UNDERSTANDING PERCEPTIONS AND DEVELOPING TYPOLOGIES OF FEMALE FOREST LANDOWNERS FOR ENSURING THE SUSTAINABLE MANAGEMENT OF FOREST RESOURCES IN GEORGIA, UNITED STATES

by

JACQUELINE ANNE MINER

(Under the Direction of Puneet Dwivedi)

ABSTRACT

Female forest landowners (FFLs) currently own about 21.4% of total forestlands in the Southern United States. Since women outlive men by about five years, the percentage of FFLs is likely to further increase in the future. Due to this likely shift in forestland management, it is vital to develop a better understanding of FFLs by investigating their unique challenges and opportunities in forestland management and their management objectives. The first study used SWOT-AHP to understand the challenges and opportunities of FFLs in Georgia, United States. Results highlighted a need for targeted education and outreach programs. The second study used the Q methodology to develop a typology of FFLs in Georgia based on their forestland management motivations. Analysis identified three types of FFLs based on their management objectives. Results will promote the active engagement of FFLs in the Southern United States, in general, and in Georgia, in particular.

INDEX WORDS: Forest management, Gender, Socio-psychological motivations, Southern United States

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CHAPTER 1

INTRODUCTION

In 2018, approximately 9.6 million family forest landowners in the United States collectively owned 272 million acres of forestland, i.e., about 33.8% of all forestland in the United States (Butler et al., 2021). Of these 9.6 million family forest landowners, about 20% were female forest landowners (FFLs) (Butler et al., 2021). Female forest landownership has increased steadily in recent years. In 2006, FFLs owned approximately 33.8 million acres (Butler, 2008), increasing to almost 47 million acres in 2013 (Butler et al., 2016), and 51.6 million acres in 2018 (Butler et al., 2021). In 2018, family forest landowners in the Southern United States owned about 140.4 million acres of forestland, and FFLs owned 30 million acres (Butler et al., 2021). Following a similar trend to national forestland ownership, the amount of forestland owned by FFLs in the Southern United States increased from 14.6 million acres in 2006 to 25 million acres in 2013 (Butler et al., 2021; Butler et al., 2020). This trend is expected to continue and is primarily attributable to differences in life expectancy (Arias et al. 2021), as married women outlive their husbands and become primary owners.

Despite the rapid increase in female forest landownership, little literature exists that investigates FFLs (Butler et al., 2017), specifically their land management motivations or the challenges they face with forestland management. To the best of my knowledge, only two studies exist that examine FFLs at a national level (Butler et al., 2017; Majumdar et al., 2009). Compared to male forest landowners, FFLs were more likely to inherit their land (Butler et al., 2017), less likely to

participate in commercial timber harvests (Butler et al., 2017), less likely to manage their forestlands for wildlife (Butler et al., 2017), and more likely to manage their forestland for biodiversity and aesthetics than timber production (Majumdar et al., 2009). Other studies in the existing literature refer to FFLs but only as a part of a broader investigation (Table 1).

Table 1. Summary of the Existing Literature on FFLs.

Studies	Year	Area	Landowners (#)	Male	Female
Bliss et al. (1997)	1992	Tennessee Valley Region	996	47%	53%
Sullivan et al. (2005)	1999	Virginia	300	74%	26%
Jarrett et al. (2009)	***	Southern United States*	585	72%	28%
Majumdar et al. (2009)	2002-2006	United States	8373	79%	31%
Sun et al. (2009)	2006	Mississippi	2229	74.9%	26.9%
Miller et al. (2012)	2010	Lake States**	850	89%	11%
Schelhas et al. (2012)	***	Alabama	235		
Thompson and Hansen (2012)	2010	United States	429		
Poudyal et al. (2014)	2007	Cumberland Plateau Tennessee	528	76%	24%
Hartter et al. (2015)	2011	Oregon	1999	47.1%	52.9%
Butler et al. (2017)	2011-2013	United States	1619	68.8%	31.2%

*Alabama, Florida, Georgia, Mississippi, South Carolina.
**Michigan, Minnesota, Wisconsin.
***Studies did not specify year/s that survey was distributed.

Bliss et al. (1997) reported that a significantly lower number of FFLs approved the use of prescribed burning and herbicides. Sullivan et al. (2005) found that female respondents were less interested in undertaking active forest management and harvesting activities than male respondents. Sun et al. (2009) found that application frequencies for a reforestation cost-share program were lower for FFLs, while Schelhas et al. (2012) reported that FFLs were more likely to participate in cost-sharing programs than males. Miller et al. (2012) reported that FFLs are less likely to participate in the forest carbon markets while Thompson and Hansen (2012) did not find any statistical difference between male landowners and FFLs with respect to positive or negative attitudes toward carbon sequestration. Hartter et al. (2015) reported that women were more likely to express educational needs when it comes to forest management and Poudyal et al. (2014) found

that FFLs are less likely to convert their forestlands into other land uses. Jarrett et al. (2009) found that FFLs were more likely to obtain forestry-related information from friends and family than male landowners and are open to receiving more information on various aspects of sustainable forest management including management, taxes, and intergenerational land transfer (Jarrett et al., 2009). Finally, other literature suggests that FFLs are inclined to manage their land for conservation (Ozanne et al., 1999; Tindall et al., 2003). These findings are similar to those in Nordic countries (Follo, 2011; Kuuluvainen et al., 2014; Lidestav, 1998; Lidestav and Ekström, 2000) suggesting that FFLs in developed countries that have a similar forestry landscape may share similar attitudes and behaviors regarding forest management.

The limited research on FFLs has placed them at a distinct disadvantage as there are fewer educational and extension outreach materials catering to FFLs. Past extension efforts that do exist have largely failed due to a disconnect between information provided and information needed by FFLs (Huff, 2017). Furthermore, the forestry sector has been unsuccessful at creating peer-to-peer networking opportunities and platforms for FFLs (Huff, 2017). The absence of opportunities for FFLs has caused their limited participation and lack of confidence in participating in forest-related discussions (Hamunen et al., 2020). The forestland management obstacles FFLs endure may explain why they are more likely to give away or sell their forestland than male forest landowners (Markowski-Lindsay et al., 2017) which may interfere with the provision of forest-based ecosystem services (Kreye et al., 2019). It may also lead to forestland conversion to other land uses such as residential development and urbanization (Alig et al., 2010).

Despite existing research, the land management motivations of FFLs remain poorly understood. A need exists for exploratory studies to develop a better understanding of FFLs' management objectives. By understanding FFLs management objectives, active forestland stewardship among FFLs may be encouraged through extension outreach and technical assistance to ensure the continued management of forest resources in the United States. Critical decisions about the future of forestlands in the United States will ultimately fall to FFLs as life expectancies for women are higher than men in the United States (Arias et al., 2021). These decisions about forestland management may determine the fate of forestry in the United States, in general, and in the Southern United States, in particular. By understanding FFLs management objectives and their challenges with forestland management, active forestland stewardship may be encouraged to ensure the sustainability of forest management in the United States. In this case, sustainable forest management is the practice of managing forests to meet the current needs and desires of society for forest resources without compromising the availability of these for future generations (Bundtland et al., 1987).

Goal and Objectives

The goal is to promote forest stewardship among FFLs through advanced research and capacity building for ensuring the sustainability of forest resources in the Southern United States. The first objective was to assess perceptions of FFLs about the sustainable management of forest resources. The second objective was to develop a typology of FFLs based on their intrinsic motivations for forest management.

Study Area

Considering the limitations imposed by resources and time, I focused on FFLs in Georgia, United States. In 2017, Georgia alone provided 3.9% of total roundwood harvested nationwide, the highest in the country. Georgia's forest industry produced an economic impact of $36.3 billion on the state's economy in 2018 (Georgia Forest Commission, 2019). Additionally, Georgia is the leading exporter of forest products accounting for 11.1% of trade value for nationwide exports (Georgia Forestry Association, 2021). The majority of Georgia's forestland is privately owned (89%), of which 61% belong to family forest landowners (Butler et al., 2021). About 22% of family forestlands are owned by FFLs, translating to ownership of approximately 2.8 million acres of the almost 13 million acres of family forestland in the state (Butler et al., 2021). The total forestland under female ownership is projected to increase in Georgia in the foreseeable future, largely following the demographic trends at the regional and national levels.

CHAPTER 2

PERSPECTIVES OF FOUR STAKEHOLDER GROUPS ABOUT THE PARTICIPATION OF FEMALE FOREST LANDOWNERS IN FOREST MANAGEMENT IN GEORGIA, UNITED STATES[1]

[1] Miner, J., Dwivedi, P., Izlar, R., Atkins, D., and Kadam, P. 2021. *PLoS ONE*. 16(8). Reprinted here with permission of publisher.

Abstract

As the number of FFLs in the United States continues to rise, there is an increasing need to understand the perceptions of stakeholder groups about opportunities and challenges faced by FFLs in the context of sustainable forestland management. My first study utilizes the technique of SWOT-AHP (Strengths, Weaknesses, Opportunities, and Treats - Analytical Hierarchy Process) to understand the perceptions of four stakeholder groups (FFLs, private foresters, government representatives, and non-profits) in Georgia – a significant forestry state located in the Southern United States. I chose sixteen factors (four under each SWOT category) from a comprehensive literature review and detailed interviews with individuals from the identified stakeholder groups. Using these factors, I then created a survey that had stakeholders compare the factors within their respective SWOT categories. Next, I generated a second survey (one for each stakeholder group) that asked participants to compare the highest-ranking factors from each SWOT category. I found that all stakeholder groups prioritized weaknesses over the other SWOT categories. Results also showed a significant need for relevant educational outreach programs that cater to FFLs. Additionally, results highlighted a need to promote the interest of future generations in forestland management as all stakeholder groups felt that limited interest from future generations was the most important threat to the continued management of forests. This chapter will directly feed into regional, national, and international attempts to increase the participation of minority family forest landowners in sustainable forest management by identifying the challenges and opportunities for FFLs that may help promote integrated forest policy development.

SWOT-AHP Analysis Framework

The SWOT (strengths, weaknesses, opportunities, and threats) analysis is an established technique for understanding stakeholder perceptions by analyzing the internal and external environments that influence the perceptions of stakeholder groups (Kurttila et al., 2000; Wheelan and Hunger, 1995). Internal factors are those that directly influence stakeholders in the study area of interest and are comprised of strengths and weaknesses. External factors consist of opportunities and threats and have an indirect influence on the stakeholders (Shrestha et al., 2004). Factors that influence the perceptions of stakeholder groups are identified and categorized into a respective SWOT category based on stakeholder consultations.

The SWOT technique is commonly used to develop appropriate strategies that balance the identified internal and external factors (Kurttila et al., 2000; Pesonen et al., 2001). However, it cannot quantitatively analyze the factors (Kurttila et al., 2000; Pesonen et al., 2001) and does not allow researchers to compare the factors to understand their priority rankings (Dwivedi and Alavalapati, 2009; Gallego-Ayala and Juízo, 2011; Pesonen et al., 2001). SWOT analysis also does not allow researchers to determine which factors are most important to individuals and stakeholder groups directly related to the research area of interest nor how they should correlate in strategy development (Kajanus et al., 2004; Shinno et al., 2006).

