

NON-TIMBER FOREST PRODUCT LIVELIHOOD OPPORTUNITIES IN APPALACHIA

Katie Ellen Trozzo

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John F. Munsell, Chair

James L. Chamberlain

Michael A. Gold

Kim Niewolny

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Keywords: non-timber forest products, forest farming, cluster analysis, case study, forest  
landowners; community capitals, sustainable livelihoods

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## ABSTRACT

Non-timber forest products (NTFPs) have been harvested in the wild for generations in Appalachia. Demand for forest farmed raw material and transparent supply chains is growing, which has increased attention on the role of NTFPs in regional livelihoods. We conducted an embedded case study to understand contemporary NTFP harvest, perceptions of community-based development of NTFP livelihood opportunities, and the extent to which forest landowners are interested forest farming. One case study focused on Grayson County, Virginia and included semi-structured interviews with 16 key stakeholders. Interviews explored motivations, species preferences, and uses of NTFPs among individuals and then perceived assets, obstacles, and desired strategies for NTFP livelihood development within the community. Through qualitative analysis we found financial benefits, engagement with nature, and personal preferences (personal fulfillment, learning and creativity, and lifestyle) were key motivators. Newcomers to Appalachia were more likely to balance monetary, environmental, and lifestyle motivations, and multigenerational residents focused more on financial motivations and to a lesser degree lifestyle. We used the community capitals framework to analyze the community focused data and found references to natural, human, and cultural capital as both an asset and an obstacle. Financial capital was a top-obstacle whereas social capital was a top asset. Strategies focused on social, human, and financial capital investments such as social networking, educational programming, tax incentive programs, and local fundraising. The regional case study surveyed via mail those who own 5 or more acres of forestland in 14 Southwest Virginia Appalachian counties to understand extent to which they are interested in forest farming or leasing land for forest farming. We had a response rate of 28.9% and found 45% of forest landowners, owning 47% of the

forestland, were interested in forest farming. Those that were likely to lease their land accounted for 36% of all respondents and owned 43% of the forestland. Further, those who were interested did not differ based on demographic and land characteristics.

Our study reveals the contemporary state of NTFP livelihoods combines markets sales with broader homesteading objectives and that lifestyle and environmental motivators are an increasing focus as newcomers take roots in the region. Further, communities may be able to draw upon the cultural and natural capital around NTFPs as well as the strong social capital often present in rural communities to further invest in social networking, education, financial incentives, and funding to support NTFP livelihood development. Finally, forest farming and leasing of land for this practice is of considerable and broad appeal to forestland owners in Southwest Virginia, which may indicate possibilities for a critical mass to supply a growing demand for sustainably sourced and quality NTFP raw materials.

Keywords: case study; cluster analysis; community capitals; forest farming; forest food and medicine; forest landowners; sustainable livelihoods

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## GENERAL AUDIENCE ABSTRACT

In recent decades Appalachia has experienced socioeconomic challenges with lack of employment opportunities, high poverty levels and the resulting outmigration of residents, especially youth, in search of work. At the same time newcomers are migrating into the area drawn by the culture and natural environment, which is shifting the social fabric of the region. It is in this new context that communities are asked to develop livelihood opportunities using what is available to them. Non-timber forest products (NTFPs) have been harvested in the wild for generations in Appalachia and offer one avenue of possibility, especially as the market has begun to support higher prices for raw materials that meet the increasing consumer demand for sustainability and quality. Within these new dynamics we set out to understand contemporary uses of NTFPs in Appalachia, and what motivates people to work with these species, as well as community perceptions about how to develop NTFP livelihood opportunities, and the extent to which Appalachian residents are interested in forest farming (the cultivation or stewardship of NTFPs in an existing forest). Our study reveals the contemporary state of NTFP livelihoods combines markets sales with broader homesteading objectives and that lifestyle and environmental motivators are an increasing focus as newcomers take roots in the region. Further, communities may be able to draw upon the cultural and natural capital around NTFPs as well as the strong social and human capital often present in rural communities to further invest in social networking, education, financial incentives, and funding to support NTFP livelihood development. Finally, forest farming and leasing of land for this practice is of considerable and broad appeal to forestland owners in Southwest Virginia, which may indicate possibilities for a critical mass to supply a growing demand for sustainably sourced and quality NTFP raw materials.

## **ACKNOWLEDGEMENTS**

This dissertation is a huge accomplishment for which I feel a deep sense of pride. Much of the five years I worked on this project I felt like completion was impossible. There were times I was very close to giving up and now standing on the other side I see that huge tasks are only accomplished through small steps, one after the other. This document represents years of those steps both in the act of studies and research and equally in the act of facing everything that stood in the way of believing this was possible and that I was worthy of the task. I have come out the other side a different person, one who is ready to take the small steps to face the incomprehensible tasks ahead of us in our time. One who has learned the beauty and power of discipline and sacrifice for something I believe in. For all of this, I give thanks to everyone and everything who helped me get to this place of deep privilege.

John, my advisor, you have opened up so many possibilities for me to explore and grow in my work. You have always believed in me and encouraged me to grow beyond my comfort zone. You have supported me through this process in so many ways and have deeply listened to me and seen me in the times it was most needed. I will forever be grateful and proud that we not only made it through this dissertation, but we have built a relationship I will cherish forever. Thank you for your unwavering commitment, sincerity, and deep well of creativity and enthusiasm with which you grace the academic world.

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## TABLE OF CONTENTS

|                                                                |      |
|----------------------------------------------------------------|------|
| ABSTRACT.....                                                  | ii   |
| GENERAL AUDIENCE ABSTRACT.....                                 | iv   |
| ACKNOWLEDGEMENTS.....                                          | v    |
| TABLE OF CONTENTS.....                                         | viii |
| LIST OF TABLES.....                                            | x    |
| LIST OF FIGURES .....                                          | x    |
| CHAPTER 1: INTRODUCTION .....                                  | 1    |
| 1.1 Background.....                                            | 1    |
| 1.2 Objectives.....                                            | 4    |
| 1.3 Study Area.....                                            | 5    |
| 1.4 Methodology .....                                          | 7    |
| 1.5 Organization.....                                          | 12   |
| CHAPTER 2: LITERATURE REVIEW .....                             | 14   |
| 2.1 Non-Timber Forest Products.....                            | 14   |
| 2.2 Forest Farming .....                                       | 19   |
| 2.3 Agroforestry.....                                          | 21   |
| 2.3 Social Marketing.....                                      | 23   |
| 2.4 Amenity Migration and Absentee Landownership .....         | 25   |
| 2.5. Community Development and Community Capitals .....        | 27   |
| 2.6 Summary .....                                              | 33   |
| CHAPTER 3: FOREST FOOD AND MEDICINE IN CONTEMPORARY APPALACHIA | 34   |
| 3.1 Abstract.....                                              | 34   |
| 3.2 Introduction.....                                          | 35   |
| 3.3 Literature Review.....                                     | 36   |
| 3.4 Methods.....                                               | 39   |
| 3.5 Results.....                                               | 43   |
| 3.6 Discussion .....                                           | 57   |
| 3.7 Conclusion .....                                           | 61   |
| CHAPTER 4: DEVELOPMENT OF NTFP LIVELIHOODS IN APPALCAHIA.....  | 63   |
| 4.1 Abstract.....                                              | 63   |
| 4.2 Introduction.....                                          | 63   |
| 4.3 Literature Review.....                                     | 66   |
| 4.4 Methods.....                                               | 73   |
| 4.5 Results.....                                               | 82   |
| 4.6 Discussion .....                                           | 98   |

|                                                                        |     |
|------------------------------------------------------------------------|-----|
| 4. 7 Conclusions.....                                                  | 104 |
| CHAPTER 5: FOREST FARMING: WHO WANTS IN? .....                         | 107 |
| 5.1 Abstract .....                                                     | 107 |
| 5.2 Introduction.....                                                  | 108 |
| 5.3 Literature Review.....                                             | 110 |
| 5.4 Methods.....                                                       | 117 |
| 5.5 Results.....                                                       | 121 |
| 5.6 Discussion .....                                                   | 129 |
| 5.7 Conclusion .....                                                   | 133 |
| CHAPTER 6: CONCLUSION .....                                            | 136 |
| 6.1 Summary .....                                                      | 136 |
| 6.2 Implications.....                                                  | 137 |
| 6.3 Practical recommendations .....                                    | 139 |
| 6.4 Recommendations for Future Research .....                          | 140 |
| REFERENCES .....                                                       | 141 |
| APPENDIX A. IRB APPROVAL LETTER FOR QUALITATIVE PROTOCOL .....         | 163 |
| APPENDIX B. RENEWED IRB APPROVAL LETTER FOR QUALITATIVE PROTOCOL ..... | 164 |
| APPENDIX C. QUALITATIVE RESEARCH PROTOCOL .....                        | 165 |
| APPENDIX D. INFORMED CONSENT FOR QUALITATIVE PROTOCOL.....             | 166 |
| APPENDIX E. INTERVIEW QUESTIONS .....                                  | 168 |
| APPENDIX F. IRB APPROVAL LETTER FOR QUALITATIVE PROTOCOL .....         | 169 |
| APPENDIX G. PRE-NOTICE LETTER FOR SURVEY .....                         | 170 |
| APPENDIX H. SURVEY COVER LETTER .....                                  | 171 |
| APPENDIX I. SURVEY REMINDER CARD .....                                 | 172 |
| APPENDIX J. REPLACEMENT SURVEY COVER LETTER.....                       | 173 |
| APPENDIX K. SURVEY INSTRUMENT .....                                    | 174 |
| .....                                                                  | 174 |

