative political positions, which have traditionally been linked to a desire to protect self-determination by advocating for economic growth over environmental protection [49,50]. This suggests that as a matter of principle, some groups may still support production-oriented policies and programs, even though attitudes towards timber production may be shifting. A number of studies have found that landowners in the southeast are indeed cautious of government oversight and are concerned that regulations will weaken private property rights [27,29]. However, those who resist government involvement are not necessarily rejecting the idea that citizens should take responsibility for environmental problems [29,51].

To examine these factors, we used survey methods to measure people's attitudes, including individual experiences with forests and the ideological/political perspectives of rural communities. This study addresses a gap in the literature by offering a regional examination of public attitudes towards forest management. We also extend the work of M. Kreye, who examined southern US landowner attitudes, perceptions, and cultural norms regarding ecosystem service payment programs [26–29,36]). Here, we focus on the demand side of the ecosystem services policy landscape—the general public—whose support is crucial to the development and continued funding of programs that benefit private lands.

2. Materials and Methods

2.1. Conceptual Model

Individual preferences for forest management are thought to be informed by a person's knowledge of forest management and attitude towards the outcome (Figure 1). This knowledge could be in the form of personal knowledge and experience [35], and in other cases, it may be more in the form of social knowledge [50]. For example, some may have personally experienced how management can help enhance the provision of valued ecosystem goods and services, and some may consider the opinions of family and friends to help inform their preferences. For those unfamiliar with the sights of timber harvesting, forest management may also be perceived as interfering with the "natural" or ecological functions of forests. In comparison, people who make forest management decisions or have experience with forest issues as part of their professional role (e.g., educators, developers) have the opportunity to understand forest management within the context of the larger community or economy. Those who experience forests through recreational activities may choose to focus on management as it relates to the aesthetic qualities of forests [39].

Social forms of knowledge about forest management may also be a function of dominant ideologies that describe social expectations about our relationship with forests. For example, those who identify with groups with conservative values may want forests managed so they are economically self-sustaining, but within a land stewardship ethic [27,29]. Comparatively, those who identify with groups who have environmentally progressive values may express biocentric and altruistic motives for supporting wildlife and resource protection [52].

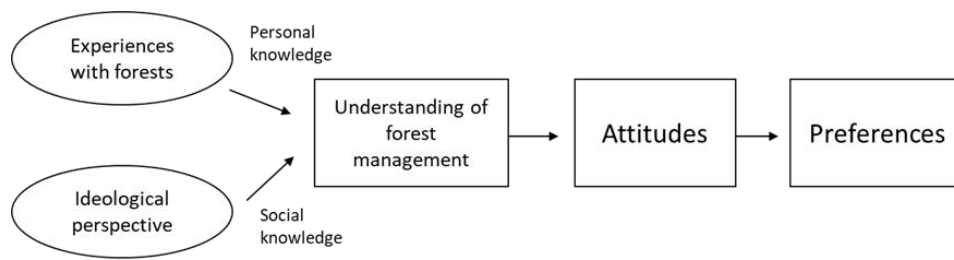


Figure 1. Conceptual model of how people’s experiences with forests and ideological perspectives help create different types of knowledge that inform their attitudes and preferences for forest management outcomes.

2.2. Survey Design

Multi-stage survey design and implementation methods were used to develop, test, validate, and electronically distribute a survey to residents in Florida, Georgia, Mississippi, and South Carolina [53]. Survey design consisted of an extensive review of the literature and semi-structured interviews with ten natural resource professionals and staff at natural resource state agencies in the study area. Early drafts of the survey also underwent pre-testing and a cognitive review with the same natural resource professionals and eight volunteers. The final survey contained 26 questions and was expected to take 15 min for respondents to complete. The questions relevant to public attitudes and the associated analysis are presented in this paper.

To understand respondents’ knowledge of forest management, we measured their experiences with forests using a Likert scale question format containing six statements. Three statements referred to active experiences with forests (i.e., recreation, making forest management decisions, management as part of professional duties) and two statements referred to passive experiences (i.e., caring about forests, knowledge about forest ecosystems). One statement represented the null condition (i.e., “I don’t have a lot of experiences with forests”). Respondents were asked how strongly they agreed or disagreed with each statement in order to determine what types of experiences are more common and how they may relate to a more sophisticated understanding of forest management.

Attitudes towards harvesting and government involvement were measured using a 5-point Likert scale (Table 1). The scales used in the study were originally developed by Schaaf et al. (Cronbach’s $\alpha = 0.75$) [42,54]. The timber harvesting scale included a total of eight statements representing either pro-harvesting (e.g., “harvesting is good for the economy”) or anti-harvesting views (e.g., “forests should be left untouched by humans”). Three items related to harvesting for production purposes (items 1–3), and five items related to harvesting for general forest management purposes to improve forest health and regeneration or reduce risk of wildfire (items 4–8). A total of nine statements were used to understand respondents’ attitudes towards government interventions regarding private forest management [40]. Statements referred to the use of both authority tools and empowerment tools. Scalar questions are currently the only method for obtaining direct measures of attitudes from study participants and are frequently used in empirical research to understand individual behaviors [55].