The analytic hierarchy process (AHP) was introduced to the SWOT analysis technique for ensuring a quantitative prioritization of factors. Developed by Saaty (1980), the AHP is a quantitative method used to analyze complex decision problems with multiple criteria (Saaty, 2000). SWOT analysis acts as an ideal framework for AHP as it allows researchers to analytically examine the

identified SWOT factors and compare them (Görener et al., 2012). The SWOT-AHP technique allows for more precise strategy development as it grants researchers an opportunity to propose strategies that highlight the highest-ranking positive (strengths/opportunities) factors while addressing the highest-ranking negative (weaknesses/threat) factors (Kurttila et al., 2000).

A common three-step approach outlined by Kurtilla et al. (2000) is used by researchers.

a) Factors are identified by researchers for each SWOT category (Duchelle et al., 2012; Masozera et al., 2006). Identification of the factors can occur through several means, including expert consultations, interviews with key stakeholders, and a careful literature review.

b) The AHP method is applied to determine the SWOT factor priority rankings (Gallego-Ayala and Juízo, 2011). Researchers do this by developing a survey to distribute to representatives from each stakeholder group included in the analysis (Duchelle et al., 2012). The survey asks the stakeholder representatives to compare the identified factors to one another, within their respective SWOT category, through pairwise comparisons. These comparisons are then evaluated with the eigenvalue method where an eigenvalue is assigned to each factor and constitutes the estimation of factor priorities (Dwivedi and Alavalapati, 2009; Kurttila et al., 2000). Each factor is given a priority ranking in all SWOT categories, also referred to as local priority rankings.

c) The highest-ranking factor in each SWOT category, determined through the survey, is compared by stakeholder representatives through another survey that utilizes pairwise

comparisons (Kurttila et al., 2000). Again, the eigenvalue method is used for the evaluation, and rankings are used to determine the prioritization of the highest-ranking factors identified through the first survey. The priority ranking given to the highest-ranking factors in the second survey is called global priority scores. These global priority scores, along with the local priority rankings, are used for strategy development.

The information from the pairwise comparisons can be represented using a reciprocal matrix where the appointed relative weights enter the matrix as $\alpha_{ij,}$ and the reciprocal ($1/\alpha_{ij}$) is assigned to the opposite side of the diagonal represented below. Note that *i* and *j* refer to rows and columns, respectively.

$$\mathbf{A}=(\alpha_{ij})\begin{bmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/n \\ . & . & \dots & . \\ . & . & \dots & . \\ . & . & \dots & . \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{bmatrix}$$

The rows of the matrix represent the ratios of weights for each factor in respect to all others. So, in the matrix where $i=j$, then $\alpha_{ij}=1$. I then multiply the matrix by the reverse of the vector weights, w, to develop a new vector $n\mathbf{w}$,

$$\boldsymbol{Aw}=n\boldsymbol{w}$$

where $\boldsymbol{w}=(w_1,w_2,\dots,w_n)^T$, n is the number of rows or number of columns, and T represents the transposed vector. The new vector can be written as

$$(\boldsymbol{A}-n\boldsymbol{I})\boldsymbol{w}=0$$

where n is also the largest eigenvalue, λ_{max}, or trace of matrix $\boldsymbol{A}$ and $\boldsymbol{I}$ is the identity matrix of size n ensuring that $\lambda_{max}=n$ is a necessary condition to confirm consistency. Inconsistency could arise if there are varying responses in the pairwise comparisons, which leads to λ_{max} deviating from n. The following formula should be used to test for the consistency of the matrix.

$$\boldsymbol{CI}=(\mu_{max}-n)/(n-1)$$

$$\boldsymbol{CR}=\boldsymbol{CI}/\boldsymbol{RI}$$

where ***CI*** is the consistency index, ***RI*** is the random index- created from a random matrix of order n, and ***CR*** is the consistency ratio. Saaty (1980) identifies that the CR should be less than 10% to confirm consistency. The three things that improve CI are homogeneity of factors in each SWOT group, a smaller number of factors in each group, and a clear understanding of the decision problem for the researchers. For undertaking SWOT-AHP, a large sample size - over 30 participants - is not needed; therefore, it helps in providing intrinsic motivations of stakeholder groups at a reasonable research expenditure.

Methods

Identify SWOT Factors

I conducted a comprehensive literature review for identifying relevant factors under each SWOT category (Butler et al., 2017; Lidestav, 1998; Majumdar et al., 2009; Ozanne et al., 1999; Schelhas et al., 2012). Then, I interviewed 14 Georgia-based professionals across four forestry stakeholder groups, i.e., FFLs (three interviews), Government Representatives (four interviews), Private Foresters (four interviews), and Non-profit Representatives (three interviews). I obtained approval (# PROJECT00002589) from the University of Georgia Institutional Review Board before undertaking the research. Out of 14 professionals, 8 were females. In these interviews, I asked the professionals to review the identified factors based on the literature review and provided them an opportunity to suggest other suitable factors that were not previously identified. Following these interviews, I finalized the factors under each SWOT category (Table 2).

Data collection and analysis for the first survey

I developed a survey based on the finalized factors, which utilized pairwise comparisons to compare and rank factors within each SWOT category. I distributed the survey to FFLs attending a workshop[2] held in Athens, Georgia, on October 1, 2020. The survey was distributed to the FFLs in attendance. Those FFLs who did not own land in Georgia were not included in the survey. In total, 11 FFLs completed the survey at the workshop, and an additional response was received from an email survey totaling 12 FFL responses. Shortly following the workshop, I compiled a list of females from other stakeholder groups working in Georgia. In total, I contacted 15 private foresters, 17 government representatives, and 12 non-profit representatives through email to participate in the survey. Survey responses varied from each stakeholder group, with an average

[2]Six workshops throughout two years were held by Land & Ladies, a private company aimed to educate FFLs about forestland management, in association with the University of Georgia Warnell School of Forestry and Natural Resources. The workshops covered three forestry topics (topics were repeated twice). Agendas for the three workshop topics are included in the appendix.

response rate of 60% (Table 3). Many non-profits were represented, including the Longleaf Alliance, Georgia Land Trust, Georgia Heirs Property, Southern Regional Extension Forestry, and the Georgia Nature Conservancy. Government representatives were from the Georgia Department of Natural Resources (DNR), the Georgia Forestry Commission (GFC), and the United States Department of Agriculture (USDA). A collection of private companies was represented in the private stakeholder group, including International Paper and Weyerhaeuser.

Table 2. SWOT Factors and their Definitions used in the First Survey.

Strengths	**Enhanced Environmental Services**: Increased participation of women forest landowners in forest management can improve water quality, increase carbon storage, enhance recreational opportunities, and better wildlife habitats.
	Income Opportunities: Increased participation of women forest landowners in forest management will provide additional income opportunities (e.g., hunting leases, thinning, harvesting, pine straw raking, etc.).
	Participation in Existing Networks: Bringing women forest landowners into forestry-related networks will add diverse perspectives and create women leaders at local and regional levels.
	Connection to Land: Active forest management will increase emotional and physical attachment to the land, thus motivating women landowners to retain ownership for themselves and for future generations.
Weaknesses	**Limited Knowledge of Forest Management**: Women forest landowners often possess limited knowledge about forestry and forest management, especially when buying or inheriting land.
	Lack of Women-Centric Outreach Programs: A lack of women-oriented forestry conferences/workshops for continued education in forest management and forestry practices places women owners at a disadvantage.
	Limited Women Forest Professionals: A lack of women forest professionals may limit a typical women forest landowner's active participation in discussion of land management with a same-gendered counterpart.
	Absence of Initial Contact: When purchasing or inheriting land for forest management, women forest landowners may lack resources or access to professional consultations.
Opportunities	**Peer-to-Peer Educational Opportunities**: Participation in forest landowner-oriented educational conferences for women may facilitate experienced women forest landowners and women forestry professionals to educate, advise, and train other women forest landowners.
	Community Development: Forestry can facilitate community formation for discussing forests and related land management issues among women forest landowners, forestry professionals, and the broader forestry community.
	Access to New Markets: Active forest management is critical to enrolling forests in new markets for environmental services (e.g., carbon markets, water quality markets, stream mitigation banking, wetland mitigation banking, recreational opportunities, etc.).
	Enhanced Job Opportunities for Women: For various reasons, including assisting women forest landowners, women foresters are essential to a vibrant forestry industry.
Threats	**Investment Risks**: A fluctuating demand for forestry products and the potential of environmental risks such as hurricanes, wildfires, and pests can affect forest profitability.
	Lack of Representation: Women forest landowners are underrepresented in relevant government policy decisions**.**
	Absenteeism: When women inherit forest land, many may be absentee landowners which can lead to detachment from the land and a decision to sell the property.
	Limited Interest from Future Generations: If future generations' interest in forest management is limited or nonexistent, parcellation of forestland may become more prevalent and retention of ownership threatened.

Table 3. Response Rate for the First SWOT Survey by Selected Stakeholder Groups.

	Landowners	Non-profit	Government	Private Foresters	Total
Surveys Sent (#)	12	11	17	15	55
Surveys Received (#)	12	7	8	6	33
Response Rate	100%	63.6%	47.1%	40%	60%

Data collection and analysis for the second survey

For each stakeholder group, I analyzed the geometric means from the survey responses to determine the highest priority factors for each SWOT category. I used the prioritization scores to create four new surveys, one for each stakeholder group, that used pairwise comparisons to determine which factor and SWOT category were most important to each stakeholder group. I individually emailed all the first survey respondents the new surveys and distributed them to FFLs at a second workshop in Albany, Georgia, on February 18, 2021. Stakeholder response rates varied but averaged 66.6% (Table 4). I took necessary precautions to ensure that each stakeholder was given the correct survey which was especially important as the highest priority values varied between stakeholder groups. I combined responses from individuals in each stakeholder group to determine the geometric means of all pairwise comparisons. I then derived the relative priority for each category in each stakeholder group from the geometric means of SWOT categories using the standard AHP technique. All CRs were below 10% which implied consistency (Saaty, 1980).

Table 4. Response rate for the second round of SWOT surveys.

	Landowners	Non-profit	Government	Private Foresters	Total
Surveys Sent (#)	21	7	8	6	42
Surveys Received (#)	10	5	7	6	28
Response Rate	47.6%	71.4%	87.5%	100%	66.6%

Results and discussion

The results section is divided into three sub-sections. The first section focuses on the local factor priorities from the first survey. The second section discusses the global factor priorities obtained

from the second survey distributed to each stakeholder group. The third section elaborates on the overall priority scores for each factor.

Local priority scores

Figures 1-4 are perception maps derived from the geometric mean obtained after analyzing the data collected from the first survey for each stakeholder group. It should be noted that factors furthest from the origin were assigned the highest priority while the factors nearest to the origin were given the least priority.