## LIST OF TABLES

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table 1.1 | A Priori table of research questions and the corresponding data collection topics and interview questions for the Grayson County, Virginia qualitative case study. ..9                                                                                                                                                                                                                                                                                                                                |
| Table 3.1 | Interview topics and questions asked of study participants. Questions were purposefully open-ended and responses were categorized to identify broader themes. References to the themes were then categorized into sub-themes and quantified.....42                                                                                                                                                                                                                                                    |
| Table 3.2 | Demographics and characteristics of all study participants and the breakdown of newcomers and multigenerational residents in a qualitative case study of forest food and medicine perspectives in Grayson County, VA. ....44                                                                                                                                                                                                                                                                          |
| Table 3.3 | The breakdown of newcomer and multigenerational residents' references to each category and sub-theme that emerged around motivations to work with forest food and medicine. The percentages for each category were calculated from the proportion of total references to motivations. ....51                                                                                                                                                                                                          |
| Table 3.4 | The common name, scientific name, number of participants who referenced and frequency of references to medicinal forest species broken down by species type.54                                                                                                                                                                                                                                                                                                                                        |
| Table 3.5 | The breakdown of newcomer and multigenerational residents' references to forest food and medicine species types. The percentages for each category were calculated from the proportion of total references to forest food and medicine. ....56                                                                                                                                                                                                                                                        |
| Table 4.1 | Timeline of meetings, workshops, projects and qualitative research conducted in Grayson County, Virginia between 2014 and 2017. These data provided the context and groundwork for our study of assets, obstacles, and strategies for NTFP livelihoods in the County. Activities were conducted by a group of individuals from Grayson County during community-based research focused on NTFP production and livelihoods. The group called themselves the Blue Ridge Woodland Growers (BRWG's).....75 |
| Table 4.2 | Blue Ridge Woodland Growers vision, mission, and goals developed through a participatory process over 3 meetings (Oct 5, Dec 7, and Dec 23) in 2015 as part of community-based research focused on NTFP development in Grayson County, Virginia.....77                                                                                                                                                                                                                                                |
| Table 4.3 | Focal topics and interview questions asked of 16 key informants in Grayson County, Virginia who are involved with development of NTFP livelihoods. ....80                                                                                                                                                                                                                                                                                                                                             |
| Table 4.4 | Demographics and characteristics of study participants in a qualitative case study of assets, obstacles, and strategies for NTFP livelihood opportunities in in Grayson County, Virginia. ....82                                                                                                                                                                                                                                                                                                      |
| Table 4.5 | Frequency of reference among 16 interview participants in Grayson County, Virginia to qualitative responses to assets, obstacles, and strategies for NTFP livelihood development. References and frequencies are grouped according to seven capital investments in the community capitals framework. ....84                                                                                                                                                                                           |
| Table 5.1 | Forest Farming and non-timber forest products (NTFPs) definitions provided in a survey of Appalachian forest landowners in 14 Counties in Southwestern Virginia.....120                                                                                                                                                                                                                                                                                                                               |
| Table 5.2 | Responses to Likert-type questions in a survey of Appalachian forest landowners in 14 Southwest Virginia Counties. Questions pertained to their interest in forest farming and likelihood they would lease their forest for this purpose. Also reported are acreages owned by respondents across interest and likelihood responses. ....122                                                                                                                                                           |
| Table 5.3 | Cross tabulation of survey measurements of interest in forest farming and likelihood of leasing for this purpose among Appalachian forest landowner respondents in 14 Southwest Virginia Counties.....124                                                                                                                                                                                                                                                                                             |

|                                                                                                                                                                                                                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Table 5.4 Four groups of Appalachian forest landowners from 14 Southwest Virginia Counties. Groupings were determined by two-step cluster analysis using survey measurements of residency, roots in the region, and farming status. The percent and number of respondents for each variable are listed for each landowner group. .... | 124 |
| Table 5.5 Demographics and characteristics of respondents in four Appalachian forest landowner groups from 14 Counties in Southwest Virginia. Percent or mean are reported for each category. ....                                                                                                                                    | 126 |
| Table 5.6 Descriptive statistics pertaining to parcel size, forest size, and percent of parcel that is forested for four Appalachian forest landowner groups from 14 Southwest Virginia Counties. ....                                                                                                                                | 127 |
| Table 5.7 Kruskal-Wallis tests for statistical significance between four forest landowner groups from 14 Southwest Virginia Counties regarding forest farming interest and likelihood of leasing. Mean scores reported for each group also are reported.....                                                                          | 128 |
| Table 5.8 Percent responses for forest farming interest and likelihood for leasing measures among four Appalachian forest landowner groups from 14 Southwest Virginia Counties.....                                                                                                                                                   | 128 |

## LIST OF FIGURES

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Figure 1.1 The 14 Appalachian Counties in Southwest Virginia included in study are named and coded white.....                                                                                                                                                                                                                                                                                                                                                                                 | 5   |
| Figure 1.2 Grayson County is situated along Virginia’s border with North Carolina in the Blue Ridge region of the South Central Appalachia Mountains. Case study data were collected through interviews with 16 county residents. ....                                                                                                                                                                                                                                                        | 6   |
| Figure 3.1 Grayson County is situated along Virginia’s border with North Carolina in the Blue Ridge region of the South Central Appalachia Mountains. Case study data were collected through interviews with 16 county residents.....                                                                                                                                                                                                                                                         | 40  |
| Figure 3.2 The four main categories of motivations to work with forest food and medicine species along with the percent of the total references to motivations and the number of people who referenced each category (center pie chart). Sub-themes are also shown for each category with their corresponding percent of the total references to motivations and number of people (peripheral pie charts).....                                                                                | 46  |
| Figure 3.3 The breakdown of references to edible and medicinal forest species (center pie chart). Percent of total references for each category were calculated from the proportion of total references to species. Number of people who referenced each category is also included. Sub-categories of edibles and medicinal forest species are also included with their corresponding percent of total references to species and number of people who referenced (peripheral pie charts)..... | 53  |
| Figure 4.1 This qualitative case study took place in Grayson County, Virginia located in the Blue Ridge region of the South-central Appalachian mountain region. The hashed area represents the physiographic Appalachian Region. States are annotated and Grayson County is solid grey.....                                                                                                                                                                                                  | 73  |
| Figure 5.1 The 14 Appalachian Counties in Southwest Virginia included in study are named and coded white.....                                                                                                                                                                                                                                                                                                                                                                                 | 117 |
| Figure 5.2 Scene of forest farming included in a survey of Appalachian forest landowners in 14 Southwest Virginia Counties.....                                                                                                                                                                                                                                                                                                                                                               | 119 |

## **CHAPTER 1: INTRODUCTION**

### **1.1 Background**

Appalachia is broadly defined as the mountainous region of the eastern United States (US) that runs from New York to Georgia and west to Mississippi (Appalachian Regional Commission 2018). It is home to one of the most biologically diverse temperate forest ecosystems in the world (Ricketts et al. 1999), which includes a variety of food-, medicine-, and craft-producing species (Greene et al. 2000). This natural wealth has supported generations of people that have tended, harvested, and used forest trees, plants, and fungi for food and medicine (Hufford 2003; Cavender 2006; Moerman 2009; Moerman 2010; Freedman 2017).

Non-timber forest products (NTFPs) are products made from plant materials and fungi found in forest ecosystems (Chamberlain et al. 2018). They are referred to by many names, including specialty forest products, and are derived from herbaceous plants, vines, mushrooms, shrubs, and trees. Food and medicine are two major categories of NTFPs; other categories include floral decoratives (e.g., pinecones, fresh/dried flowers, greenery), specialty wood-based products (e.g., walking sticks, stems for furniture, carving wood), and landscaping materials (e.g., transplants, ornamentals) (Chamberlain et al. 2009). Appalachian forests are home to over 25 commonly traded medicinal NTFPs and even more that are used for food (Greene et al. 2000).

Appalachian NTFPs are common in herbal and cosmetic retail products, as well as household decorations and culinary products. Together these uses constitute a multi-billion dollar industry that supports a vast enterprise of wild harvesting, local trade, product aggregation, and global sales (Greene et al. 2000; Hufford 2003; Kruger 2018). Some NTFPs can handle extensive and continual harvesting, but many cannot (Bierzychudek 1982) and overall population decline is an issue of concern given rapid growth in sectors

that depend upon these products (Sanders and McGraw 2005; Albrecht and McCarthy 2006; Van Der Voort and McGraw 2006). A growing number of NTFP-dependent companies seek sustainable, high-quality raw materials because they and many of their customers increasingly place high importance on the environmental responsibility of their products and forest farming is one method for supplying these consumers (Craker and Gardener 2005; Laird et al. 2005).

Forest farming is an agroforestry practice that involves intentionally cultivating or stewarding understory NTFP species in an existing forest and forest farmers are the people who grow/manage and sell marketable crops in these systems (Chamberlain et al. 2009). Agroforestry is defined as an “intensive land-use management that optimizes the benefits (physical, biological, ecological, economic, social) from biophysical interactions created when trees and/or shrubs are deliberately combined with crops and/or livestock” (Gold and Garrett 2009, p.46). Agroforestry practices, such as forest farming, merge production and conservation into a single system that meets both human and environmental needs (Trozzo et al. 2014a).