Survey questions were used to collect data on relevant demographic characteristics (i.e., race, age, gender, education, and income level). Respondents were also asked to provide their zip code, which allowed us to determine the urbanicity of their location. The only data not collected using survey methods was political party affiliation data, which was obtained from the polls published by the Gallup News [56]. This approach is an initial investigation into the role of ideology in preferences for forest management, and the lens of the study was at the state level rather than individual level. We considered that in cases where partisan politics is strong, respondents with weak preferences might express attitudes that conform with the larger community [57].

Table 1. Items used to measure attitudes towards timber harvesting and government involvement on private lands, based on the attitude scales created by Schaaf et al. [42,54]).

Topic	Attitudinal Dimension	Item
Timber harvesting	Production	1. Harvesting is good for the economy.
		2. Cutting and removing trees is sometimes necessary to provide economic profits to the forest owner.
		3. Forests should be used to produce products such as paper or lumber that humans can use.
	Management	4. Forests should be left untouched by humans.
		5. Cutting trees can sometimes be good for a forest.
		6. Some forest management by humans is necessary.
		7. Cutting and removing trees should be followed by planting trees.
		8. When necessary, trees should be cut and removed from forests to prevent forest fires.
Government involvement	Authority tools	1. The government should be able to regulate the use of forests located on private land to protect public benefits.
		2. The government should have the right to tell private forest owners how to best manage their forests.
		3. There should be regulations regarding how trees are managed on private forest land.
		4. The government should fine private forest owners who fail to use best management practices.
	Empowerment tools	5. The government should use financial incentives to help or encourage private forest owners to change management practices.
		6. The government should conduct workshops on forest best management practices for private forest owners.
		7. The government is responsible for promoting and understanding of forest conservation.
		8. The government and private forest owners should work together towards forest conservation.
		9. The government should use positive images and cultural symbols to promote forest conservation.

2.3. Survey Implementation

In 2017, the survey was distributed online using a third-party survey service (i.e., Qualtrics) to collect responses from a representative sampling frame balanced—based on race, age, gender and income, according to the most recent US Census for Florida, Georgia, Mississippi, and South Carolina, an approach that is known to help reduce sampling bias [36,58]. Online surveys offer the advantages of speed, efficiency, and lower costs in data collection for regional and nationwide studies [53]. A total of 1669 usable responses were collected from adult members of the public (95% CI and a 5% margin of error). The total number of responses from Florida, Georgia, Mississippi, and South Carolina was 423, 407, 410, and 429, respectively. As an analog to traditional response rates, we report completion rates, which are “the single most informative metric to report for a volunteer opt-in panel” [10,26,59]. The survey had a 92.3% completion rate, indicating that a low number of prospective respondents failed to complete the survey based on self-selection [60].

2.4. Data Analysis

The principal components analysis (PCA) procedure is often used in empirical research to help inform the design of attitudinal constructs that are used for policy [61]. Data describing experiences with forests were analyzed using PCA, a statistical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables (entities each of which takes on various numerical values) into a set of values of linearly uncorrelated variables called principal components, to identify major groups (i.e., what types of experiences occur together more frequently). Varimax rotation and retained factors with eigenvalues greater than 0.97 produced three components, which cumulatively explained 82.7% of the variation across the six statements. Kaiser-Meyer-Olkin measure of sampling adequacy was 0.615, and the Bartlett test of sphericity was significant ($p = 0.000$) suggesting that data are appropriate for factor analysis.

Responses to the previously developed timber harvesting and government involvement attitude scales were analyzed by summing individual responses to calculate a unique score for each individual respondent. Before summation of responses to the timber harvesting scale, responses to item 4, “forest should be left untouched by humans” was inverted. Individuals with scores ranging from 12–18 were classified as strongly disagreeing with timber harvesting, 19–25 moderately disagreeing with harvesting, 26–32, moderately agreeing with timber harvesting, and 33–40 strongly agreeing with timber harvesting. For statements about government use of authority tools, respondents with scores ranging from 4–7 were classified as strongly disagreeing with authority tools, 8–11 as moderately disagreeing, 12–15 as moderately agreeing and 16–20 as strongly agreeing. For statements about landowner empowerment tools, individuals with scores ranging from 5–9 were classified as strongly disagreeing with landowner empowerment tools, 10–14 as moderately disagreeing, 15–19 as moderately agreeing, and 20–25 as strongly agreeing. Demographic characteristics were correlated with individual attitude scores using least squares regression.

To test for differences in response options between attitudinal dimensions, we used a chi-square (χ^2) test. We used mean scores to compare statements representing production outcomes (items 1–4) and general management outcomes (items 4–8). Statements representing authority tools (items 1–4) and landowner empowerment tools were also compared (items 6–9).

3. Results

3.1. Demographic Variables

Observations on race, age, gender, education, income, and political party affiliation from the survey data and US Census data can be found in Table 2. The majority of respondents were white (78.4%), female (56.6%), and educated above the high school level (60.4%). The median age range was 25–44, and median income ranged from \$35,000–50,000 per year. The sample also leaned Republican (42.8% versus 39.8% Democrat and 17.5% other party).

Table 2. Descriptive statistics of population sampled by state and in the Southeastern US region as a whole as compared to 2017 US Census*.