For the FFL stakeholder group, the strengths category was led by *income opportunities* (30.6%), followed by *connection to the land* (27.4%), *participation in existing networks* (24.9%), and *enhanced environmental services* (17%). The two factors that received the highest priority score for weaknesses were *limited knowledge of forest management* (31.5%) and *absence of initial contact* (28.4%). These two factors encompassed approximately 60% of FFLs' perceptions of forestland management weaknesses. *Access to new markets* (31.7%) dominated opportunities, while *limited interest from future generations* (32.9%) was the most important threat (Figure 1).

For the non-profit stakeholder group, the participants assigned the highest priority scores to *connection to land* (33.7%) and *income opportunities* (28.5%) among all the factors present under the strengths category. Non-profit representatives dominantly ranked *absence of initial contact* (38.6%) over *limited knowledge of forest management* (21.8%), *limited women forest professionals* (21.3%), and *lack of women-centric outreach programs* (18.2%). The opportunities

category was most defined by *peer-to-peer educational opportunities* (33.7%) and *investment risks* (29.8%) under the threats category (Figure 2).

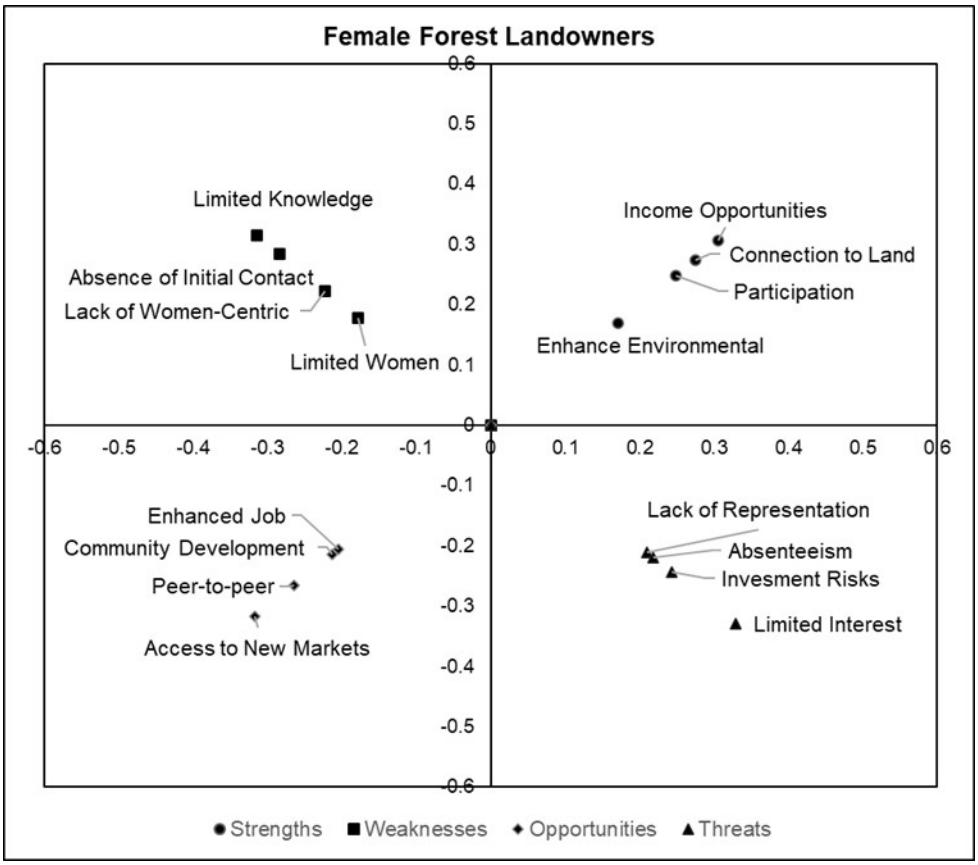

Figure 1: Perception Map of Factor Priorities Assigned by FFLs.

Government representatives prioritized *income opportunities* (32.3%) and *connection to land* (28.9%) over the other factors under the strengths category. Like the non-profit stakeholder group, the government representatives ranked *absence of initial contact* (28.2%) and *limited knowledge of forest management* (25.3%) the highest. However, it should be noted that the *lack of women-centric outreach programs* (25.1%) ranked almost equally to *limited knowledge of forest management* (25.3%). The government representatives showed slight preference over factors in the opportunities category, shown by the low variability in their ranking. The highest priority factor

was *enhanced job opportunities for women* (29.8%), followed by *access to new markets* (24.9%), *peer-to-peer educational opportunities* (23.8%), and *community development* (21.6%). Like FFLs, the *limited interest of future generations* (41.3%) was dominantly prioritized by the government representatives (Figure 3).

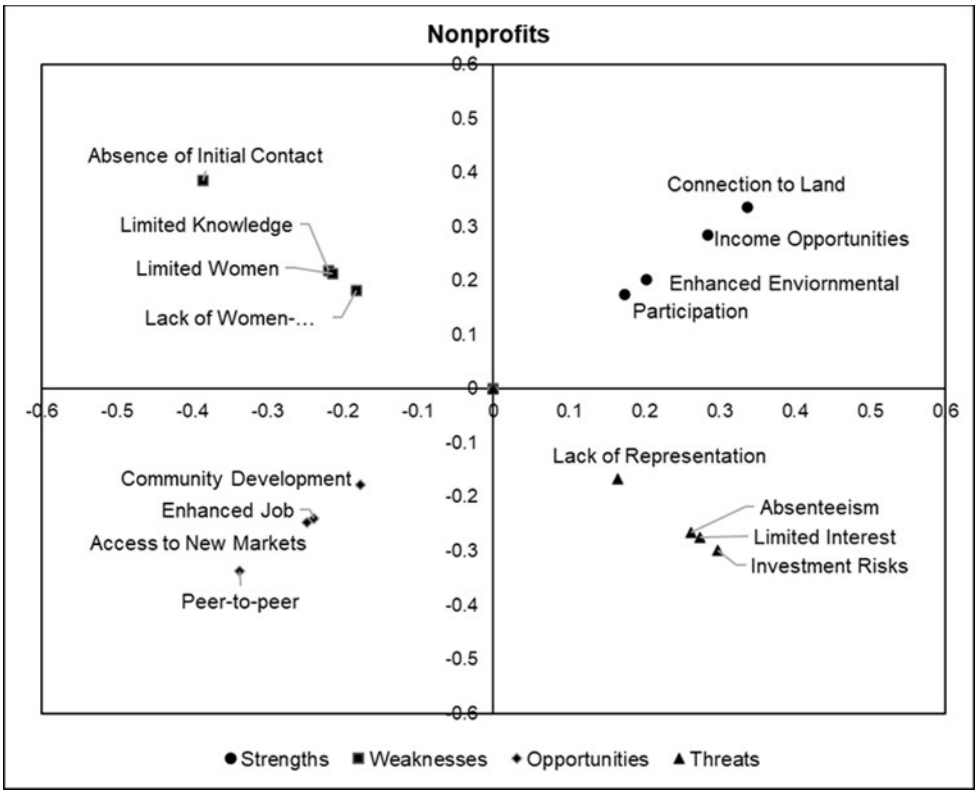

Figure 2: Perception Map of Factor Priorities Assigned by Non-profit Representatives.

I contacted fifteen private foresters through email to complete the first survey. Their overall rankings are shown in Figure 4. Of these 15 individuals, six responded, providing a 40% response rate (Table 3). Unlike the other stakeholder groups, the private foresters prioritized *participation in existing networks* (38.2%) over the other factors in the strength category. However, *income opportunities* (31.8%) was ranked second, similar to the other stakeholder groups. Like the FFLs, the private foresters prioritized *limited knowledge of forest management* (40.4%) over the other

factors in the weaknesses category. Like the government stakeholder group, the private foresters prioritized *enhanced job opportunities for women* (29.2%) for opportunities. *Absenteeism* (36.6%) was given the highest rank in the threats, followed by *limited interest from future generations* (32.9%), *investment risks* (16.1%), and *lack of representation* (14.1%).

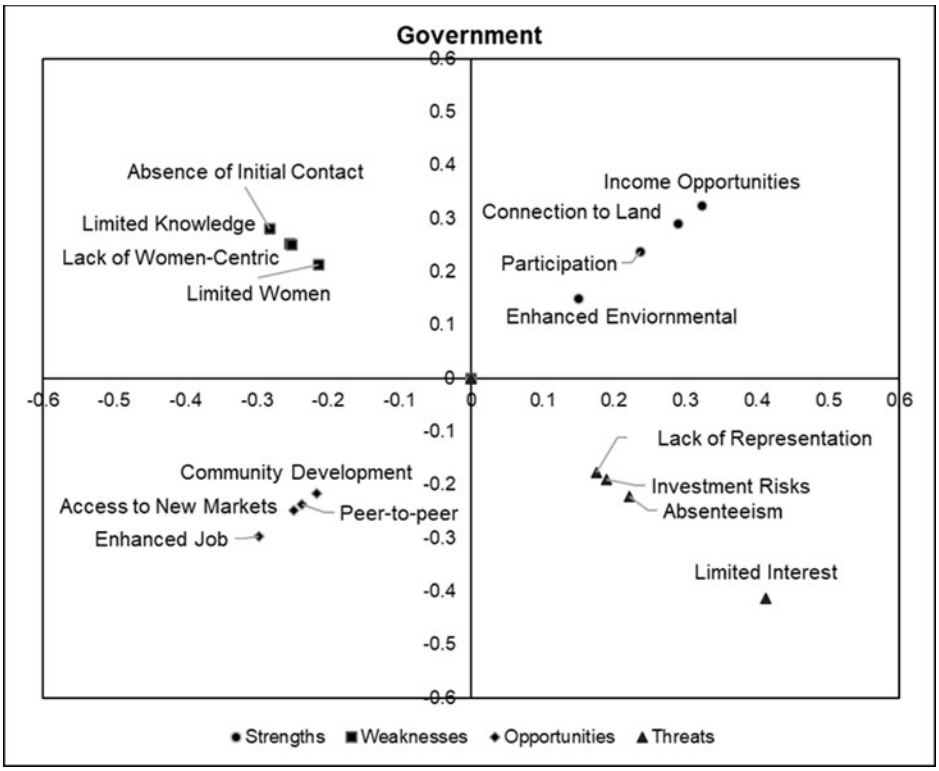

Figure 3: Perception Map of Factor Priorities Assigned by Government Representatives.

Global priority scores

Figure 5 displays the breakdown of how each stakeholder group prioritized the SWOT categories. These priority scores were obtained from the data collected from the second survey. Individuals from each group compared the highest-scoring factor from each SWOT category through pairwise comparisons. Understanding how stakeholder representatives ranked the highest-scoring factors gave me an idea of what SWOT category was most important to each group. Figure 5 allowed me

to identify the overall perception, positive or negative, for each stakeholder group. For SWOT analyses, strengths and opportunities can be combined as positive factor priorities, while weaknesses and threats can be combined as negative factor priorities.