Forest farming offers an avenue for sourcing raw material that NTFP-dependent companies procure to manufacture and confidently sell products that can be traced back to a point of origin and forest management regime, but higher price points are necessary for farmers to succeed (Burkhart and Jacobson 2009). Verification and labelling programs recently have been developed to certify forest farming trade in Appalachia and early adopters of these programs have sold raw materials at price points that far exceed historical prices for wild harvested products, which has led to the possibility of profitably forest farming multiple species. Still, trade in raw material from forest farms in Appalachia is relatively small compared to that sourced through wild harvesting, but the potential for

growth and economic impact in the region is substantial and the need for alternative livelihoods is high.

Socioeconomic problems in Appalachia have accelerated in recent decades due to industrialization and globalization (Schumann 2013; Steffen et al. 2015). Extractive industries are no longer engines of economic development (Freudenburg 1992; Flora et al. 2016; Marley 2016) and most of the manufacturing sector has left (Flora et al. 2016). As a result, employment opportunities are limited and poverty levels are high, causing many to leave Appalachia's rural life for work in urban centers (Obermiller and Howe 2013; Pollard and Jacobson 2015). Many of the families that remain in Appalachia are small-scale farmers (Paul et al. 2004; Nehring et al. 2009; Gaventa 2011) who have diversified into alternative production after cash crop tobacco farming was no longer broadly viable (Altman et al. 1996). At the same time, newcomers are migrating to the region seeking amenity benefits – such as natural beauty, a rural lifestyle, low cost of living, and land for uses like farming – and bring with them different perspectives and values. As in other rural areas in the US, Appalachia is at a crossroads and many residents are thinking creatively about how to use natural resources to support community development and provide sustainable livelihoods (Flora et al. 2016).

NTFPs and forest farming can contribute to community development by providing sustainable livelihood opportunities (Garrity 2004; Ros-Tonen and Wiersum 2005; Griggs et al. 2013). NTFPs have long played a role in informal markets and cultural activities in Appalachia, but dedicated landscape-level efforts to leverage markets and local uses to build sustainable livelihoods, either through formalized forest farming or traceability of wild-harvesting, have not been common. A number of obstacles have been identified, including lack of information about cultivation, stewardship, processing, and marketing, which can increase risk perceptions among potential producers (Rule et al. 2000; Gold et al.

2004; Trozzo et al. 2014a; Chakravarty et al. 2015). Further, beyond a few select species mainstream NTFP industries often lack economic capacity to buy raw materials at a price that supports profitable cultivation (Burkhart and Jacobson 2009). Overall, there is great complexity and diversity in the path to NTFP commercialization, which may require communities to creatively use the resources available to them (Sanchez 1995; Rule et al. 2000; Flora and Flora 2008).

## **1.2 Objectives**

This dissertation presents research on NTFP production as a livelihood opportunity in Appalachia. Research activities involved a qualitative case study in one Appalachian community in Virginia, as well as a quantitative study of forest landowners in 14 Southwest Virginia counties. The first qualitative investigation studied contemporary harvests and uses of forest food and medicine in an Appalachian community. It was designed to address three broad questions: Who are the people involved in harvesting forest food and medicine? What motivates them? Which species do they use and how do they use them? The second qualitative investigation drew upon the community capitals framework (Flora and Flora 2008) to research stakeholder perceptions about the assets, obstacles, and strategies needed to develop NTFP livelihoods in Appalachia. This study asked: what community resources are available for developing NTFP livelihoods in Appalachia? Which resources require additional investment? And what strategies are necessary to utilize assets and overcome barriers?

The quantitative study identified the extent to which Appalachian forest owners in 14 counties in Southwest Virginia were interested in practicing forest farming or leasing a portion or all of their forestland for this practice. Also studied was whether forest owners in the study area differ in terms of their land use and residency characteristics, and whether differences are associated with interest in farming or leasing. The goal was to understand

which owners are interested in forest farming and why, and to couple these data with the size of the forestland they own.

### 1.3 Study Area

The study occurred in Southwest Virginia. Quantitative survey research was conducted across the entire study region (Figure 1.1). Southwest Virginia was chosen as a focus region because of proximity to Virginia Tech and a regional NTFP focused NGO organization that could benefit from the survey findings and because it has representation from three different physiographic provinces in Appalachia (Blue Ridge, Ridge and Valley, Alleghany Plateau). Qualitative case studies were conducted in Grayson County, situated along Virginia's border with North Carolina in the Blue Ridge region of the South Central Appalachia Mountains (Figure 1.2). Like many Appalachian communities, Grayson County experienced the boom and bust of the timber industry in the first half of the 1900s, followed by the rise and fall of manufacturing in the second half of the century (Maynard and Holton 2013). In 2010, the county had a population of 15,533, which declined from 17,917 in 2000 due to a combination of death among an aging population and the out-migration of youth (US Census Bureau 2010; Maynard and Holton 2013). Current residents either travel outside the

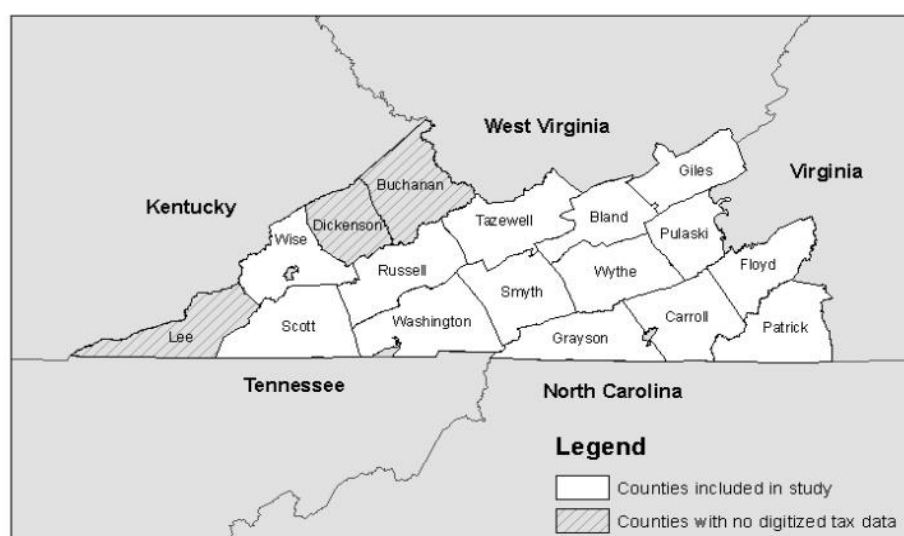


Figure 1.1 The 14 Appalachian Counties in Southwest Virginia included in study are named and coded white.

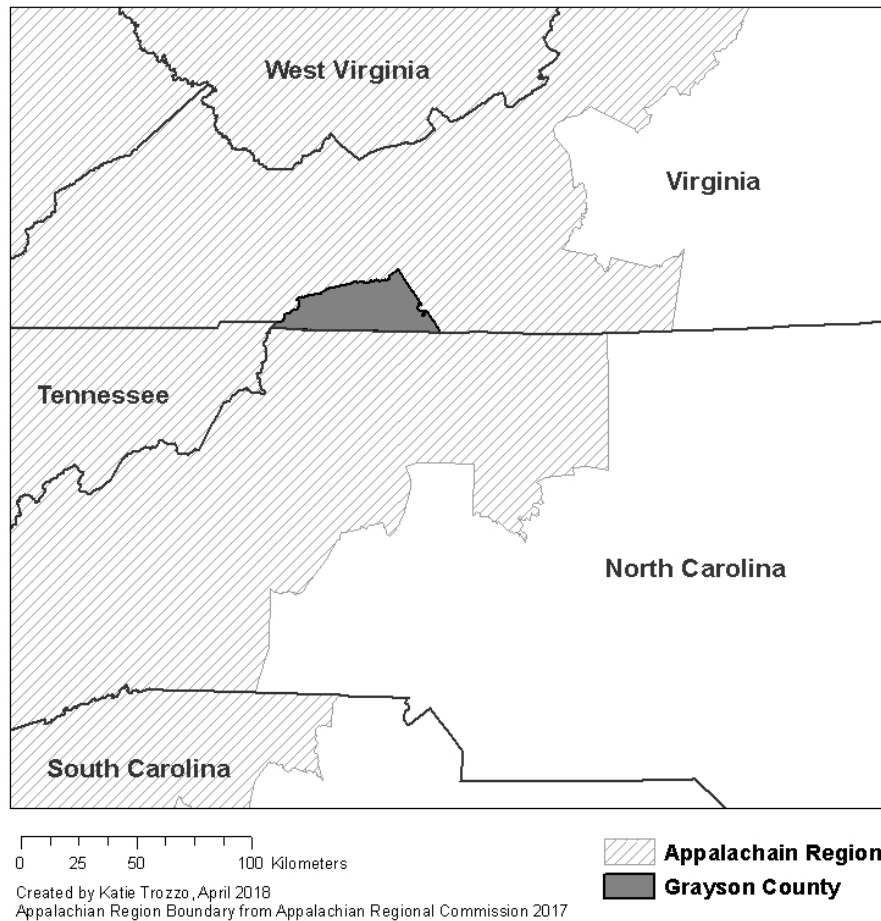


Figure 1.2 Grayson County is situated along Virginia’s border with North Carolina in the Blue Ridge region of the South Central Appalachia Mountains. Case study data were collected through interviews with 16 county residents.

county for work, compete for limited jobs, or face unemployment (Maynard and Holton 2013).