	Florida <i>n</i> = 423 N = 20,984,400	Georgia <i>n</i> = 407 N = 10,429,379	Mississippi <i>n</i> = 410 N = 2,984,100	South Carolina <i>n</i> = 429 N = 5,024,369	Southeastern US * <i>n</i> = 1669 N = 39,422,248	4 States US Census(2017 estimates) ** N=39,422,248	US Census (2017 estimates) ** N=325,719,178
Race (%)							
White	75.2	77.6	82	78.8	78.4	56.9	60.7
Non-White	24.8	22.4	18	21.2	21.6	n/a	n/a
African American	10.2	10.8	14.9	12.6	12.1	28.6	13.4
Asian/ Pacific Islander	5.2	5.4	2	4	4.1	2.6	6
Native American	n/a	n/a	n/a	n/a	n/a	0.5	1.3
Hispanic	9.5	6.1	1.2	4.7	5.4	11	18.1
Multi-racial	n/a	n/a	n/a	n/a	n/a	1.9	2.7
Age (median in years)	45–64	25–44	25–44	25–44	25–44	38.3	37.7
Gender(%)							
Female	51.3	54.1	66.6	54.6	56.6	51.4	50.8
Male	48.7	46	33.4	45.5	43.4	48.7	49.2
Education (%)							
Some high school	3.8	3	5.6	2.8	3.8	9.3	7.4
High school degree	23.6	22.1	24.6	22.1	23.1	29.3	27.5
Higher than high school***	61.9	59	57.8	62.7	60.4	46.6	48
Professional/grad degree	10.4	15.7	11.5	12.1	12.4	9.7	11.5
Income (median)	US\$35,000–< \$50,000	US\$50,000–< \$75,000	US\$35,000–< \$50,000	US\$35,000–< \$50,000	US\$35,000–< \$50,000	US\$48,919	US\$57,617
Political party (%)****							
Republican	39	40	45	47	42.8		38
Neither (independent)	19	18	17	16	17.5		17
Democrat	42	42	38	37	39.8		45
Location (%)*****							
Urban	43	35.9	1.5	0.5	21.1	70.5	80.7
Rural	57	64.1	98.5	99.5	79.9	29.5	19.3

* Florida, Georgia, Mississippi, and South Carolina;

** 2017 US Census estimates were obtained from the following sources. Population (N), Race (%) and Gender (%): 2017 US Census Annual Population Estimates Program; Age and Education (%): 2012–2016 American Community Survey 5-Year Estimates; Income: Household Income: 2016, American Community Survey Briefs (2016 dollars);

*** This category combines respondents that received technical, associate or bachelor's degrees;

**** Data from 2017 Gallup Polls;

***** Decennial Census, US Census Bureau 2010. In our survey "urban" was defined as more than 1000 people per square mile, US Census urban definition included population in urbanized areas (at least 50,000 people) and urban clusters (at least 2500 and less than 50,000 people).

When compared to the US Census estimates, within the four study states, the sample contained significantly more whites (+22%) and those educated above a high school education (+14%). In most of the southeast, most of the population lives in urban settings; however, only a modest portion of survey respondents (20.1%) had zip codes from an urban area (Table 2). Of the counties sampled, only 3.64% had population density >1000 people/sq mile. This is similar to all counties in the four study states where on average 3.37% of counties have a population density > 1000 people/sq mile. This suggests that sampling was distributed randomly throughout the state (i.e., not clustered in urban areas).

Some differences in respondent demographics between states did emerge. We found the largest share of whites was from Mississippi, and the smallest from Florida (82% and 75%, respectively). Respondents in Florida were generally older compared with the other states; their median age category was between 45–64 years of age. The largest gender difference was in Mississippi with 66.6% female vs. 33.4% male, with the rest closely aligned with the Census estimates. Mississippi had both the highest percentage (24.6%) of high school graduates and the lowest percentage (57.8%) of respondents who received higher level degrees (i.e., technical, associate or bachelor's). Median household income was highest in Georgia, which represented the \$50,000–\$75,000 income category. The income levels representing our southeastern sample are generally comparable to the US Census median household income for the four study states (\$48,919) but are somewhat lower compared to the greater US (\$57,617). In regards to political preferences, South Carolina had the most Republicans and had the largest gap between the two political parties (47% vs. 37%), and Mississippi also had significantly more Republicans than Democrats (45% vs. 38%).

3.2. Experiences with Forests

Items with factor loadings greater than 0.4 were used to help characterize main components of experiences with forests (Table 3). Component one was characterized as recreation orientation and included items describing experiences related to recreation and caring about forests. Component 2, management orientation, included professional experiences, making management decisions, and knowing a lot about ecosystems. The last component, few experiences, included only the null statement (i.e., not a lot of experiences with forests).

Table 3. Principal components analysis of questions about experiences with forests ($n=1669$).