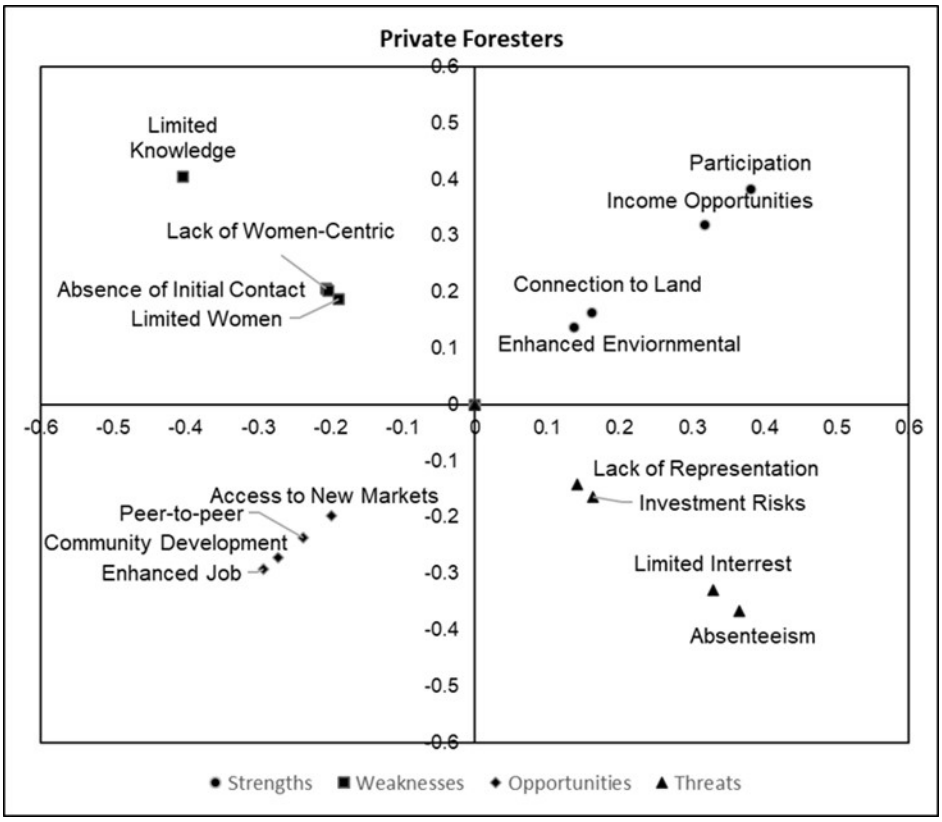

Figure 4: Perception Map of Factor Priorities Assigned by Private Foresters.

Negative perceptions were held by FFLs (-52%) and government representatives (-66%), while private foresters (+53%) and non-profits (+52%) had slightly positive perceptions. The government stakeholder group had the most negative perception. They ranked weaknesses (39%) and threats (27%) highest over strengths (20%) and opportunities (13%). The FFLs prioritized weaknesses (30%) followed by strengths (27%), highlighting their more neutral but still slightly negative perception. Though private foresters and non-profit representatives prioritized weaknesses (36% and 34%, respectively) first, they also highly ranked opportunities (29% and

26%, respectively) and strengths (24% and 26%, respectively); thus, leading to their overall more positive perception of FFL's forestland management opportunities.

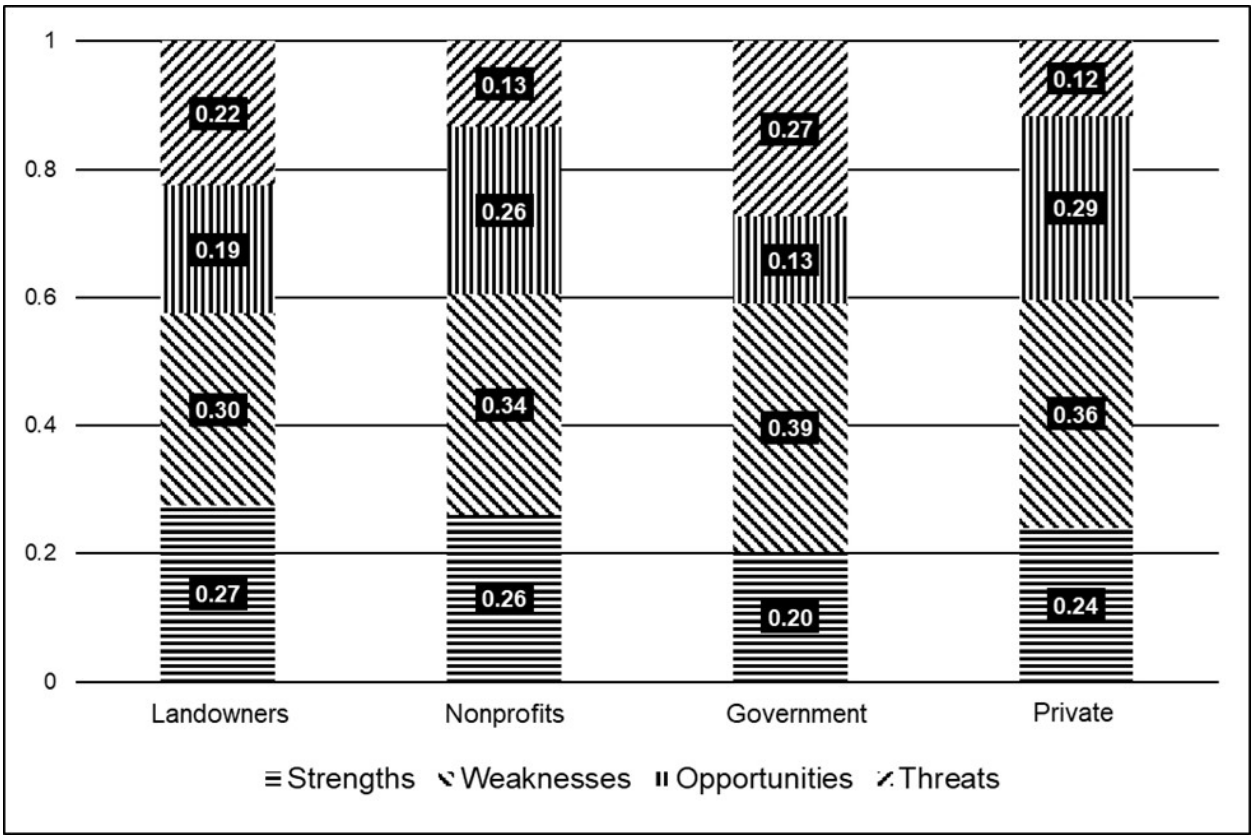

Figure 5: SWOT Category Factor Priorities for each Stakeholder Group.

The high priority score given to weaknesses by all stakeholder groups demonstrates concern over the challenges present for forestland management for FFLs. The prioritization of the weaknesses can be partly attributed to the lack of extension efforts available to FFLs and is stressed by my results as FFLs and private foresters prioritized *limited knowledge of forest management* over other factors in the weakness category. FFL's limited knowledge of forest management emphasizes the importance of educating them in forestland management through extension efforts by government agencies, non-profit organizations, and private industry. Providing educational opportunities

catered to FFLs may provide women with more comfortable environments to learn about forestland management options (Huff, 2017). Additionally, the non-profit and government stakeholder groups prioritized a *lack of initial contact* for the weakness category. Not only could these educational opportunities better inform current and future FFLs about forestland management options, but they could also strengthen the connection of FFLs with each other and individuals in the forestry industry.

Non-profit representatives felt that *peer-to-peer educational opportunities* was the most important opportunity factor, further emphasizing the need for enhanced educational outreach. Providing educational opportunities catered towards FFLs will not only expand their knowledge of forestland management but will also create an environment to foster connections with other FFLs. These connections with other landowners could help them make integral management decisions for their forestland, which is especially important to ensure that the Southern United States maintains its position as the wood basket of the world. The prioritization of peer-to-peer educational opportunities supports conclusions drawn by Schubert and Mayer (2012), who found that about half of family forest landowners were influenced by members of their forest communities in the Western Upper Peninsula of Michigan. Additionally, other studies (Kittredge et al., 2013; Ma et al., 2012) found that while professional consultations are important in forest landowner management decisions, landowners are also influenced by peer landowners. Though overall feelings towards forestland management for FFLs are negative due to flaws in the current outreach system, there are groups (non-profit representatives and private foresters) who believe in opportunities for FFLs which highlights prospective areas of improvement in the forestry sector.

Conversely, the government representatives and FFLs held negative perceptions of forestland management for FFLs. The government representatives ranked threats as the second most important category next to weaknesses, while the FFLs ranked strengths second and threats third. Both groups prioritized the *limited interest of future generations* as the most influential threat factor. During my interviews with representatives of the stakeholder groups, the importance of engaging future generations in forestry was brought up often. One government representative felt that it was not so much of a lack of interest in forestry as there is a disconnect between the interest of FFLs, especially younger women landowners, and conventional forestry practices. Worry over future forest landowners further emphasizes the importance of educational outreach opportunities and how essential they are for women inheriting or purchasing their forestland now and well into the future.

Overall priority scores

Priority scores assigned by each stakeholder group in addition to the average for each factor were taken to determine the overall priority scores of each factor (Figure 6). Overall, *income opportunities* (30.8%) was given the highest priority for strengths. This factor is followed by *connection to land* (26.6%) and *participation in existing networks* (26.05%). The overall highest ranked weakness was *limited knowledge of forest management* (29.8%), closely followed by an *absence of initial contact* (28.9%). Overall priority scores for opportunities were very close. The most prioritized factor was *peer-to-peer educational opportunities* at 26.9%, followed by *enhanced job opportunities for women* (25.8%) and *access to new markets* (25.3%). *Limited interest from future generations* (33.6%) was ranked as the overall most important factor for threats and was followed by *absenteeism* (26.7%) and *investment risks* (22.3%).

Figure 6: Overall Average Priority Scores of each SWOT Factor from the First Survey. S1: enhanced environmental services, S2: income opportunities, S3: participation in existing networks, S4: connection to land, W1: limited knowledge of forest management, W2: lack of women-centric outreach programs, W3: limited women forest professionals, W4: absence of initial contact, O1: peer-to-peer educational opportunities, O2: community development, O3: access to new markets, O4: enhanced job opportunities for women, T1: investment risks, T2: lack of representations, T3: absenteeism, T4: limited interest from future generations.

The high priority given to *limited interest from future generations* indicates that all stakeholder groups view the decreased interest in forestry by younger generations as the most significant threat to forestland management. The lack of engagement from future generations is highlighted by Sharik et al. (2015), who found that although undergraduate enrollment in natural resource programs is steadily increasing, there has been a decline in enrollment in forestry. One of the biggest concerns for landowners throughout the United States is keeping land intact for heirs (Butler et al., 2021; Butler, 2008). Landowner's concern over future land management may explain why FFLs prioritized this factor over all other threat factors. The factor definition (Table 2) implied increased parcellation of land if future generations continue to express a lack of interest in forestry. Increasing parcellation of land is an especially prominent issue for landowners in the Southern United States as these landowners are more likely to have inherited their land compared to other regions in the United States (Kaetzel et al., 2012).