Maynard and Holton (2013) analyzed land cover, economic impacts, and agricultural trends in Grayson County. Farms and forests almost evenly cover most of Grayson’s land base. Farming and forestry each bring in over \$2 million to the local economy. Primary farming crops include dairy and beef cattle, hay, and Christmas trees; secondary crops include tobacco, cabbage, pumpkins, berries, fruit, and vineyards. Grayson differs from counties in the Alleghany Plateau region of Southwest Virginia because it is not subject to coal mining (Virginia Department of Mines, Minerals, and Energy 2015), and while it is at

risk of being economically distressed according to the Appalachian Regional Commission (2018) for fiscal year 2019, it is not among the four distressed counties in Appalachia Virginia. Local food initiatives recently have emerged in the county and include a successful farmers market in Independence, the county seat. Additionally, NTFPs are included as part of the counties strategic plan (Maynard and Holton 2013).

#### **1.4 Methodology**

This research is an embedded case study with two sub-units of analysis; Grayson County, Virginia and then Southwest Virginia as a whole. It follows a sequential mixed method process where findings from the Grayson County case study informed the development of the survey instrument for the greater region. Qualitative data allowed us to gather rich data based on lived experience of how NTFPs tie into individual lives and community livelihoods. Quantitative data provided the opportunity to understand the general trends around interest in forest farming and leasing land for this practice among forest landowners in the region and the characteristics of those interested.

The research began with the case study in Grayson County, Virginia where it followed an action/community-based research process. Action research is practical, community oriented, participatory, collaborative, and focuses on community empowerment (Ivankova 2015). Outcomes of this research can meaningfully inform community decisions and actions (Herr and Anderson 2005; Greenwood and Levin 2007). Participants often gain a sense of empowerment to study and change their practice by playing an active role in the research (Ivankova 2015). The community directed the topic of research by offering me a PhD fellowship focused on opportunities around NTFPs and the research process was set up to answer key questions that could inform action on the ground including: How are residents using these species now and why? What do community members perceive as assets, obstacles, and strategies for NTFP livelihoods? On the ground organizing and action was

occurring simultaneously with the research so community members were discovering in action and the interviews with key organizers and participants captured emerging perspectives around how to move forward with NTFP livelihoods. Ultimately, those interviewed were a core group of stakeholders with embodied experience with NTFPs and were navigating the discovery of emerging opportunities for NTFP livelihoods around. Interviews conducted with these participants aimed to answer two research questions, which informed the development of the two manuscripts of my dissertation from the Grayson County case study (Table 1.1). Document analysis also was used to record the activities around the action research process which lasted from 2014 to 2017 with over 100 stakeholders participating through meetings, workshops, projects, and research.

Despite a number of years of action, as a solo researcher without a budget and working within the timeframe of a PhD, there were a few ways in which our process fell short of an ideal action research scenario. While two growers participated in a pilot study/sale of forest grown verified and organic certified black cohosh, a broader group of community members were not involved in the data collection and analysis of the interviews which were a primary part of the research. Also because of a lag in analysis of the interview data and the time constraints of my PhD fellowship, action planning with the results from conversations with the key organizers and stakeholders and monitoring of action effects did not occur.

Another major part of this research included a quantitative survey study of forest landowners in Southwest Virginia. This study occurred separately from the Grayson County case study and the action research process described above, though findings from Grayson inspired inquiry into the extent of interest regionally in forest farming as an emerging NTFP livelihood opportunity in Appalachia, the topic of leasing land for forest farming, and collecting information on survey respondent's residency status and roots in the region. Results

Table 1. 1 A Priori table of research questions and the corresponding data collection topics and interview questions for the Grayson County, Virginia qualitative case study.

| Manuscript                                                       | Research Questions                                                                                                                           | Research Topics                 | Interview Questions                                                                        |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------|
| Chapter 3<br>Forest Food and Medicine in Contemporary Appalachia | Who are the people involved in harvesting forest food and medicine? What motivates them? Which species do they use and how do they use them? | Grayson Personal History        | When did you arrive in Grayson and what brought you here? Where were you from before this? |
|                                                                  |                                                                                                                                              | NTFP Experience                 | What is your experience with NTFPs?                                                        |
|                                                                  |                                                                                                                                              | NTFP Crops                      | What NTFPs do you currently grow or steward? Why these crops?                              |
|                                                                  |                                                                                                                                              | NTFP Motivations                | Why do you do it in general?                                                               |
|                                                                  |                                                                                                                                              | NTFP Use                        | What do you do with your harvest?                                                          |
| Chapter 4<br>Development of NTFP Livelihoods in Appalachia       | What community assets and obstacles exist to NTFP development and what strategies do community members see as important?                     | Community Assets                | What characteristics and resources do you think Grayson has going for it to develop NTFPs? |
|                                                                  |                                                                                                                                              | Community Obstacles             | If we leverage these resources, what things do you think may still get in the way?         |
|                                                                  |                                                                                                                                              | Strategies for NTFP Development | What do you think are important steps for getting around these obstacles?                  |

of the survey research provided a wider understanding of some of the themes that emerged from the Grayson case study.

### *Philosophical Foundations*

Pragmatism has shaped the development of this project. It takes a pluralistic ontological stance, understanding reality as complex and multiple, and an epistemological position that there are multiple ways of knowing (Johnson and Gray 2010; Creswell 2014). This moves beyond the dichotomy of qualitative and quantitative inquiry and allows space for leveraging all available worldviews, assumptions, and methods to solve problems (Tashakkori and Teddlie 2003; Johnson and Gray 2010; Creswell 2014). This paradigm fits with our research plan because of its practicality, commitment to finding solutions to real world problems and acknowledgment of action as necessary for knowledge generation (Tashakkori and Teddlie 2003; Greenwood and Levin 2007; Johnson and Gray 2010; Creswell 2014). Pragmatism provides a strong basis for leveraging qualitative and quantitative strands within this research (Creswell 2014).

### *Positionality Statement*

Positionality is how the researcher is positioned in relation to the study setting, which determines “how one thinks about power relations, research ethics, and the validity or trustworthiness of the study’s findings” (Herr and Anderson 2005, p.3). This positionality statement is where I will outline some of my experiences, perspectives, and attitudes that may have influenced the research approach and the interpretation and presentation of data. Entering into this research I was coming out of a year of working on conserving lands in North Carolina and prior to that, a masters program looking into adoption of riparian forest buffers in Virginia. I saw NTFPs as an important possibility for livelihoods in the region

along with conservation of forest lands and forest botanical species. I also had a passion for foraging fruits and nuts.

Through my coursework I was introduced to action research and community-based approaches that strongly appealed to me as a way to ensure meaningful research for communities by communities. This approach directed me in many decisions around my research and I attempted an action research process in Grayson County. The Matthews Foundation, a local foundation in Grayson County, invited inquiry around NTFPs by offering a fellowship for a doctoral student and this funding supported my research.

As part of this process I moved to Grayson County to immerse myself in the community and from 2014 to 2015 I lived with local farmers on their land in the County after which I lived in the town of Independence from 2015 to 2017. Part of the agreement with the Matthews Foundation was that I would help organize opportunities around NTFPs in the community, which inspired the development of the Blue Ridge Woodland Growers where members of the community interested in NTFPs connected through meetings, workshops, and trainings.

In participating as a facilitator, I was able to experience the process of organization around and discovery of NTFP livelihood opportunities within the community. In my personal life and through the BRWG I also deepened my practice of foraging and wild harvesting and also was able to experience first hand planting, inventorying, harvesting, and processing of NTFPs. During the project term I became a board member of the Appalachian Beginning Forest Farmer Coalition, which allowed me to connect to resources within the larger region. Over the course of the three years, more broadly I participated in the community like any other newcomer, developed friendships, and volunteered with local organizations focused on local food, land stewardship, and nature discovery. By the time I

conducted interviews, many of the interviewees I had come to know as active members of the BRWG or collaborators around NTFPs.

The depth of my experience and relationships in the community and region allowed me to see emerging opportunities for NTFP livelihoods and better understand the dynamics of communities seeking viable opportunities. This translated into new collaborations between Grayson NTFP growers, the national forest grown verified program, and buyers of forest grown black cohosh to conduct the first sale of forest grown verified black cohosh. Some less familiar with community based and action research may see this process as a biased study, but this intended approach allowed us to understand the perspective of a community as it actively sought new livelihood opportunities around NTFPs. It also informed the development of the larger regional study we conducted looking at interest levels in forest farming and leasing land for this practice among forest landowners in Southwest Virginia.

## **1.5 Organization**

This dissertation follows a manuscript format with three independent manuscripts developed from original research that are bookended with a literature review and a conclusion. Chapter 2 reviews the literature on NTFPs, forest farming, agroforestry, social marketing, amenity migration, and the community capitals framework. Each of the following three manuscripts focus on a different facet of NTFP production and livelihoods in Appalachia from two different studies. The first two manuscripts (Ch. 3 and 4) stemmed from the qualitative case study research. The last manuscript (Ch. 5) was a stand-alone quantitative study inspired and informed by the qualitative research. Chapter 3 is an empirical case study conducted in Grayson County, Virginia that investigated the contemporary harvest and use of forest food and medicine in an Appalachian community by asking harvesters about their motivations, preferred species, and uses. Chapter 4 builds on the context described in Chapter 3 by expanding the focus to a community-level and reporting on how an Appalachian

community can develop new livelihoods around NTFPs. Chapter 5 focuses on forest farming and leasing land among forest landowners in 14 Southwest Virginia counties. Altogether, these studies contribute to our understanding of NTFP production as a livelihood opportunity in Appalachia.