	Items	Recreation Oriented	Management Oriented	Few Experiences
1.	I care about forests	0.6654	−0.964	0.1462
2.	I know a lot about ecosystems	0.3092	0.488	−0.013
3.	I don't have a lot of experiences with forests	−0.1238	−0.1777	0.9588
4.	Forests are included in parts of my profession	−0.1141	0.6016	0.1278
5.	I often make management decisions about forests	−0.1905	0.5888	0.1717
6.	Forests are an important part of my recreation	0.6404	0.111	−0.1158

Note: bold values indicate loadings greater than 0.3

Response to the Likert scale options indicate that a majority of respondents strongly agreed with the recreation orientation statements (50.7% and 64.5%, respectively, Table 4). Most respondents reported that they did not have meaningful professional or management experiences with forests (47% and 57.9% strongly disagreed, respectively). A moderate portion of respondents agreed and strongly agreed with the single few experiences statement (18.15% and 22.05%, respectively).

Table 4. Percentages of responses to Likert scale items about experiences with forests in Southeastern US*.

Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total Number of Responses
1. I care about forests	3.89	4.01	7.19	20.37	64.53	1669
2. I know a lot about ecosystems	10.01	18.99	38.89	19.47	12.64	1669
3. I don't have a lot of experiences with forests	12.94	16.84	30.02	18.15	22.05	1669
4. Forests are included in parts of my profession	46.97	17.32	17.91	7.97	9.83	1669
5. I often make management decisions about forests	57.88	13.18	14.62	5.51	8.81	1669
6. Forests are an important part of my recreation	5.09	6.77	17.68	19.77	50.69	1669

* Florida, Georgia, Mississippi and South Carolina.

Least squares regression models with the demographic variables performed modestly with a relatively low r-squared (Table 5). We found that respondents with more recreational experiences tended to have higher annual household incomes, less education, were older and white. Respondents with more profession-oriented experiences tended to have higher annual household incomes, higher education, were younger, non-white and male. Respondents with few experiences with forests tended to have lower incomes, less education, older, non-white and female.

Table 5. Least squares regression of principal components with socio-demographic variables ($n = 1669$).

Socio-Demographic Variables	Recreation Orientation		Profession Orientation		Few Experiences	
	Coefficient	<i>p</i> -Value	Coefficient	<i>p</i> -Value	Coefficient	<i>p</i> -Value
Income	0.0083	0.000	0.0404	0.000	−0.0088	0.000
Education	−0.0068	0.001	0.0048	0.027	−0.0194	0.000
Male	−0.0001	0.98	0.3897	0.000	−0.0634	0.000
Age	0.0901	0.000	−0.328	0.000	0.1030	0.000
White	0.1759	0.000	−0.2578	0.000	−0.1794	0.000
Constant	−0.374	0.000	0.6673	0.000	−0.007	0.000
df	5		5		5	
R-squared	0.0084		0.0654		0.0011	

3.3. Attitudes about Timber Harvesting

A majority of respondents (43% and 37%) received scores that were classified as strongly and moderately agreeing with timber harvesting on private lands, and very few (3%) strongly disagreed (Figure 2). There was also significant variation in level of agreement given to items describing timber harvesting for production (items 1–3) and management purposes (items 4–8, $\chi^2 = 573.9$, $df = 4$, $p = 0.000$, Table 6). Overall, respondents more often agreed with statements that described harvesting for general management purposes compared to timber production. For example, most respondents (63.5%) strongly agreed that cutting and removing trees should be followed by planting trees.

Table 6. Percentages of responses to Likert scale items about timber harvesting in Southeastern US*.

Items		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total Number of Responses
Production	1. Harvesting is good for the economy.	2.4	6.1	26.8	41	23.8	1669
	2. Cutting and removing trees is sometimes necessary to provide economic profits to the forest owner.	4.3	9.7	28.5	35.1	22.5	1669
	3. Forests should be used to produce products such as paper or lumber that humans can use.	3.7	10.8	30.4	34.1	21.1	1669
	<i>Mean</i>	3.5	8.8	28.6	36.7	22.5	
Management	4. Forests should be left untouched by humans (rev).	10.4	16	36.5	25.3	11.7	1669
	5. Cutting trees can sometimes be good for a forest.	4.0	6	21.3	30.5	38.2	1669
	6. Some forest management by humans is necessary.	3.5	5.5	20.1	32.2	38.7	1669
	7. Cutting and removing trees should be followed by planting trees.	2.6	2.9	12	18.9	63.5	1669
	8. When necessary, trees should be cut and removed from forests to prevent forest fires.	5.2	6.9	23.6	29.8	34.5	1669
	<i>Mean</i>	5.1	7.4	22.7	27.3	37.3	

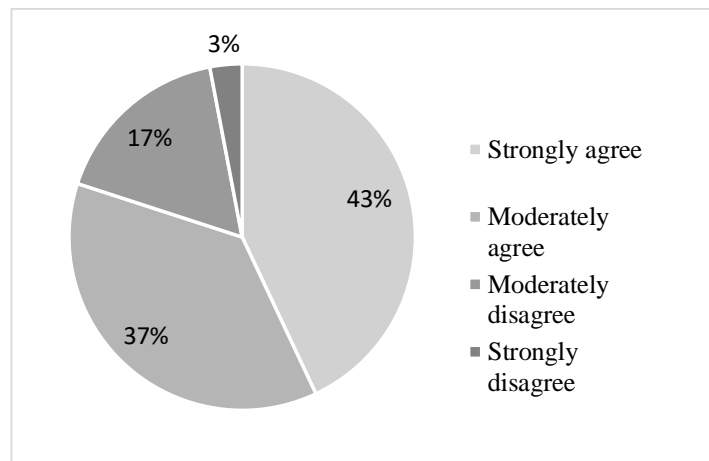


Figure 2. Respondent attitudes towards harvesting on private lands.