The second-highest-ranking factor *income opportunities* suggest that the stakeholder groups are most excited by the economic opportunities provided by active forestland management for FFLs. However, the stakeholder groups seem most intrigued by more traditional forest products as *access to new markets* only ranked tenth overall. Interest in traditional forest practices seems to support conclusions drawn that forest landowners in the Southern United States are more likely to manage their land for consumptive purposes (Kaetzel et al., 2012). Additionally, the factor *investment risks* is ranked lower, which further proves that FFLs in Georgia are more excited about managing their forestland for profit despite the possible investment risk. FFLs interest in generating income from their forestland is also supported by *enhanced environmental services* being ranked lowest overall by the stakeholder groups and does not support the conclusions of other studies that women tend to manage their land for conservation (Ozanne et al., 1999; Tindall et al., 2003). The difference between conclusions drawn in this study and studies of others could be attributed to the fact that the Southern United States is the largest supplier of roundwood in the United States, where a significant percentage of family forest landowners harvest their forestlands regularly for income generation (Butler et al., 2016).

The stakeholder groups also felt that the biggest challenge facing FFLs is their limited knowledge of forest management and their lack of land management resources or access to professional consultants. Indicating this challenge, both *limited knowledge of forest management* and the *absence of initial contact* were highly prioritized by all stakeholder groups. Prioritization of these factors supports the findings of Butler et al. (2021) and Schelhas et al. (2012), which state that most forest landowners want some type of information for how to manage their forestland. The data also suggests that women prefer to receive this knowledge and these contacts through their

peers. *Peer-to-peer educational opportunities* was the highest-ranking information transfer factor by all stakeholder groups. Butler et al. (2021) determined that the most popular advice topics include timber management which additionally supports my findings on the economic incentive that forestland provides to landowners.

Finally, all stakeholder groups agreed that *lack of representation* was the least important threat. All four stakeholder groups ranked this factor behind all others, and all groups rated the priority 21% or less. Landowners seemed to be the most worried about the lack of representation of FFLs in government policy decisions as they prioritized it at 20.9% of all threats. In comparison, all others prioritized it at 17.6% or less. Despite this being a low-ranking factor, the effect of low numbers of FFLs in positions to influence government policy may have detrimental effects not only on their land but also on other forestlands owned by families through unrepresentative policy decisions.

I multiplied the overall category priority scores (global scores) obtained from the second survey by the individual scores (local scores) obtained from the first survey. Figure 7 displays how individual stakeholder groups prioritized the SWOT factors. Similar patterns can be observed between the FFLs, non-profit representatives, and government representatives. These three groups prioritize *income opportunities* (S2) and *connection to land* (S4) over the other factors in the strengths category, whereas the private foresters prioritized *participation in existing networks* (S3). For weaknesses, the FFLs, non-profit, and government stakeholder groups significantly prioritized *absence of initial contact* (W4) while the private foresters significantly prioritized *limited knowledge of forest management* (W1) and ranked *absence of initial contact (W4)* third in priority

behind *lack of women-centric outreach programs* (W2). The most discrepancy between stakeholders can be observed in the opportunities category. Private foresters ranked *enhanced job opportunities for women* (O4) the highest, while non-profits prioritized *peer-to-peer educational opportunities* (O1). Government representatives had little difference in their rankings of the factors but slightly prioritized *enhanced job opportunities for women* (O4) like the private foresters. The FFLs ranked *access to new markets* (O3) highest, unlike any other stakeholder group. While all stakeholder groups ranked *limited interest from future generations* (T4) highly, government representatives and FFLs ranked it highest. Non-profit representatives slightly out-prioritized T4 with *investment risks* (T1), and private foresters thought *absenteeism* (T3) was the biggest threat. The discrepancy between factor ranking of private foresters and the other stakeholder groups further emphasizes the difference in perceptions of FFLs in forestland management. I observed a slightly positive perception for the private forester group compared to the other stakeholder groups who had more negative perceptions.

Results represent aggregated opinions of respondents that belong to the four chosen stakeholder groups. Despite the consistent CRs, results were dependent on individuals' responses which could lead to results that are not representative of all stakeholder opinions and emphasize a need for research that incorporates more stakeholder groups (e.g., industry). Continuing research will allow for a clearer understanding of more comprehensive stakeholder perceptions for more intentional educational efforts by relevant government, non-profit, and private groups.

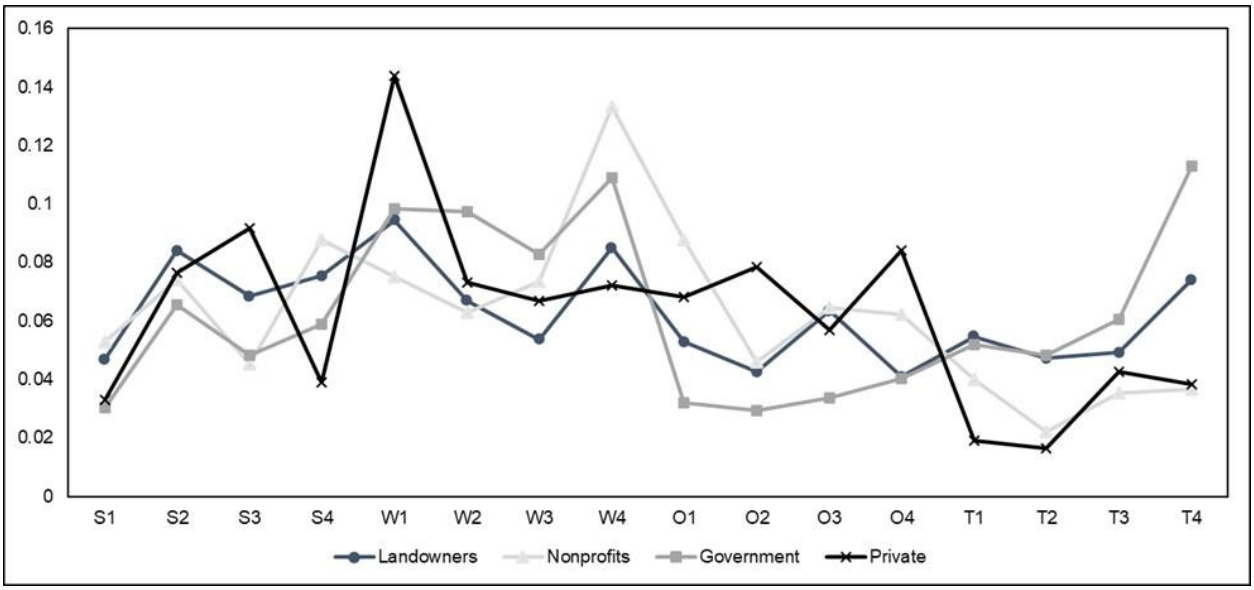

Figure 7: Overall Perceptions of SWOT Factors by Stakeholder Group. S1: enhanced environmental services, S2: income opportunities, S3: participation in existing networks, S4: connection to land, W1: limited knowledge of forest management, W2: lack of women-centric outreach programs, W3: limited women forest professionals, W4: absence of initial contact, O1: peer-to-peer educational opportunities, O2: community development, O3: access to new markets, O4: enhanced job opportunities for women, T1: investment risks, T2: lack of representations, T3: absenteeism, T4: limited interest from future generations.

Conclusions

I utilized SWOT-AHP to analyze the perceptions of four stakeholder groups about FFLs land management in Georgia, United States. Georgia was chosen due to the high prevalence of FFLs as well as the high production of roundwood and finished wood-based products. Despite the study focusing on one state, the results can be utilized by other southern states due to similar social, cultural, and policy conditions.

Results highlighted differences between stakeholder perceptions of forestland management for FFLs. While perceptions of all stakeholder groups were dominated by weaknesses, the government stakeholder group held the most negative perception, followed by FFLs who had only a slightly negative perception of forestland management. Conversely, the non-profit and private forester

stakeholder groups saw the potential opportunity of forestland management for FFLs; thus, explaining their more positive perception.

Overall, my analysis demonstrates a vital need for educational opportunities for FFLs. Literature suggests that professional advice and peer-to-peer learning are viable options for knowledge transfer for landowners (Hamunen et al., 2020; Huff, 2017; Kittredge et al., 2013). Findings suggest that FFLs in Georgia see their limited knowledge of forestland management as their biggest challenge when inheriting or purchasing land despite their excitement for the income opportunities available with forestland. I also found that the non-profit and FFL stakeholder groups see peer-to-peer educational opportunities as one of the most important opportunities for FFLs. Results from the overall priority scores suggest that stakeholders are most concerned about the limited interest from future generations when it comes to forestland management. This concern is not surprising as many individuals in the interviews discussed this as a threat to the future of forestry.

The stakeholders also felt that the greatest strength for FFLs in forestland management was economic gain and returns from traditional forest products such as timber. FFL's strength from income generation differs from other existing studies that found women manage their forestland for more environmental benefits and tend to be more environmentally conscious (Butler et al., 2017; Lidestav and Berg Lejon, 2013; Ozanne et al., 1999). While this management objective may not seem inherently sustainable, one must keep in mind that sustainable management of forest resources includes managing forests to meet the current needs of society including wood product needs. Inevitably, the production of forest products involves active forest management and

therefore generates income for landowners. Additionally, the stakeholders felt that the biggest weakness for FFLs was their lack of knowledge about forestland management and their limited access to professional consultants, which further emphasizes the need to generate educational opportunities and outreach programs which cater to women.

This research will help fill in existing gaps in literature around FFLs in the United States and will increase awareness of the challenges and opportunities present for FFLs in forestland management. The research contributes to existing literature that investigates FFLs and forestland management. The methodology and findings can be utilized in ongoing research of stakeholder perceptions of forestland management. Though my paper investigated the relevant stakeholder perceptions of forestland management for FFLs, I did not do any research relevant to gender differences in these perceptions. Future research could investigate male stakeholder perceptions of the challenges and opportunities for FFLs in forestland management. Additionally, this research focused on just Georgia, United States. This methodology and research can be utilized to research other regions in the United States and other countries worldwide to provide a more comprehensive understanding of stakeholder perceptions of FFLs about forestland management.

CHAPTER 3

DEVELOPING A TYPOLOGY OF FEMALE FOREST LANDOWNERS IN GEORGIA, UNITED STATES[3]

[3] Miner, J., Goyke, N., and Dwivedi, P. 2022. *Forests, Trees, and Livelihoods.* 03/2022. Reprinted here with permission of publisher.

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Abstract

The percentage of female forest landowners (FFLs) in the United States increased from 11% in 2006 to 20% in 2018. Since women almost outlive men by about five years, the percentage of FFLs is likely to further increase in the future. Due to this likely shift in forestland ownership, it is vital to develop typologies of FFLs based on their motivations for forestland management. In this study, I used the Q methodology to develop a typology of FFLs in Georgia – a prominent forestry state located in the Southern United States. Each participant sorted 30 statements that represented 10 unique forestland management objectives common for FFLs. Analysis of the responses identified three types of FFLs that reflect the land management objectives of the participants. Type 1 FFLs find part of their identity in their forestland. Type 2 FFLs prioritize financial returns from their forestlands. Type 3 FFLs prioritize improving wildlife habitat. Salient to the three types, all FFLs display high levels of place attachment and prioritize future generations in management decisions. These results illustrate the need for educational and networking opportunities that better cater to the specific forest management objectives of FFLs.