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Non-Timber Forest Products

The relationship between NTFPs and sustainable rural livelihoods is well studied internationally (Garritty 2004; Ros-Tonen and Wiersum 2005; Chakravarty et al. 2015). A number of studies also have focused on NTFPs as livelihoods in the US (Emery and Pierce 2005; Robbins et al. 2010; Vaughan et al. 2012). Many of the studies focused in Appalachia have either aimed to describe the market chain, to quantify the extent of harvest and sales, or explore management approaches to wild harvesting (Bailey 1999; Green et al. 2000; Greenfield and Davis 2003). Only a few studies have looked at contemporary sociocultural aspects of harvest and motivations of those that harvest in the Appalachian region (Bailey 1999; Hufford 2003), which is surprising in this region that region holds a deep NTFP history and a living tradition of working with these species.

#### *Historical Context in Appalachia*

Appalachia has a rich history of people tending, harvesting, and using NTFPs (Cavender 2006; Davis and Persons 2014; Freedman 2017). The region is blessed with one of the most diverse temperate forests in the world, which has long supported traditional use of NTFPs by those who live here (Ricketts et al. 1999). Native American people historically managed many NTFP species from the forest for food and medicine that they relied upon for survival ( Borchers et al. 2000; Davis and Persons 2014; Freedman 2017). They used fire and tree girdling to intentionally manage the eastern forest ecosystems to meet their food needs (MacDougall 2003; Delcourt and Delcourt 2004; Delcourt et al. 2017). They were also known to trade, transport, and cultivate fruit and nut trees along their migration routes and possibly even grow certain species in orchards (MacDougall 2003; Delcourt and Delcourt 2004). Their management over centuries both directly and indirectly favored the growth of

native NTFP fruit and nut trees and influenced the species composition of the eastern oak and pine forests known today (Abrams and Nowacki 2008).

Native Americans used over 30 tree species for their mast, with staples including oak (*Quercus* spp.), hickory (*Carya* spp.), and chestnut (*Castanea* spp.), and to a lesser extent walnut (*Juglans* spp.) (Abrams and Nowacki 2008). Tribes of the eastern forest also used other nut trees including beechnuts (*Fagus grandifolia*) and hazelnuts (*Corylus americana* and *C. cornuta*). They shelled and either ate these nuts raw (only some species) or processed them into flours, oils, nut milks, nut butters, and soups or stews (Kavasch 1979; Freedman 2017). Young leaves of certain trees, such as beech (*Fagus grandifolia*), also were cooked or consumed raw as a spring green (Kavasch 1979).

Native Americans also harvested roots, shoots, greens, fruits, and spices from the forest. This included over 20 fruit and berry producing trees such as black cherry (*Prunus serotina*), junberry (*Amelanchier arborea*) and spicebush (*Lindera benzoin*) (Kavasch 1979; Abrams and Nowacki 2008). Ramps (*Allium tricoccum*) were a significant food for many eastern tribes who harvested the bulb and/or the greens in early spring (Moerman 2010). Some other roots harvested from the forest floor included wild sarsaparilla (*Aralia nudicaulis*), wild ginger (*Asarum canadense*), and greenbrier (*Smilax* spp.). The aerial portions of some herbaceous plants were used as a vegetable such as jewelweed (*Impatiens capensis*) and pokeweed (*Phytolacca decandra*).

Native Americans also used parts of trees, shrubs, and understory plants for medicine. Many of the native botanicals that still grace Appalachian forests were important medicine for them, including goldenseal (*Hydrastis canadensis*), ginseng (*Panax quinquefolius*), black cohosh (*Actea racemosa*), blue cohosh (*Caulophyllum thalictroides*), mayapple (*Podophyllum peltatum*), blood root (*Sanguinaria canadensis*), false unicorn (*Chamaelirium*

*luteum*), spikenard (*Aralia racemosa*), wild ginger (*Asarum canadense*), and wild indigo (*Baptisia tinctoria*) (Kavasch 1979; Pepping 1999; Borchers et al. 2000; Davis and Persons 2014). Bark and leaves from forest trees and shrubs such as witch hazel (*Hamamelis virginiana*) and American chestnut (*Castanea dentata*) also were used for medicinal preparations (Kavasch 1979; Borchers et al. 2000). While much of the nuanced knowledge and tradition of using these forest plants has been lost due to forces of colonization, many carry on the cultural practices and work to revive them today (Turner and Turner 2008).

Settlers began arriving to the Appalachian region as part of European colonization in the 1700s (Yarnell 1998). Many settlers started using food and medicine from forested ecosystems managed by Native Americans (MacDougall 2003; Cavender 2006; Abrams and Nowacki 2008; Davis and Persons 2014). Early settlers often depended on the plants indigenous to America that were closely related to species they used in the Old World such as ramps (*Allium tricoccum*), wild ginger (*Asaram canadense*), red oak (*Quercus rubra*), black walnut (*Juglans nigra*), and pipsissewa (*Chimaphila maculata*) (Cavender 2003; Rivers et al. 2014). Other important species included the American chestnut (*Castanea dentata*), American hazelnuts (*Corylus americana* and *C. cornuta*), beech (*Fagus grandifolia*), white oak (*Quercus alba*), black cherry (*Prunus serotina*), and basswood (*Tilia americana*) (Wigginton et al. 1975).

Settlers were motivated to use species from the forest both directly for their survival and indirectly as a cash crop to provide the possibility of purchasing necessities. They would harvest and export high value products such as American ginseng and raw furs, which became two major exports in colonial America (Davis and Persons 2014). Ginseng provided settlers with much needed cash to supply what they could not from farming and many families relied on this plant in particular to get them through the economic crisis following the Civil War. This knowledge of ginseng was passed down from generation to generation

(Davis and Persons 2014). The American chestnut, no longer dominant in our forest canopy today due to a devastating fungal disease, also historically provided an important supplement to the settler home economy. Chestnuts provided many with two sources of cash crops, the nuts themselves and hogs, which were fattened on the nuts (Freinkel 2007).

Large-scale herbal products sourcing businesses emerged in Western North Carolina around the mid-1800s and later spread throughout Appalachia and the East more broadly to support both domestic and overseas demand (Price 1960; Cowles Papers 2014; Manget 2016). By the end of the Civil War, the industry around forest botanicals took off and companies such as the Wallace Brothers in Statesville, North Carolina worked with networks of country stores to source their products and at one point were trading over 2,000 Appalachian NTFP botanical species with an inventory of over 2 million pounds (Manget 2012; Manget 2016). The American herbal products industry shrank by the mid-20<sup>th</sup> century with the onset of synthetic pharmaceuticals, though a resurgence had taken root by the 1970s and 80s alongside the emergence of contemporary herbal and alternative medicine (Kruger 2018).

### *Contemporary context in Appalachia*

Much of the cultural knowledge about forest food and medicine remains woven into contemporary Appalachian culture. For instance, communities from Georgia to Canada still eat ramps in early spring and hold ramp festivals open to the public (Davis and Persons 2014). However, younger generations are losing this local knowledge as reliance on wild plant species has decreased (Rigg 2006). Yet the culture around wild harvesting botanicals for side income persists and plays an important role in community economies (Green et al. 2000; Hufford 2003; Davis and Persons 2014), and the NTFP industry that Appalachia helps

supply now exceeds one billion dollars annually (Chamberlain et al. 1998; Vaughan et al. 2013).

NTFP markets could help improve livelihoods in the region (Ros-Tonen and Wiersum 2005). Many, though not all, forest food and medicine species are slow growing, perennial plants harvested for their roots. Over time, wild harvesting these plants has led to declines in populations (McGraw 2001; Case et al. 2007). This is especially the case with American ginseng given Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates trade of this species (Frey et al. 2018). Some consider this an example of Hardin's (1968) tragedy of the commons (Cassidy and Brozik 2009; Cassidy et al. 2013). Others see the potential of ginseng to contribute to a functioning commons in places impacted by mountain top removal coal mining (Hufford 2002).

Western consumers increasingly are aware of sustainability issues related to food and medicine, and many give sustainable products purchasing preference despite higher costs and less convenience (Hjelmar 2011; Smith and Brower 2012). In addition, people are seeking out organically produced herbal products for quality and efficacy (Craker and Gardner 2005). Demand for these products may continue to rise in light of Millennial preferences, which often factors sustainability into purchasing decisions (Smith 2010; Smith and Brower 2012). The herbal industry is grappling with this trend and more companies are committing to sustainable raw material sourcing (Laird et al. 2005).

Wild harvesting of NTFPs also occurs outside of the market. In a study of the general public in New England, Robbins et al. (2016) found that 88% of NTFP harvesters gathered for direct personal use. Over 60% of respondents harvested food from the forest, also known as foraging. They found that wild harvesters were diverse in their class, gender, and race and

therefore were not able to describe wild harvesters as a consistent “type” of people, but instead characterized it as a “type” of practice.

Those who own forestland also are interested in ecological sustainability paired with profit. Some look for options to utilize their forest without cutting timber (Chamberlain et al. 2009). Others seek ways they can manage their forests for shorter rotation crops that provide income between timber harvests (Barbieri and Valdivia 2010b). Many wildcrafters also cultivate these species on their own land due to perceived decline in wild populations over the last century (Davis and Persons 2014).