Important segments of the population also expressed neutrality or indifference toward harvesting and forest management. On average, one quarter (24.9%) of respondents expressed neutral positions towards timber harvesting, and this increased to 28.6% for statements that only described harvesting for production purposes. Moreover, 62.9% agreed or were neutral towards the statement that forests should be left untouched by humans.

Least squares regression models with the demographic variables performed modestly with a relatively low r-squared (Table 7). We found support for timber harvesting tended to increase with higher levels of annual household income, education, and age ($p < 0.01$). Support was also greater among respondents who were white and male.

Table 7. Least squares regression of individual attitude scores with socio-demographic variables ($n = 1669$).

Socio-Demographic Variables	Timber Harvesting		Empowerment Tools		Authority Tools	
	Coefficient	<i>p</i> -Value	Coefficient	<i>p</i> -Value	Coefficient	<i>p</i> -Value
Income	0.1113	0.000	−0.0761	0.000	0.0044	0.4225
Education	0.1391	0.000	0.1688	0.000	0.0604	0.000
Male	0.8873	0.000	0.0177	0.307	0.353	0.000
Age	1.257	0.000	0.5134	0.000	−0.3288	0.000
White	1.4192	0.000	−0.042	0.054	−1.4911	0.000
Constant	24.691	0.000	17.669	0.000	14.1423	0.000
df	5		5		5	
R-squared	0.0857		0.0178		0.0293	

When comparing states, mean individual attitude scores for timber harvesting were relatively homogeneous (Table 8). However, Florida also had the most neutral responses towards all statements about harvesting compared to other states (Tables S1–S4).

Table 8. Mean individual scores of attitude scales across study states ($n = 1669$).

Attitude	All States		Florida		Georgia		Mississippi		South Carolina	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Timber Harvesting ¹	30.15	5.5	29.26	5.48	30.19	5.38	30.94	5.23	30.27	5.7
Empowerment tools ²	19.33	4.1	19.44	4.1	19.04	4.29	19.56	3.85	19.13	4.17
Authority tools ³	12.53	4.45	13.55	4.20	12.13	4.71	11.73	4.38	12.49	4.44

1 Scores ranging from 26 to 32 indicate moderate agreement with timber harvesting.
 2 Scores ranging from 15 to 19 indicate moderate agreement with empowerment tools.
 3 Scores ranging from 12 to 15 indicate moderate agreement with authority tools.

3.4. Attitudes Towards Government Interventions

A majority of respondents received scores that were classified as strongly agreeing and moderately agreeing (38% and 54% respectively) with landowner empowerment strategies (Figure 3). Somewhat fewer received scores classified as strongly agreeing and moderately agreeing with authority tools (28% and 36% respectively, Figure 4). There was significant variation in the level of agreement given to response options for empowerment tools compared to authority tools ($\chi^2 = 5500$, $df = 4$, $p = 0.000$, Table 9). The highest percentage of strong and moderate agreement (26.8% and 49.7%, respectively) went towards the idea that the government and private forest owners should work together towards forest conservation, followed by the ideas that the government should use positive images and symbols to promote conservation and conduct workshops on forest management best practices for forest owners. About half of the respondents strongly agreed and moderately agreed (27.5% and 25.2%, respectively) with using financial incentives for landowners. In regards to authority tools, close to half agreed and strongly agreed that there should be regulations regarding how trees are managed on private forest land, and the government should fine forest owners who fail to use best management practices.

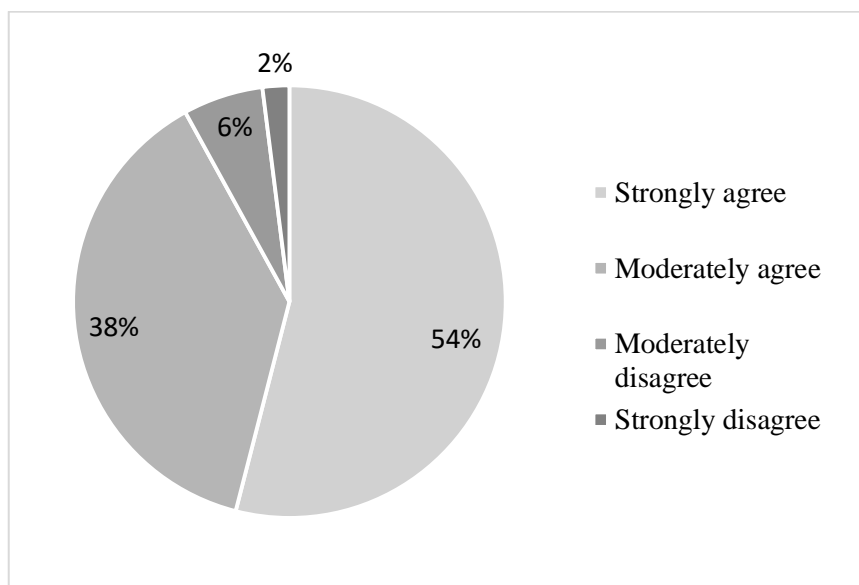


Figure 3. Respondent attitudes towards landowner empowerment strategies.