Introduction

Research on family forest landowners mentions FFLs but is often conducted through the lens of the default assumption of male forest landowners. This limitation in literature is symbolic of a wider male-default assumption in forestry, which ultimately puts FFLs at an information disadvantage. Limited knowledge about FFLs on the part of forestry professionals has led to limited educational and extension materials tailored particularly for them. The gap between information needed by FFLs and the information provided by forestry professionals has led to situations where extension efforts have largely failed (Huff, 2017), leading to FFLs having a lack

of confidence in their knowledge, therefore, limiting their participation in forest-related discussions (Hamunen et al., 2020). These difficulties may explain why FFLs are more likely to give away or sell their forestland than male forest landowners (Markowski-Lindsay et al., 2017) which may interfere with the provision of forest-based ecosystem services (Kreye et al., 2019). It may also lead to forestland conversion to other land uses such as residential development and urbanization (Alig et al., 2010). To begin addressing the existing knowledge gap, it is imperative that forestry professionals understand the motivations of FFLs for forestland management to create outreach opportunities and educational materials that best target FFLs.

Given that FFLs' motivations for forestland management are complex and nuanced, I used the Q methodology to explore them. The Q method has been used in various natural resource management settings to systematically filter individual viewpoints into more operable themes (Alam and Lovett, 2019) allowing decision-makers to consider differing viewpoints of stakeholders (Arumugam et al., 2020). The Q method is also used by researchers to improve and influence policy decisions regarding the management of natural resources. For these reasons, I consider Q as the ideal approach to identify common management objectives of FFLs and create a typology based on how they prioritize forestland management objectives.

An advantage of the Q method is that it is similar to the Informal Cultural Consensus Model as it is subject-oriented and results are based on differences between respondents (Weller, 2007). Because of this similarity, researchers can use the Q method not only to identify differences present in discourses but also to identify points of consensus. Further, the combination of the Q method

and semi-structured interviews gives a more nuanced understanding of the results and can identify unorthodox opinions of a discourse (Eyvindson et al., 2015).

Other studies exist that investigate forest landowner typologies. However, these studies do not investigate FFLs or identify distinct groups based on gender differences between landowners. Khanal et al. (2017) used principal component-cluster analysis to identify groups of non-industrial private forest landowners based on landowner management objectives in the Southern United States. Goyke et al. (2019) identified types of African American forest landowners, another minority landowner group, in the Southern United States using the Q method. Metcalf et al. (2016) used *k*-means cluster analysis and found five groups of private forest landowners based on their management objectives, use, and legacy.

Since little is known about the management objectives for FFLs, a need exists for exploratory studies to develop a better understanding of their perspectives on forest management. By understanding FFLs management objectives, active forestland stewardship among FFLs will be encouraged to ensure the sustainability of forest resources in the United States. The goal of this study is to promote forest stewardship among FFLs by understanding their motivations for forestland management. The objectives of this study were to identify what land management objectives were most important to the FFLs and to create a typology of FFLs based on their relative preferences of forestland management objectives.

Methods

Q Methodology

The Q method is a mixed-methods technique that was developed to quantify subjective views that comprise a discourse (Stephenson, 1953) by examining correlations between subjects (Brown, 1980). The Q method contrasts with R (factor analysis, cluster analysis, linear regression, etc.) methodologies that examine correlations between variables (Goyke et al., 2019). Statistically, the Q method is factor analysis where the correlation matrix is based on a correlation between participants rather than variables describing the participants. The correlations identified between subjects with the Q method are identified using factor analysis and are used to generate types describing the participants who load significantly for a particular factor (McKeown, 1984).

Typically, the Q method is conducted in an interview where individuals sort, by the degree of agreement, statements that comprise a discourse. Participants are free to define and rank statements based on their own subjective experiences. This self-referential nature has three distinct benefits. First, the Q method reduces the potential of researcher bias by using a subjective point of reference. Second, allowing participants to define the statements in their terms reduces disagreements over their meaning. Third, large sample size is unnecessary because the method is self-referential, so statistical error is not relevant. In fact, too large a sample can be counterproductive by taking away subtle distinctions in the data (Watts and Stenner, 2005). However, the Q method is not without limitations. The Q method cannot provide researchers with an idea of the representativeness of a given type, only its existence. Furthermore, the types are fixed spatiotemporally to the views of the participants at the place and time of sorting.

One of the critical aspects of using the Q method is generating a set of statements that comprise the discourse of interest, in this case, the motivations of FFLs for forestland management. To begin defining the discourse, I distributed a survey to 12 FFLs, 15 female forestry professionals, 17 female forestry government representatives, and 11 females in forestry-related non-profits during the fall of 2020. The survey asked the participants to describe what sustainable forest management meant to them. From these answers, I identified ten objectives that reflected the discourse around the motivations for forestland management for FFLs. These ten objectives were bequest intentions, economic considerations, environmental services, forest conservation, forest education, networking opportunities, place attachment, recreation, social, and wildlife management. Each objective that comprised the discourse was assigned three statements that reflected either positive, negative, or neutral aspects of the objective totaling 30 statements. I used multiple statements for each objective to ensure the topic was broadly represented (Watts and Stenner, 2005).

A careful revision of the statements was conducted through two stages to ensure the statements accurately reflected the motivations of FFLs. In the first stage, the statements were sent to three FFLs for review, followed by a remotely conducted interview. After the interviews, I rephrased and reworded the statements for clarity. In the second stage, a draft of the survey was distributed to three more FFLs. I distributed two of these three surveys in-person and the third online to ensure online distribution was a viable option. In addition to reading the statements and commenting on their clarity, during these interviews, I asked the FFLs to sort the statements just as they would during the real survey distribution. After this final round of pretesting, 30 statements were finalized.

Survey Distribution

I distributed the survey to FFLs who participated in a hybrid workshop that was conducted in Waycross, Georgia, on May 13, 2021. The day-long hybrid workshop was conducted online and in-person by Land and Ladies, a private company aiming to educate FFLs in forestland management, in association with the University of Georgia Warnell School of Forestry and Natural Resources. In total, six FFLs completed the survey, five of the in-person attendants and one online attendee. I also distributed the survey to participants in a workshop conducted online on August 19, 2021. Four FFLs completed the survey. One additional FFL completed the survey at a workshop held in Valdosta, Georgia on October 7, 2021. The surveys distributed in the online workshop and at the workshop held in Valdosta, Georgia included a section that asked for the contact information of other FFLs. I contacted additional survey participants based on information provided by FFLs and through professional foresters who provided contacts of other FFLs that would be willing to participate. Through these snowball sampling strategies, I collected an additional 13 surveys. In total, the analysis included 25 surveys.

I asked the participants to read all 30 statements before beginning the sorting process. I then encouraged the FFLs to sort the statements between most disagree (-3) to most agree (+3) on a chart that represented the quasi-normal distribution of the statements. Once they completed this, I encouraged them to rank the remaining statements between disagree (-2), somewhat disagree (-1), neutral (0), somewhat agree (+1), and agree (+2). The Q-sort followed a forced-normal distribution (Table 5), which, although not strictly speaking necessary, is commonly used as it helps participants think critically about how to prioritize the statements. Throughout the survey process, participants were reminded that they could switch the statements around however they would like

until they were satisfied with their rankings. Five of the 25 completed surveys had an associated interview. The interviews helped me to further understand the interviewee's ranking process and provided a basis for the interpretation of the typology. The remaining 20 survey participants did not have an accompanying interview. Additionally, all participants completed a short socio-demographic and landholding characteristic survey. I obtained the approval of the University of Georgia Institutional Review Board (#PROJECT00003754) before undertaking the survey.

Table 5: Distribution of the Value of Rankings Used in the Q-sort and their Corresponding Frequency.

	Most Disagree						Most Agree
Value	-3	-2	-1	0	+1	+2	+3
Frequency	3	4	5	6	5	4	3

Analysis

Two common criteria exist to determine the number of factors to interpret as types. First, all interpreted factors must have an eigenvalue of over 1.00 (McKeown and Thomas, 1988). Second, all interpreted factors should have at least two participants load significantly for them. Using these two criteria, three factors were chosen for my analysis. Four of the twenty-five responses did not load significantly into any of the three factors and were not included in the analysis. I used the free software PQMethod to carry out the statistical analysis (accessible at http://schmolck.org/qmethod/). The most interpretable output from PQMethod is an average Q sort for each type with a corresponding Q sort rank (between -3 and +3) for each of the 30 statements. Additionally, distinguishing statements for each type and consensus statements between the three types were identified at the $\alpha = 0.05$ and $\alpha = 0.01$ levels.

Results

Demographics

The typical FFL in this study was white (96%), was over the age of 50 (72%), lived in Georgia (96%), had a college degree (80%), and was employed (64%) (Table 6). One participant lived out of the state but owned forestland in Georgia. The median landownership for FFLs in the study was 525 acres of forestland. In the survey, I also included open-ended questions about the landowner's landholdings, including the counties the land was located, their overall acreage of land, and the acreage of land that is forested. The 25 respondents owned land in 33 counties located across the Piedmont and Coastal Plains physiographic regions of Georgia.

Types Overview

I identified three types of landowners that comprise the different motivations of FFLs for forestland management. While describing each statement, I will reference statements and objectives that distinguish the types from one another. Any time a statement is mentioned, I will identify it by the statement number (Table 7). After describing each of the three types, I will discuss the points of consensus between them. Note that a statement mentioned with a * is significant at the $p < 0.01$ level, and a ^ is significant at the $p < 0.05$ level for that individual type.

Type 1: Landowners with identity attachment

These landowners found part of their identity in their forestland as this is where they feel most at home (statement 4*), agree that living on or near their forestland is important to their lifestyle (statement 29*), and feel attached to their forestland (statement 18^). One landowner described

her connection with the land as ‘almost spiritual’ and emphasized that her land management was motivated by her hope that future generations will love the land as much as she does.

Table 6: Summary Demographics of FFL Respondents.

Demographic	Number of Respondents	Percentage
Age		
31-40	4	16%
41-50	3	12%
51-60	6	24%
61-70	8	32%
71-80	4	16%
81-90	0	0%
Education Level		
High School	0	0%
Some College	2	8%
Associates	2	8%
Bachelor’s	10	40%
Master’s	8	32%
Specialist	1	4%
Doctorate	2	8%
Forested Acres		
10-99	5	20%
100-999	9	36%
1000-4999	7	28%
5000-9999	1	4%
10000-100000	3	12%

Underscoring this place attachment and identity attachment, these FFLs would not sell their forestland if the opportunity arose (statement 21*) and found managing their forestland for wildlife (statement 8^) and conservation (statement 7*) important. Emphasizing their desire to manage their forestland for conservation, they did not find forest conservation difficult due to obstacles such as paperwork (statement 30^). Type 1 FFLs also strongly disagreed that managing their forestland for recreation is difficult (statement 27*). The same landowner mentioned above said she managed her land for familial recreational opportunities and that she was motivated by conservation values for her family.