## **2.2 Forest Farming**

The intentional stewardship and/or cultivation of understory crops in a mature forest ecosystem is called forest farming (Chamberlain et al. 2009; Mudge and Gabriel 2014). Forest farming based on this definition has occurred for over 200 years, though it is only recently that the practice has begun to be formalized and refined (Chamberlain et al. 2009; Vaughan et al. 2012). Forest farming often is practiced on a spectrum of intensity, from cultivation of planted stock to stewardship of existing wild stands. Some will approach forest farming using an agricultural lens with tilling, amendments, and pest control, which often is called woods cultivated (Chamberlain et al. 2009). Others will do nothing more than plant seeds and allow them to grow wild, which is called wild simulated (Chamberlain et al. 2009). Some also will work to expand existing populations of plants by planting seeds or dividing roots (Van der Voort and McGraw 2006). Many people who forest farm also are involved in some sort of wildcrafting with species that are not presently cultivatable (Mudge and Gabriel 2014).

Forest farming is one solution to the commons issues facing many forest food and medicine species (Chamberlain et al. 2009); however a number of barriers still exists. A well-

developed system of cultivation, stewardship, processing, and marketing is lacking, which increases risk perceptions and decreases likelihood of adoption (Rule et al., 2000; Gold et al., 2004; Trozzo et al. 2014a). Further, the mainstream NTFP industry often lacks economic viability for cultivation beyond a few select plants (Burkhart and Jacobson 2009). For those plants with a lucrative market like ginseng, poaching becomes an issue when cultivated on private land (Davis and Persons 2014).

Despite these challenges, interest in forest farming is increasing (Vaughan et al. 2012). Workman et al. (2003) found 15 % of respondents to a survey of southeastern US landowners already practiced forest farming and 40% were interested in learning more about it. Similarly, 36% of the respondents to a survey conducted by Strong and Jacobson (2005) reported being interested in growing forest food and medicine, and Barbieri and Valdivia (2010) found that over a third (38.6%) of forest landowners in their study were interested in adopting forest farming.

Relatively little is known about whether there are differences between the people who are and are not interested in forest farming. However, two studies provide some insight. Strong and Jacobson (2005) found that 40% of those who were interested in forest food and medicine were female, 86% were under the age 60, and 95% were non-farmers. This group was most interested in providing food for their family and taking care of the land, but still reported some interest in production and marketing crops. Barbieri and Valdivia (2010) found that those who were interested in forest farming also largely were non-farmers not focused on their land as a source of income and instead focused on living a rural lifestyle. These studies demonstrate that landowners are interested in forest farming, yet cross-sectional and randomized research has not been conducted on forest landowners in Appalachia, which is at the heart of global NTFP trade.

## 2.3 Agroforestry

Forest farming is one of five commonly recognized temperate agroforestry practices. Agroforestry provides a literature base that broadly covers the issues and opportunities associated with forest farming adoption. In the last couple decades agroforestry research has expanded its focus to include socioeconomic research (Montambault and Alavalapati 2005) with a number of studies focused in the US where researchers have identified factors that influence agroforestry adoption such as age, gender, education, income, social interaction, land characteristics, and length of ownership (e.g., Strong and Jacobson, 2005; Barbieri and Valdivia 2010; Trozzo et al. 2014a). Variables studied less often, though related to adoption include, land use intensity and farming status (e.g., Arbuckle et al. 2009; Barbieri and Valdivia 2010; Trozzo et al. 2014a).

In most cases, younger landowners appear to be more interested in agroforestry than older landowners (Konyar and Osborn 1990; Hagan 1996; Strong and Jacobson 2005; Valdivia and Poulos 2009). Most researchers find that gender does not influence interest in agroforestry (Matthews et al. 1993; McGinty et al. 2008), though women may be more involved in practices related to agroforestry and forest farming such as specialty crop production (Strong and Jacobson 2005). Furthermore, women may be less affected by factors that decrease interest such as expected risk (Trozzo et al. 2014a). Results also suggest greater levels of education lead to greater interest in agroforestry among landowners (Matthews et al. 1993; Ryan et al. 2003; Workman et al. 2003; Strong and Jacobson 2005; Arbuckle et al. 2009; Barbieri and Valdivia 2010). Likewise, agroforestry interest positively correlates with income (Featherstone and Goodwin 1993; Pattanayak et al. 2003).

Some studies indicate that interest in agroforestry among landowners is affected by parcel size (Konyar and Osborn 1990; Featherstone and Goodwin 1993; Pattanayak et al. 2003). Other studies observed no influence related to parcel size (Matthews et al. 1993;

Valdivia and Poulos 2009). Length of ownership is generally not a predictor of adoption (Arbuckle et al. 2009), though Trozzo et al. (2014b) reported that landowners who were more open to agroforestry also were newer to land ownership (Trozzo et al. 2014b). More broadly, membership in community organizations may increase interest (Pattanayak et al. 2003) and family influence can play a role in decisions to adopt (Salamon et al. 1997; Raedeke et al. 2003). Social interactions such as face-to-face communication, local networks, norms, and support structures may also influence the adoption process (Atwell et al. 2009).

Anticipated benefits of adoption of agroforestry beyond economics, such as ecological impacts, also can influence the nature of landowner interest (Arbuckle et al. 2009; Valdivia and Poulos 2009). According to Arbuckle et al. (2009), landowners who are motivated by financial objectives are less interested in agroforestry than those influenced by recreation and environmental objectives. Matthews et al. (1993) found that landowners that identified strongly with stewardship objectives were more likely to have interest in agroforestry despite potential increases in effort and cost.

Land use type appears to be an important factor in interest in temperate agroforestry systems. For example, several studies found farmers were less interested in agroforestry (Arbuckle et al. 2009; Barbieri and Valdivia 2010; Trozzo et al. 2014a; Trozzo et al. 2014b). Trozzo et al. (2014b) observed that livestock producers were less interested in agroforestry than non-producers. Featherstone and Goodwin (1993) reported that landowners invest less in conservation if they primarily manage livestock. Barbieri and Valdivia (2010) found that farmers in their study were interested in agroforestry buffers, but due mostly to revenue potential. Strong and Jacobson (2005) found that landowners most interested in agroforestry economics and production were livestock-focused. On the other hand, specialty crops owners were most interested in food production and wildlife habitat enhancement, yet were

still keen on production and revenue (Strong and Jacobson 2005). Overall, land use intensity does not hinder adoption; rather, it shapes different paths of interest.

In addition to the biophysical characteristics of property, non-agricultural uses are important to landowners. Many enjoy and use their property for a number of amenity activities. Outdoor recreation is a non-agricultural land use often provided by farms to both the landowner and the public (Gao et al. 2014). Reforestation via agroforestry can facilitate non-consumptive forms of outdoor recreation such as hiking and bird watching (Kenwick et al. 2009; Schultz et al. 2009; Grala et al. 2010). Further, a considerable body of literature catalogs the hunting opportunities provided by agroforestry (e.g., Shrestha and Alavalapati 2004; Kulshreshtha and Kort 2009; Barbieri and Valdivia 2010).

Barbieri and Valdivia (2010) studied the recreational benefits from farms and agroforestry and created a recreational multifunctionality construct outlining eight activities that commonly occur on farmland: fishing, hunting, gathering wild edibles (e.g., nuts and berries), wildlife or nature appreciation, hiking, use of off-road recreational vehicles (e.g., ATV's), horseback riding, and camping. Notably, these activities do not guarantee an economic return, differentiating them from agri-tourism. Barbieri and Valdivia's (2010) study found that production-oriented landowners ("Productivist") provided fewer recreational services compared to lifestyle-oriented landowners ("Ruralist"). Further, Ruralist landowners provided a greater number of contemplative or non-extractive activities and were more likely to adopt alley cropping, forest farming, and agroforestry practices in general than Productivist landowners.

## **2.3 Social Marketing**

Social marketing has been used to design outreach messages that are meaningful to specific landowner groups (e.g., Butler and Leatherberry 2004), and its role in agroforestry

adoption research and outreach is common (e.g., Strong and Jacobson 2005; Barbieri and Valdivia 2010; Trozzo et al. 2014b). This technique typically includes population segmentation and message design (Tyson et al. 1998) and two agroforestry studies have been conducted that specifically focus on interest in forest farming (Strong and Jacobson 2005; Barbieri and Valdivia 2010). Strong and Jacobson (2005) segmented Pennsylvania forest owners into four groups based on product-specific adoption preferences: timber, livestock, specialty crops, and non-adopters. Specialty crop respondents (36%) were most interested in growing NTFPs in forest farming systems. In general, people in this segment worked off farm (77%) or were retired (18%), and many owned smaller parcels (2.5 to 10 acres). They also were mostly female (60%). Specialty crop owners were more interested in quality of life factors such as providing food for their family and land stewardship goals like improving wildlife habitat.

Barbieri and Valdivia (2010) segmented landowners in Missouri into Productivists and Ruralists, with the latter sharing similarities with Strong and Jacobson's (2005) specialty crop segment in that both were most interested in forest farming when presented with a suite of potential land uses and agroforestry practices. In addition, respondents in both groups were mostly non-farmers (72%) focused on working and interacting with their land as part of a holistic rural lifestyle. This is in line with findings reported in Valdivia and Poulos (2009), where monetary motivations were not primary drivers of interest in forest farming.