Table 9. Percentages of responses to Likert scale items about government’s approach to private forest management in Southeastern US*.

Items			Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total Number of Responses
Authority tools	1.	The government should be able to regulate the use of forests located on private land to protect public benefits.	15.2	14.7	29.5	19.9	20.7	1669
	2.	The government should have the right to tell private forest owners how to best manage their forests.	21.3	18.4	29.6	17.4	13.2	1669
	3.	There should be regulations regarding how trees are managed on private forest land.	12	13.3	26.6	27.3	20.7	1669
	4.	The government should fine private forest owners who fail to use best management practices.	16.2	11.9	27.5	22.3	22.1	1669
Financial incentives	5.	The government should use financial incentives to help or encourage private forest owners to change management practices.	4.6	7.7	35	27.5	25.2	1669
Empowerment tools	6.	The government should conduct workshops on forest best management practices for private forest owners.	2.8	5	22.3	34.5	35.4	1669
	7.	The government is responsible for promoting and understanding of forest conservation.	4.1	8.9	32	29.5	25.5	1669
	8.	The government and private forest owners should work together towards forest conservation.	2.8	4	16.7	26.8	49.7	1669
	9.	The government should use positive images and cultural symbols to promote forest conservation.	2.8	4.4	21.8	32.2	38.7	1669
	Authority tools, average percentages			16.2	14.6	28.3	21.7	19.2
Empowerment tools, average percentages			3.1	5.6	23.2	30.8	37.3	

* Florida, Georgia, Mississippi, and South Carolina.

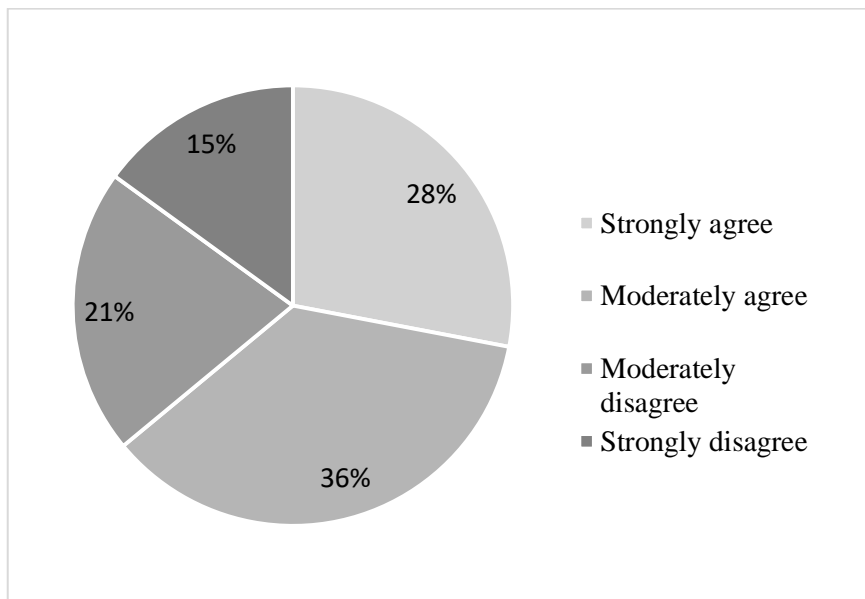


Figure 4. Respondent attitudes towards authority tools.

Least squares regression models with the demographic variables performed modestly with a relatively low r-squared (Table 7). Support for empowerment tools tended to increase with education and age, but decreased with income and if the respondent was white ($p < 0.01$ and $p < 0.05$). Support for authority tools tended to increase with level of education and if the respondent was male, but decreased with age and if the respondent was white ($p < 0.01$).

On average, public opinions about government involvement were relatively consistent among study states. Mean scores for empowerment and authority tools were relatively similar and were classified as a moderate agreement (Table 8). When looking at the Likert responses, approximately half of the respondents in all states supported government involvement, with Florida in the slight lead (Tables S5–S8). More than one third of respondents in all states expressed neutral attitudes towards the idea that the government is responsible for promoting an understanding of forest conservation, and the government’s use of financial incentives. Mississippi often gave less support to authority tools and Florida, more.

4. Discussion

Our findings point to social preferences for forest management that are unique to the southeastern region of the US and may define forest policy feasibility. Specifically, we found widespread support for timber harvesting, with a somewhat larger focus on forest management compared to production objectives, and support for landowner empowerment tools. Our survey also included strong coverage of suburban and rural areas, suggesting that we likely captured two groups that are critical to the future of forests: forest owners, and transfers from urban areas. Examination of the survey sample and survey methods suggest that there may be some limitations in obtaining a representative sample, but there were clear themes as to what attitudes were dominant and what may be useful for informing policy design.