Finally, the FFLs who identified with Type 1 did not prioritize managing their forestland for financial returns (statement 6^), although they were not strictly speaking opposed to it. The same landowner mentioned above stated that she hopes any income gained from the land will be put back into the land, emphasizing this type's non-consumptive management objectives. Type 1 FFLs also did not feel their gender has restricted them from learning about forestland management (statement 1^) nor did they feel people assume they have limited knowledge of forestland management because of their gender (statement 3^).

Type 2: Landowners who are motivated by financial returns

In contrast to Type 1, landowners who identified with Type 2 manage their land for consumptive purposes and financial gain. These FFLs prioritized managing their forestland for financial returns (statement 6*) over all other management objectives. They also actively managed their land because of the financial return possibilities (statement 14*). A landowner I interviewed who identified with this type supported this by saying they purposefully managed their land for economic gain by participating in thinning, harvesting, and pine straw raking activities.

Type 2 landowners were the least likely to manage their forestland for maintaining or improving wildlife habitats (statement 26*). These landowners also opined that their gender had restricted them from learning about forestland management (statement 1^) and that networking opportunities for FFLs were not adequate (statement 13^). The need for educational classes that combat these obstacles was mentioned by the same landowner who stated that participating in a workshop with other FFLs was good because she felt she was able to connect to other women.

Type 3: Landowners who prioritize wildlife

Landowners who identified with Type 3 showed a strong preference for managing their land for maintaining or improving wildlife habitats (statement 26^). Type 3 FFLs were the least likely of the three types to manage their forestland for income opportunities (statement 6^), further emphasizing their wildlife-oriented management objectives. A landowner I interviewed who identified with this type stated that she managed her land for aesthetic and wildlife values. This type was also the least likely of the three types to prioritize living on or near their forestland (statement 29^) and agreed that managing their forestland for recreation is difficult due to a lack of financial viability, challenging terrain, or poor location (statement 27*).

These FFLs do not consider that their gender has restricted them from learning about forestland management (statement 1^) and believed that educational opportunities for FFLs are adequate (statement 16*). Additionally, they found networking opportunities for FFLs adequate (statement 13*) and did not agree that their gender had excluded them from networking opportunities (statement 24*). These landowners may be more involved in these opportunities as the landowner mentioned above was actively involved with a landowner association. During her interview, this landowner explicitly mentioned that she did not think her gender had restricted her from managing her forestland well. However, she did mention that more educational opportunities would be nice to have to improve her land management.

Table 7: Finalized Statements used for the Q Survey given to FFLs with Q-sort Rank by Type. The Sign Indicates the Negative (-), Positive (+), or Neutral (+/-) Aspects of the Management Objective.

Objective	Statement	Survey number	Sign	Type 1	Type 2	Type 3
Economic Considerations	I manage my forestland for financial returns.	6	+/-	0^	3*	-2^
	Financial return and investment opportunities that accompany forestland management motivate me to manage my land actively.	14	+	1	3*	0
	Infrequent or low income from my forestland can make investing in my forestland burdensome.	19	-	-1	1	-1
Wildlife Management	Managing for wildlife is burdensome for forest landowners.	2	-	-2	-1	-1
	I find managing my forestland for wildlife important.	8[c]	+	1^	1	0
	I manage my forestland for maintaining or improving wildlife habitats.	26	+/-	1^	-1*	3^
Recreation	I manage my forestland for recreation.	11	+/-	1	-1	1
	Recreational opportunities on my forestland motivate me to manage my land actively.	22[c]	+	0	1	1
	Managing my forestland for recreation is not always financially viable, terrain may be bad, the location may be inaccessible, etc.	27	-	-3*	-1*	1*
Environmental Services	I manage my forestland for environmental services, like carbon mitigation and clean water.	15	+/-	0	-2	-1
	Managing my forestland for environmental services like carbon mitigation and clean water is important.	17	+	1	-1	0
	It can be difficult to manage my forestland for environmental services like carbon mitigation and clean water.	20[c]	-	-1	0	1
Bequest Intentions	It is important to me to involve my child(ren) and/or heir(s) in the management of my forestland.	12[c]	+	2	2	3
	I manage my forestland for future generations.	25[c]	+/-	3	3	3
	I would consider selling my forestland if the opportunity arose.	21	-	-3*	0	-1
Networking Opportunities	Networking opportunities are difficult to engage in because few women are participating.	5[c]	-	0	0	0
	Networking opportunities for female forest landowners like myself are adequate.	13	+/-	0^	-2^	1*
	My gender has not made me feel excluded from any networking opportunities.	24	+	-1^	0^	2*
Place Attachment	My forestland is where I feel most at home.	4	+/-	3*	-2	-2
	I am attached to my forestland.	18[c]	+/-	1^	2	2
	Living on or near my forestland is important for my lifestyle.	29	+/-	2*	0^	-2^
Social	I am afraid that I will lose contact with my female friends if I sell or pass on my forestland.	9[c]	-	-3	-3	-3
	My female friends feel attached to my forestland.	10	+	0*	-3	-3
	I often invite my female friends out on my forestland to recreate.	28	+/-	-2	-3	-2
Forest Education	My gender has restricted me from learning about forestland management.	1	-	-2^	1*	-3^
	People assume I have limited knowledge of forestland management because of my gender.	3	-	-1^	2	0
	Educational opportunities for female forest landowners are adequate.	16	+/-	-1	-2	1*
Forest Conservation	I manage my forestland for conservation	7	+/-	2*	0	-1
	Forest conservation is important for my forestland management.	23[c]	+	2	2	1
	Forest conservation is difficult as one must pass through several obstacles, including dealing with paperwork.	30	-	-2^	1	0

*indicates a statement that is significant at a p-value of <0.01. ^indicates a statement that is significant at a p-value of <0.05. [C]indicates a statement of consensus between the types

Points of Consensus

Overall, the types showed significant consensus between nine statements (Figure 8). All FFLs managed their forestland to maintain it for future generations (statement 25^), found it important to involve future generations in their forestland management (statement 12*), and were attached to their land (statement 18^). The attachment to their forestland may explain why they maintained their land for future generations. A Type 1 landowner indicated that she wants her heirs to keep the land and love it as much as she does. She also mentioned that she purposefully brought children out to her land to teach them her land management values.

Additionally, FFLs did not share strong positive feelings towards managing their forestland for wildlife (statement 8*), forest conservation (statement 23^), and recreation (statement 22^). These statements received more neutral rankings indicating that these management objectives are not as uniformly favored as those discussed previously. For example, Type 3 FFLs managed their forestland for wildlife, but these attitudes were not shared among all FFLs included in the study. FFLs also had neutral attitudes towards the difficulty of managing forestland for environmental services (statement 20*). Some landowners during the survey process asked for more information on carbon mitigation. The FFL's request for this information may explain their neutral ratings of this statement. If FFLs were not aware of these environmental services, they might have ranked the statements neutrally since they had little to no opinion on them. Additionally, no other statement in the environmental services was ranked significantly by any of the types.

Finally, FFLs also had neutral attitudes about networking opportunities being difficult to engage in (statement 5*). FFL's neutral ranking of this statement could be attributable to the phrasing of

the statement. Landowners who participated in the survey may have thought that networking opportunities were difficult to participate in but for a reason other than few women participating. Only one statement received overwhelmingly low Q-sort ranks by all types. FFLs indicated that losing contact with female friends (statement 9^) was not a concern. This statement received a Q-sort score of -3 from all types showing very strong, negative consensus. The FFLs are not worried that they will lose contact with their female friends if they sell or pass on the land.

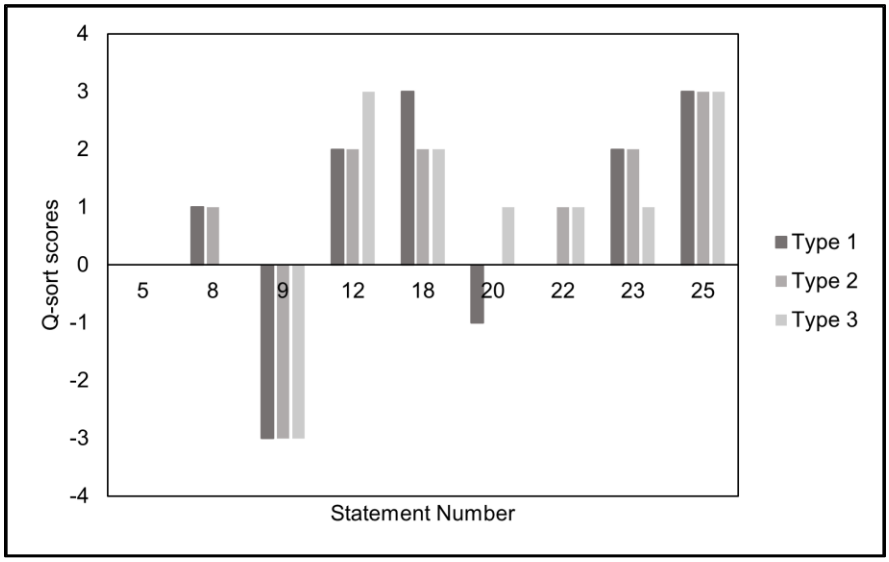

Figure 8: Q-sort Scores Assigned by Types 1, 2, and 3 for Statements of Consensus. Types 1, 2, and 3 were identified by similar forestland management objectives where type 1 landowners find part of their identity in their forestland, type 2 landowners prioritize financial return, and type 3 landowners focus on improving wildlife habitats.

Discussion

The FFLs in Georgia who identified with Type 1 demonstrated similar objectives to the consensus statements discussed above including the prioritization of future generations, neutrality towards environmental services, and disinterest in social objectives for forestland management; however, their attachment to their forestland made them distinct from the other FFL types. They were not only attached to their forestland, but they also saw it as a part of their identity and prioritized living

on or near their land. The place attachment demonstrated by Type 1 FFLs reflects similarly to the findings of Kaetzel et al. (2012) who concluded that landowners in the Southeast United States tend to live near their land. Findings also support Schelhas et al. (2012), who found that females often treat forestland as a part of a home. Further, Type 1 FFL's place attachment was supported by an interview where a landowner told me she felt extremely connected to her land and demonstrated strong familial attachment. Type 1 landowners also disagreed that they would sell their land. The place attachment attributes of Type 1 FFLs are similar to the "preservationist" landowners found by Kendra and Hull (2005) but Type 1 FFLs also contrast this group as they are unlikely to sell their forestland. Another attribute of these FFLs is that they are not restricted by their gender in forest education opportunities. Two landowners who loaded into this type both stated that forestland management was not difficult and that you are as involved as you want to be by finding the right people.