Social marketing also has been used to characterize forest landowners and their management preferences and approaches (Kluender and Walkingstick 2000; Butler and Leatherberry 2004; Kendra and Hull 2005; Butler et al. 2007; Majumdar et al. 2008; Munsell et al. 2008). Many of these studies clearly identify forest owners that value their forests for lifestyle and connection to the environment over other objectives, or who balance

these with economic aims rather than solely focusing on financial goals. For example, Kendra and Hull (2005) found that a new generation of forest landowners are more motivated by lifestyle goals and characteristics of the “back-to-the-land” movement. Similarly, Butler et al. (2007) found their largest population segment (Woodland retreat owners) valued amenity over financial goals, and Kleunder and Walkingstick (2000) identified substantial segments of environmentally oriented (Resident conservationists) and lifestyle motivated owners (Affluent weekenders). Majumdar et al. (2008) and Kuipers et al. (2013) reported that most forest landowners in their studies were motivated by a mix of consumptive and non-consumptive goals, and Salmon et al. (2006) and Butler et al. (2007) identified forest landowner segments interested in amenity and income opportunities.

## **2.4 Amenity Migration and Absentee Landownership**

The growing phenomenon of contemporary amenity migration has influenced the social fabric of Appalachia and management of the landscape and could factor into NTFP production and livelihoods in Appalachia. Amenity migration is defined by Gosnell and Abrams (2011) as the “movement of people based on the draw of natural and/or cultural amenities” (p. 303). It is considered a result of globalization expressed through the out-migration of longtime residents in search of economic opportunities and in-migration of many urbanites and suburbanites seeking a rural life (Gosnell and Abrams 2011). This shift often is called “rural restructuring,” and can significantly change the demographics and land management of rural regions (Nelson 2002, p.905). Newcomers bring with them different ideas for land management, which can conflict with long-standing practices of local residents (Yung et al. 2003; Wulfhorst et al. 2006). Despite this, newcomers have been found to cultivate new economies in rural areas and make way for new livelihood practices (Nelson 2002). This change can improve local economies, but also may close off long-standing land use traditions (Hurley and Halfacre 2011) because newcomers often align

more with recreational, aesthetic, or conservation land uses without a great deal of concern for profit (Gosnell et al. 2007; Yung and Belsky 2007).

Amenity migration has been found to influence forest management and could influence NTFP production. Majumdar et al. (2009) found that multi-generation forest landowners actively manage their forests and focus more on timber than single generation owners drawn to non-timber uses. Similarly, Butler and Leatherberry (2004) found newer owners are less likely to have timber production as a key objective and Kaetzel et al. (2002) observed that landowners most likely to engage in forest management lived closer to their land, had greater length of ownership, and/or inherited it.

Some forest researchers express concern about newcomers establishing roots in rural areas because it can lead to increased parcelization and development, and constrain forest management across the landscape (Levitt 2002; Kittredge 2004). Total forest area has been found to positively correlate with timber harvesting and newcomers often have smaller parcels, leaving them with fewer traditional forest management options (Butler and Leatherberry 2004; Rickenbach and Kittredge 2009). However, forest farming is possible on smaller parcels and can serve as an entryway to work with newer landowners on diversifying and expanding forest management. In addition to parcel size, absenteeism also affects forest management because the motivations and actions of absentee owners often differ from resident owners (Conway et al. 2003).

Absentee forest landownership is on the rise in the US (Butler and Leatherberry 2004; Butler et al. 2007), with many people living in urban areas owning land for amenity, not livelihood reasons (Petrzelka et al. 2013). These owners are less likely to maintain working forests because they have little interest in timber production and are notoriously hard to motivate (Conway et al. 2003; Rickenbach and Kittredge 2009). Many absentee

owners also have stated conservation objectives (Bond et al. 2018), but the reality is that they consistently fall behind resident owners when it comes to implementing associated practices (Kendra and Hull 2005; Rickenbach and Kittredge 2009). Some people argue that the lack of direct management by absentee owners can negatively affect forest ecosystem health (e.g., Fischer 2011). However, up to 30% of forest landowners in the South lease their forestland for managed uses, mostly for hunting and grazing, but some for timber production and other recreational activities (Butler et al. 2008).

## **2.5. Community Development and Community Capitals**

Community can be conceptualized as a location, a social system, or a common identity (Flora and Flora 2008). In the case of NTFP livelihoods, community can fit within all three concepts given many harvesters and producers identify themselves by their practice (e.g., wildcrafter, forest farmer). These harvesters and producers also form a social system wherein people have organized around crop production, uses, and sales. Lastly, the people involved in NTFP markets and cultural practices often are tied to a specific harvest or production location.

Community development is what people do to improve local quality of life (Flora and Flora 2008). It focuses on long-term betterment rather than singular economic growth and “implies that the quality of interaction among people living in a locality improves over time” (Flora and Flora 2008, p.348; Green and Haines 2012). Resources provide a basis for community development. Communities can consume, store, or invest their resources and resources can be considered capital when used to produce more or other resources (Rule et al. 2000; Green and Haines 2012). Communities may need different capital investments as they progress in the development process (Fey et al. 2008; Flora and Flora 2008), but all communities, regardless of their condition, have resources which they can use as capital (Flora and Flora 2008; Gutierrez-Montes 2009).

The community capitals framework, developed by Flora and Flora (2008) offers an analytical tool to help communities identify and recombine their resources for community development. Researchers have applied it in diverse fields and even conceptualized it within an agroforestry context (Munsell et al. 2018). The framework includes seven forms of capital: human, social, financial, political, cultural, natural, and social. While sustainable livelihoods often draw upon five capitals in particular (natural, social, human, built, and financial capital) (Flora and Flora 2008), political and cultural capital are additions that increasingly are explored in rural working lands research (e.g., Munsell et al. 2018).

Natural capital refers to assets and natural resources of a particular location such as weather, geographic isolation, and natural beauty, flora, fauna, biodiversity, water, land, and air (Emery and Flora 2006; Green and Haines 2012). Natural capital provides the foundation of all other capitals (Flora and Flora 2008) and represents natural elements of the landscape such as soil, water, and air and can provide ecological functions such as flood control, water catchment, and wildlife habitat. Natural capital also can be leveraged for direct use or market outputs (NTFPs, timber, agricultural crops, etc.) (Green and Haines 2012). However, it can be spent down through natural resource extraction, which can have negative effects on human, social, built, and financial capital (Rule et al. 2000; Flora and Flora 2008). For example, in Appalachia, habitat and species loss, water and air pollution, and loss of entire mountains have destabilized communities (York 2016).

Cultural capital refers to how people know the world around them and defines what they see as problematic and changeable. It gives a sense of identity and reveals itself in traditions and language (Emery and Flora 2006; Flora and Flora 2008). “Cultural capital influences what voices are heard and listened to, which voices have influence in what areas, and how creativity, innovation, and influence emerge and are nurtured” (Emery and Flora 2006, p.21). It is essentially the worldviews parents pass down to their children about how

society works (Flora and Flora 2008). Wild crafting (also called wild harvesting) NTFPs for side income is part of Appalachia's cultural fabric passed down from early settlers (Hufford 2003; Davis and Persons 2014). Cultural capital in Appalachia is influenced by shifts in the social fabric of the region, with many multigenerational residents leaving the area in search of economic opportunities whilst newcomers migrate in searching for regional amenities (Obermiller and Howe 2013; Pollard and Jacobson 2015; Leebrick 2015).

Human capital refers to the capacities or experiences of individuals such as education, background, job skills, creativity, health, interpersonal skills, leadership capacity, and talents (Rule et al. 2000; Flora and Flora 2008; Green and Haines 2012). Human capital helps build other resources for community change (Emery and Flora 2006). Many multigenerational resident wild crafters have a significant base of knowledge about NTFPs acquired through years of harvest and observation (Emery 2001). However, much of this knowledge is being lost as youth leave rural Appalachian communities (Heinemann and Hadler 2015). At the same time, newcomers bring with them skills, education, and experience acquired elsewhere and many are retired, giving them time to contribute to community or entrepreneurial efforts (Gosnell and Abrams 2011).

Political capital refers to organizational or group access to decision-making, power, voice, and reputation (Green and Haines 2012). Power drives political capital (Flora and Flora 2008). Community power is "the ability to affect the distribution of both public and private resources within the community" (Floral and Flora 2008, p.145). Communities can transform political capital into "built, social, cultural, and financial capital" (Flora and Flora 2008, p.167). Yet in many rural communities, the old guard often are project stoppers (Floral and Flora 2008). Further, absentee landownership and transition of land to newcomers impact land access for wild crafters to harvest NTFPs (Ginger et al. 2012).

Financial capital is defined as “financial resources available to invest in community capacity-building, to underwrite the development of businesses, to support civic and social entrepreneurship, and to accumulate wealth for future community development” (Emery and Flora 2006, p.21). It is use of money for investment instead of consumption. Investment happens when a community uses purchasing or other financial instruments to build additional value, and can include stocks, bonds, derivatives, market future, and letters of credit (Flora and Flora 2008). Many Appalachian communities struggle with poverty and lack of financial resources for development (Schumann 2016). When communities do not have financial capital locally, they often look for investments at the state or federal level to fund community development strategies (Flora and Flora 2008). The growing base of newcomers to the region may also provide possibilities for community-based funding or at least the ability for these residents to pursue entrepreneurship on their own (Leebrick 2015).