Overall, recreation was reported as the dominant experience among most respondents. This was likely due to having a close proximity to forests, which can reduce barriers to recreational opportunities. Many also expressed having few experiences with forests, which is suggestive of people’s disinterest in forests or inability to meaningfully engage with forests (e.g., lack of rituals, age) [37,62]. Few reported having actual forest management experience, which has important implications for using public values to guide forest policy, because knowledge of forest management appears largely limited to those who actually work with forests, and lesser so to those who recreate. The proportion of those who

claim to have forest management experience is also much smaller than the proportion of private lands owned by families suggesting that landownership is also not a good proxy for knowledge of forest management. Corroborating this, only a small fraction (> 10%) of forest owners take advantage of federally supported forest owner technical and assistance programs, which often prompts forest owners to have a forest management plan [63]. This finding illustrates how much of the regions natural heritage is in the hands of what appear well-meaning but uninformed citizens.

Examination of respondent demographic characteristics indicated that different socio-economic groups tended to have different experiences and attitudes towards timber harvesting and government involvement, which could have implications for which types of policies different groups would support. Overall, recreation was associated more with older, wealthier individuals, whereas younger, better educated groups tended to engage with forests in a professional setting. Individuals from disadvantaged socio-economic groups (e.g., lower income, education, nonwhite, female) reported having fewer experiences with forests. From a policy perspective, this could be a concern because already disadvantaged groups may become more disadvantaged if they are unable to experience the benefits provided by forests (e.g., place to exercise) or, due to lack of information, they are unable to express their preferences for public goods provided by forest management (e.g., water quality). Interactions between race, income, and access to outdoor recreation have been found in other studies [64,65]. Future forest policies should consider the potential for environmental justice issues, due to the lack of engagement from disadvantaged groups [66].

Interestingly, when compared with Schaff et al. [40] and similar environmental attitudes studies [67,68], our respondents tended to have lower levels of education but expressed similar levels of environmental concern (as indicated by support for forest management over production outcomes). This suggests that perspectives about forests and harvesting in the southeast may be less often a function of formal intuitions (i.e., economy, schools, governance) and more often an expression of cultural values toward forests. For example, owners in Southeast (i.e., Alabama, Georgia, and South Carolina) tend to be more concerned about amenity and recreation benefits than profits from timber harvesting [45]. The desire to be a good land steward has also been found to disrupt profit maximizing motives when it comes to wildlife management [29]. Cultural values aside, it may also be that small landowner involvement in the forest industry or collaborative groups is also hampered by an economy of scale problem or a lack of suitable opportunities and programs [69].

The finding of the general preference for forest health outcomes over timber production is consistent with the nationwide study conducted over a decade earlier by Schaaf et al. [40,54]. It is also in agreement with similar studies conducted in other countries [70–72], though we caution that landowner motivations are highly context-dependent and generalizing across diverse countries is difficult given cultural, historical, political, and social differences. Since this discussion is beyond the intended scope of this paper, a strong qualitative comparison of these studies such as these could be useful as a focus of future work. In the US, the preference for forest health likely arises from the desire to maintain ecosystems as natural landscapes for recreational and amenity purposes [34,39]. Recreational experiences in forests may also explain people's emotional attachment to forests, which is also important for wanting to maintain forest health [73]. However, without training people often have difficulty identifying which landscapes have been modified through timber harvesting, with the exception of clearcutting [41]. While the indicators used by some to describe forest conditions (e.g., wild, natural) tend to be meaningful to the public, they are not terms typically used by forestry professionals [74,75]. This suggest that perceptions of forest health will likely be the metric the public and landowners will most often use in assessing the value of policy alternatives, even though they may not have the capacity to determine what forests are in fact healthy [76].

Differences in forest related experiences (and lack of experiences) also explain why many people in the southeast have apathetic attitudes toward forest management. A significant proportion of respondents expressed neutral opinions about harvesting and indifference toward active forest management (i.e., 62.9% of respondents in the southeast are neutral or agree that forests do not need

management by humans). Comparatively, other respondents expressed strongly held attitudes towards timber harvesting, which is somewhat different from the nationwide study where there were more moderate levels of agreement [40,54]. This outcome suggests while some are knowledgeable, there are important limits in people's understanding of the complex interdependence between forests and human systems in the southeast [41,74]. Respondents who are more aware of the region's economic dependence on forests likely expressed strong opinions about timber harvesting because they are concerned about the sustainability of forests in the southeast.

The idea that government should be somehow involved in private lands decisions was acceptable to a low majority of respondents. This suggests knowledge that forests are privately owned and controlled may add value to the landscape [28]. Consistent with this is the finding that respondents were generally opposed to the idea that government should act as a leader or teacher of forest management. Instead, they supported strategies that encouraged collaboration between government and private forest owners (e.g., associations, best management practices). This type of concern was also found in a related study conducted in Georgia where landowners expressed that controlling their management practices was important for determining their landscape values and sense of place [77]. Attitudes towards authority tools and incentives were generally less positive; however, there was greater tolerance among respondents in the southeast when compared to nationwide respondents in Schaaf et al. [40]. This outcome is similar to the attitudes of southern forest owners, who strongly prefer landowner empowerment strategies, but at times still support the use of regulatory tools. For example, family forest owners in Florida often express concerns about regulations that protect wildlife, but many also agree that regulations are often needed [29].