Type 2 landowners are comparable to the "timber-oriented" landowners identified by Khanal et al. (2017) and "farmers" identified by Kendra and Hull (2005) with their emphasis on financial returns from the forestland. I interviewed two of the women associated with this type, and both described their land management objective as industry-focused; thus, supporting this finding. Type 2 FFL's emphasis on income generation could be attributed to higher amounts of landowners in the Southeast managing their land for consumptive purposes than the national average (Kaetzel et al., 2012). These findings add nuance to conclusions drawn by Butler et al. (2017), who stated that women often did not participate in forest management activities like harvesting for sale or personal use in the last five years. In contrast to Types 1 and 3 FFLs, Type 2 FFLs found their gender had impaired their learning which may lead to lower levels of current forest understanding,

emphasizing the need for state-wide education programs to be developed for forest landowners (Hartter et al., 2015; Tumpach et al., 2018). Type 2 landowners were also not as attached to their forestland, nor did their objectives include conservation or wildlife like Types 1 and 3, respectively. In fact, in an interview, I had a landowner state that it was difficult for women to connect to the land. This may further explain why their management objectives are dominated by financial return.

Those FFLs who most strongly prioritized wildlife management fall into Type 3. While other landowners may have found managing wildlife important, this group had the objective to maintain or improve wildlife habitats. Type 3 landowners relate most closely to "Forest Managers" identified by Davis and Broussard (2007) as they emphasized managing land for future generations and providing habitat for wildlife. They also displayed much stronger attitudes towards gender in forestland management. While Type 1 landowners did not find their gender had restricted their educational opportunities for forestland management, Type 3 FFLs strongly opined that their gender did not restrict either educational opportunities or networking opportunities. These women may be more open to participating in conversations and more confident talking with forest industry professionals. Type 3 FFL's position on their gender in forest education opportunities may support conclusions that found women find value in talking with forest professionals, logging contractors, and consulting published books (Schelhas et al., 2012). Like Type 2 landowners, these FFLs were attached to their land but did not find their identity embedded in their forestland, nor did they prioritize living on or near their land. However, unlike Type 2, these FFLs did not have financial objectives in their land management. This same landowner stated that she did not have financial objectives on her forestland as she does not make much money off it. Type 3 FFL's disinterest in

financial return from their forestland is more in line with previously mentioned studies (Butler et al., 2017; Lidestav and Berg Lejon, 2013).

All three types of FFLs in Georgia managed their land with future generations in mind and demonstrated strong place attachment though Type 1 FFLs demonstrated the highest level of place attachment. These attitudes are similar to those found among landowners in Maine (a state in the Northeast United States with a large forestry sector) who had high levels of place attachment to their forestland and are concerned with keeping their land intact for their heirs (Leahy and Lyons, 2021). FFLs prioritization of future generations additionally supports findings that FFLs in the Southern United States have forestland management objectives of passing their forestland onto their children (Schelhas et al., 2012). All the FFLs I interviewed mentioned their children and descendants. One of them mentioned wanting to use her land to build something specifically for her children to enjoy. This high prioritization of future generations may also explain why FFLs in this study were found to have wildlife and forest conservation-oriented management objectives. The FFLs may use these management objectives to responsibly and sustainably steward their land to ensure it is in the best condition for their future inheritors.

Conclusions

My results highlighted three distinct types of FFLs in Georgia, United States. Type 1 FFLs found part of their identity in their forestland which is particularly attributable to their very strong place attachment to their forestland. Type 2 and 3 FFLs were also attached to their forestland but did not demonstrate a strong identity attachment as neither group prioritized living on or near their

forestland nor did they feel most at home on their forestland. Type 3 FFLs highly prioritized wildlife management but specifically managed their forestland to maintain or improve habitats. These landowners were also the least likely of the three types to feel that their gender had restricted them from forest education or networking opportunities. What makes Type 2 FFLs distinct from the other types of FFLs is their strong motivation for financial return on their forestland, which contradicts previous understandings of FFLs' land management objectives (Butler et al., 2017; Majumdar et al., 2009). While they recognized that there were investment risks in forestland management, this did not hinder their decisions for harvesting.

Developing a typology of FFLs in Georgia will help bridge the gap between the outreach needs of FFLs and the information provided by forest professionals by highlighting the diverse ways FFLs manage land in Georgia, United States. Although this study focused on one state, the results may be applicable to other southern states as well. As a minimum, I anticipate that these three types of motivations will be found among FFLs in neighboring states, although that does not preclude there being others as well. The identification of three FFL types was based on 25 completed surveys from FFLs but this does not implicitly imply FFLs do not have other motivations for forestland management. The Q method does not require a large sample size as it may dilute some of the distinctions between the identified types so, I elected for a smaller sample size. Additionally, some sampling bias may be present in the study as survey respondents often attended educational workshops that promoted FFLs' land management. The inclusion of these FFLs limited the number of FFLs uninterested in forestland management included in the survey. Contacting uninterested FFLs proved to be very difficult due to the ongoing COVID-19 pandemic. While these uninterested FFLs may have been unintentionally missed during the survey process, this should not take away

from the identified typology as the purpose of this study was to identify types of FFLs based on their land management objectives. Additionally, while surveys were completed online due to the pandemic, participants had contact with me to ensure I could answer any questions they may have had while completing the survey. Though having the participants complete the survey online was not how Q was originally designed, the results still reflect management motivations of FFLs in Georgia, United States.

This methodology should be used in ongoing research to identify other types that may exist in other social, cultural, and policy contexts. Future research may also include harvesting activity data into the creation of types, as mentioned by Silver et al. (2015). While the Q method does not allow me to conclude on the number of FFLs who identify with each type, future research could attempt to quantify such numbers for the state of Georgia through other methods such as mail-based surveys. Continuing this research will provide a more comprehensive understanding of FFLs management objectives. I hope this information can be utilized in applicable government, private, and non-profit agencies to better reach FFLs through educational workshops and networking opportunities to engage them in forestland management as landowner demographics continue to change. This research will aid forest professionals in having a better understanding of FFLs management objectives in Georgia and the other states across the Southeastern United States.

CHAPTER 4

CONCLUSIONS

This thesis used two methodologies to investigate FFLs' perspectives about forestland management. First, I used SWOT-AHP to identify perceptions of four stakeholder groups about the unique challenges and opportunities that FFLs face considering forestland management. Overall, stakeholder groups felt overwhelmed by the weaknesses present for FFLs, highlighting the more negative perception of both FFLs and government stakeholder groups. However, non-profit, and private forester stakeholder groups held a more positive perception highlighting the potential opportunities for FFLs in forestland management. Second, the Q method was used to distinguish types of FFLs based on their forestland management objectives. Through this method, three types were identified. Type 1 found part of their identity in their forestland. Type 2 had financial objectives. Type 3 managed their land for wildlife.

Throughout this thesis, one theme emerged above all others: the need for educational opportunities. Findings from the first chapter suggest that FFLs view their limited knowledge of forestland management as their biggest challenge. To reconcile this, a push for educational opportunities for FFLs is necessary to ensure they have access to the knowledge they need for forestland management. While the second chapter highlights that not all FFLs are hindered by the lack of female-focused educational opportunities, some do perceive this as a relevant obstacle to their forestland management objectives. Additionally, throughout the interviews with FFLs for the second chapter, those that did not feel their gender had interfered with their access to educational

opportunities often had connections with forestry professionals through their husbands or their fathers. Types identified in the second chapter could be used to develop relevant educational opportunities and extension outreach materials for FFLs.

Conclusions have been drawn that suggest the educational opportunities needed by FFLs are primarily in the hands of extension outreach and materials. While extension efforts are an important aspect to improving FFL forestland management education, other methods may also help increase their knowledge of forestland management. For example, continuing to promote workshops that engage FFLs, such as the one described in my thesis, is a critical aspect to improve the education of FFLs. These workshops discuss integral topics in forestland management such as an introduction to forestry, harvesting basics, and regeneration techniques. However, a barrier exists for these workshops. Women who are not actively involved in forestland management, such as women who just inherited their forestland, may be disconnected from workshop opportunities or apprehensive to attend workshops due to distrust. To reconcile this, it is critical to promote these workshop opportunities and other extension outreach opportunities by word of mouth. The word-of-mouth promotion must be done by FFLs currently involved in educational opportunities. Finally, it is imperative for men forest landowners to involve their children, heirs, and significant others in forestland management. Male forest landowners could bring their heirs and significant others to educational classes they are attending or could include them in current land management plans on their forestland. These actions would not only promote the education of women in forestry – and therefore provide future FFLs understanding of forestland management – but may also reduce worry over future generation interest in forestland management. While the targeted

approaches discussed above are not all-inclusive of ways to improve FFL education, they are steppingstones for reducing the barriers FFLs face in forestland management.

Results from this research are descriptive of FFLs in Georgia, United States. However, the results may be relevant in other southern states. It should be noted that results from the first chapter correspond with aggregated opinions of stakeholders included in the study. In turn, these results may not be representative of all stakeholders' opinions. For the second chapter, forestland management motivations for the types identified are likely to exist in other states, and therefore, it is quite likely that other types may exist as well.

The presence of these limitations highlights the ever-present need for continued research. Such research could include using the SWOT-AHP method to investigate other stakeholder group opinions, such as forestry industry representatives, or using either methodology to identify gendered differences in forestland management. Continuing research in this area will allow forest professionals to have a better understanding of FFLs' management objectives and allow a clearer understanding of stakeholder perceptions. Improved knowledge of FFLs forest management objectives and challenges will allow for more purposeful educational opportunities for FFLs hosted by relevant organizations such as government groups and non-profits. Methods used in this thesis can be utilized in ongoing research to provide a more comprehensive understanding of FFLs and forestland management for ensuring the sustainable management of forest resources in Georgia and beyond.

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APPENDIX

"Introduction to Forestry" Workshop Agenda

8:30- Registration and Refreshments

9:00- Welcome and Introductions

9:20- Introduction to Land Management (Danielle Atkins, Land & Ladies) *

10:00- Harvesting Basics (Noelle Arena, Weyerhaeuser) *

10:30- Reforestation Techniques (Alexandra Ford, Georgia Forestry Commission) *

11:00- Break

11:15- Survey activity (if applicable)

12:00- Lunch

12:30- Field Tour

2:30- Consultant Round Table ^

3:30- Concluding Testimonies

4:00- Adjourn

*Presentations by females from differing stakeholder groups to ensure FFLs are given a range of information
^Two to five consultant foresters spoke with FFLs in groups to answer questions they have about forest management and the topic of discussion that day.

“Harvesting Basics” Workshop Agenda

8:30- Registration and Refreshments

9:00- Welcome and Introductions

9:20- Markets and Products (Jenny Brown, Brown & Brown Forestry Consulting)

10:00- Forestry Taxes (Yanshu Li, Warnell School of Forestry & Natural Resources)

11:00- Break

11:15- Survey activity (if applicable)

12:00- Lunch

12:30- Field Tour

2:30- Consultant Round Table

3:30- Concluding Testimonies

4:00- Adjourn

“Reforestation Techniques” Workshop Agenda

8:30- Registration and Refreshments

9:00- Welcome and Introductions

9:20- Planning and Preparation (Danielle Atkins, Land & Ladies)

10:00- Cost Share opportunities (Sharon Swagger, NRCS)

10:30- Pine Seedling Options (Alexandra Ford, Georgia Forestry Commission)

11:00- Break

11:15- Survey activity (if applicable)

12:00- Lunch

12:30- Field Tour

2:30- Consultant Round Table

3:30- Concluding Testimonies

4:00- Adjourn