The diversity of opinions regarding regulatory versus empowerment approaches was not well explained by ideological preferences for government involvement at the statewide scale. While on the whole people in the southeast are more often conservative or Republican they were, in fact, more favorable to authority tools compared to the greater US (as reported in Schaff et al. [29]). We acknowledge that important differences in sampling techniques may prevent a suitable comparison; however, it is useful to consider that those in the southeast may perceive private forest benefits (e.g., recreation, timber supply) as being weakly associated with highly politicized environmental issues (e.g., water supply, climate mitigation). Recreation and timber-related benefits are often more tangible compared to controversial environmental features (e.g., appropriate levels of pollution, climate change, wildlife population health) [78]. The forest industry in the south is also made up of many independent actors (e.g., forest owners, consultants, loggers, processing mills) which may prompt preferences for oversight. Regulatory structures often emerge in environments where there is an increasing number of economic actors [79].

Political ideology did appear to have more of an influence when looking at individual states. Mississippi respondents were the highest supporters of timber harvest (i.e., least neutral) for both production and forest conservation purposes, and were more often opposed to government involvement, suggesting that they place a high value on autonomy in making management decisions [29]. Comparatively, Florida was the least Republican and the most supportive of the environmental regulations (e.g., it was the only state that the majority agreed with the government telling private forest owners how to best manage their forests). Importantly, the implications of the findings of political ideology are limited as the comparison was done at the state level and not the individual level. Factors endogenous to local issues may also result in systematic preferences based on ideology, which were not captured using this approach.

This study has several other challenges associated with obtaining a representative sampling frame and controlling for self-selection bias, especially with the data collected from Mississippi. Research has found the reported demographic characteristics of online respondents and their known distribution in the US population could differ by 5–10% [80]. The use of opt-in panels may also allow self-selection bias to still occur, which could be problematic when using completion rate as a substitute for response rate.

5. Conclusions

We found the public largely supports healthy forests and timber harvesting; however, an increasing number of uninformed landowners on smaller parcels will likely interfere with the provision of important ecosystem services. This suggests that existing government policies and programs, such as landowner assistance programs, are failing to help landowners meet public demand for ecosystem service provision in the southeastern US. Much of society does want to see private forests being put to best use; however, preferences for ecosystem maintenance and restoration, over timber production, may be a function of most people experiencing forests through recreational activities, and not more formal learning experiences. Regarding government interventions, there is a clear preference for voluntary approaches that have the government and landowners working together. More research is needed to fully explore how ideological perspectives, as indicated by political party preference may influence preferences for government involvement, however, early findings do suggest that a wide range of policy tools, including authority tools, would likely be acceptable for statewide forest policies, even though the southeast is generally more conservative.

We conclude that the attitudes of people in the southeastern US make them well suited for responding positively to policies and programs that use recreational experiences as a pathway for making more informed choices as citizens; however, we are cautious that this pathway may only lead to the desire to protect forests and not meaningful knowledge of forest management. The presence of apathetic attitudes and poor understanding of forest management among a significant portion of the public also has important implications for seeking socially approved policy solutions. In order to maintain both the timber economy and protect forest health on private lands, there is a continued need to support outreach programs that educate new audiences (e.g., poorer, female). It would be useful for future research to examine how outreach programs that help expose diverse audiences to the resource management profession may be more effective at motivating people to understand forest management.

For landowners, innovative policy strategies, such as market-based strategies (e.g., payments for ecosystem services) and nudges, may be useful for encouraging responsible behaviors without compromising independently made choices. This approach is consistent with a stewardship ethic while protecting property rights, and as such is consistent with the current political climate. These alternatives may also provide a much needed change from traditional landowner assistance programs (e.g., Natural Resource Conservation Service) that which tends to assume a top down form of communication and program development, whereas markets and negotiated contracts (e.g., conservation easements) may be able to facilitate more interactive discussions about forest-based values between buyers and sellers that reflect the particular needs of both. Since most environmental problems (e.g., water stress) are place-based and heavily context-dependent, the more effective strategies may emerge from local governments and organizations that operate closer to the forest rather than the federal government [81]. Within this framework, there is a critically important role for federal programs in promoting and sponsoring the development of place-based programs through grants and technical assistance for local program planners. To the extent that these programs reflect public and landowner preferences and values, they are more likely to succeed at both sustaining forests and forest-based livelihoods.

Supplementary Materials: The following are available online at <http://www.mdpi.com/1999-4907/10/9/776/s1>, Table S1. Percentages of responses to Likert scale items about timber harvesting in Florida, Table S2. Percentages of responses to Likert scale items about timber harvesting in Georgia, Table S3. Percentages of responses to Likert scale items about timber harvesting in Mississippi, Table S4. Percentages of responses to Likert scale items about timber harvesting in South Carolina, Table S5. Percentages of responses to Likert scale items about government's approach to private forest management in Florida, Table S6. Percentages of responses to Likert scale items about government's approach to private forest management in Georgia, Table S7. Percentages of responses to Likert scale items about government's approach to private forest management in Mississippi, Table S8. Percentages of responses to Likert scale items about government's approach to private forest management in South Carolina.

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