Built or physical capital provides the infrastructure that supports all the other capitals and activities in a community (Emery and Flora 2006; Flora and Flora 2008). Built capital is infrastructural resources including roads, houses, processing centers, and farm equipment. (Green and Haines 2012). An example of built capital in rural communities is local food hubs, which provides aggregation, shared processing, warehousing, coordinated distribution, and wholesale and retail sales to small- and medium-scale farmers (Horst et al. 2011). A number of shared use kitchens also have emerged to support the local and regional food systems (Tarasuk and Reynolds 1999). Scaling up production of NTFPs may require similar mechanisms for cleaning, drying, and further processing the harvest.

Social capital is defined as "features of social organization, such as trust, norms, and networks" that facilitate collective action (Putnam 1993, p. 167). It resides in relationships among people and acts as the glue that holds society together (Putnam 1993; Coleman 1988). Social capital is strongly linked with innovation and development of sustainable rural

livelihoods (Warner et al. 1999; Pretty and Ward 2001; Westlund and Bolton 2003; Torri and Herrmann 2011; Green and Haines 2012). While many communities focus on built and financial capital, social capital has been found to spur a “spiraling up” process and, therefore, provides a critical entry point for increasing other capitals and creating community change (Emery and Flora 2006). Holtkamp and Weaver (2018) describe how a community in central Appalachia used social capital to build economic opportunities through locally driven community development strategies. Increased social capital can decrease transaction costs and perceived barriers to adopting agroforestry practices and make communities more likely to display the innovation and collective action for economic success (Putnam 1993; Rule et al. 2000; Pretty and Ward 2001; Westlund and Bolton 2003).

Social capital can lead to collective action which is an action that requires two or more people to coordinate efforts (Sandler 1992; Putnam 1993; Ostrom 2000; Schmid 2000; Krishna 2004). It can build new social capital by forging networks, mobilizing resources, and building new organizational forms (Sturtevant 2006). Collective action is defined as "action taken by a group in pursuit of members' perceived shared interests" (Marshall 1998, p. 200) and is well-studied within a natural resource management context (McCarthy et al. 2004; Meinzen-Dick et al. 2004; Lubell and Fulton 2007). A number of researchers have explored collective action in relation to commercialization of underutilized species such as NTFPs (Meinzen-Dick et al. 2004; Devaux et al. 2009; Gruère et al. 2009; Hellin et al. 2009; Kruijssen et al. 2009; Markelova et al. 2009). Underutilized products that often start off with low market demand require collective actions such as "pooling resources, realizing scale economies, sharing information, and developing a community-based incentive structure" to develop robust markets (Gruère et al. 2009, p. 44). Collective action can feed into smallholder market-chain innovation and access (Devaux et al. 2009; Markelova et al. 2009). However, it cannot overcome insufficient market potential, therefore, choosing

products with sufficient market demand becomes an important task to foster collective action (Gruère et al. 2009; Cernusca et al. 2012).

Two commonly referenced types of social capital exist. Bonding social capital refers to close ties that promote group cohesion. Bridging social capital refers to loose ties that connect different individuals, groups, organizations, and communities (Emery and Flora 2006; Green and Haines 2012). Communities more successful at collective action have both bonding and bridging capital (Agnitsch et al. 2006). Therefore, networking inside and outside the community and fostering collective action offer key strategies for building social capital (Flora et al. 1997; Warner et al. 1999; Green and Haines 2012; Flora and Flora 2008).

The seven capitals interconnect and can enhance or detract from one another (Flora and Flora 2008). When one capital declines, others can follow suit (Gutiérrez-Montes 2005). Communities can strategically reverse a downward spiral by increasing stocks (assets within a capital), flows (when one capital is invested into another), and investment of capital (Emery and Flora 2008). This "spiraling up" refers to the process when "assets gained increase the likelihood that other assets will also be gained" (Emery and Flora 2008, p. 22). Asset mapping offers an approach to guide communities to their own "spiraling up" strategy. Beyond discovering assets, it must include strategies to recombine assets to address an issue (Flora and Flora 2008).

The community capitals framework has been applied to understanding agroforestry adoption and retention. Rule et al. (2000) explained barriers to adoption of agroforestry practices using early formulations of community capitals framework that included lack of experience among farmers (human capital), risk and complexity perceptions (human and cultural capital), limited accessibility to information (social capital), and lack of financial resources and longer term investments (financial capital). Munsell et al. (2018) used the

community capitals framework to understand the impact of agroforestry practices in a post-adoption agroforestry study in Cameroon. The authors found that increases in natural capital and financial capital were primary products of adoption, whereas political and cultural capitals were less affected by associated practices.

## **2.6 Summary**

There is a deep history and living tradition of using NTFPs in Appalachia, though scientific studies pertaining to the potential of these products to contribute to livelihoods in the region are limited. An NTFP industry is present, but supply chains are changing and the long-term viability and sustainability of wild harvesting is under question. Forest farming is an agroforestry practice that is increasingly of interest. The body of research on agroforestry adoption lays out potential dynamics with respect to forest farming adoption in the region. Social marketing concepts and studies that focus on agroforestry and forestry provide example approaches for studying interest in forest farming among different groups of people in the region. Amenity migration leads to an increasingly mixed social landscape of longtime residents and newcomers, which could influence NTFP production and livelihoods. Community development concepts, especially the community capitals framework, offers a unique and diversified investment model that is well suited for researching NTFPs as a livelihood opportunity in Appalachia.

## **CHAPTER 3: FOREST FOOD AND MEDICINE IN CONTEMPORARY APPALACHIA**

### **3.1 Abstract**

Forest food and medicine have a long history in Appalachian culture, but the region's social landscape is shifting from in-migration of amenity seekers and out-migration of multigenerational residents in search of economic opportunities. As a result, much of what we know about harvest and use has likely changed. We conducted 16 interviews with people involved in harvesting forest food and medicine in a Southwest Virginia community. Our study focused on participants' motivations to work with forest food and medicine, species preferences (edible versus medicinal), and uses (home use versus market sales). Financial benefits, nature, and personal preferences were key motivators. We compared data between multigenerational residents and newcomers to the area. Multigenerational residents emphasized income through market sales of medicinal forest species, noting harvest of multiple product types (plants, bark, leaves, buds). They also mentioned edible species (mushrooms and nuts), but to a lesser degree. On the other hand, newcomers were more likely to balance their focus between medicinal and edible forest species as well as home use and market sales. When compared to multigenerational participants, they were more inclined toward a broad suite of edible species (mushrooms, nuts, fruit, plants); however for medicinal forest species they limited harvesting to herbaceous plants. Shared motivators offer a starting point for regional programs that address the needs of both multigenerational residents and newcomers. As the future unfolds, residents are collectively shaping the next chapter in Appalachia's forest food and medicine culture in a way that meets socioeconomic goals while maintaining the region's natural resources for future generations.

Keywords: case study; non-timber forest products; wild harvesting; Virginia; sustainable development

### 3.2 Introduction

Appalachia is broadly defined as the mountainous region of the eastern United States (US) that runs from New York to Georgia and west to Mississippi (Appalachian Regional Commission 2018). It is home to one of the most biologically diverse temperate forest ecosystems in the world (Ricketts et al. 1999), which includes a wide variety of forest food and medicine species (Greene et al. 2000). This natural wealth has supported generations of people that have tended, harvested, and used forest trees, plants, and fungi for food and medicine (Hufford 2003, Cavender 2006; Moerman 2009; Moerman 2010; Freedman 2017).

Non-timber forest products (NTFPs) are products made from plant materials and fungi found in forest ecosystems (Chamberlain et al. 2018). They are referred to by many names, including specialty forest products, and are derived from herbaceous plants, vines, mushrooms, shrubs, and trees. Food and medicine are two major categories of NTFPs; other categories include floral decoratives (e.g., pinecones, fresh/dried flowers, greenery), specialty wood-based products (e.g., walking sticks, stems for furniture, carving wood), and landscaping materials (e.g., transplants, ornamentals) (Chamberlain et al. 2009). Appalachian forests are home to over 25 commonly traded medicinal NTFPs and even more that are used for food (Greene et al. 2000).

Forest food and medicine products can support sustainable development by providing livelihood opportunities (Garritty 2004; Ros-Tonen and Wiersum 2005; Griggs et al. 2013) while improving forest health and deepening people's connection with forests. This is a critical issue in Appalachia given that industrialization and globalization have accelerated socioeconomic problems in recent decades (Schumann 2013; Steffen et al. 2015). Extractive industries are no longer engines of economic development (Freudenburg 1992; Flora et al. 2016; Marley 2016) and most of the manufacturing sector has left (Flora et al. 2016). As a result, employment opportunities are limited and poverty levels are high, causing many to

leave Appalachia's rural life for work in urban centers (Obermiller and Howe 2013; Pollard and Jacobson 2015). Many of the families that remain in Appalachia are small-scale farmers (Paul et al. 2004; Nehring et al. 2009; Gaventa 2011) who have diversified into alternative production after cash crop tobacco farming was no longer broadly viable (Altman et al. 1996).

At the same time, newcomers are migrating to the region seeking amenity benefits—such as natural beauty, a rural lifestyle, low cost of living, and land for uses like farming—and bring with them different perspectives and values. This shifting social composition could influence the culture of harvesting forest food and medicine in Appalachia. As in other rural areas in the US, Appalachia is at a crossroads and many residents are thinking creatively about how to use local resources—including natural resources—to support sustainable development and improve livelihoods (Floral et al. 2016). Information about the people, species, motivations, and uses of forest food and medicine in contemporary Appalachia will provide much needed insight into the ways regional programming can improve livelihoods while stewarding the health and sustainability of the region's forests for future generations.

### **3.3 Literature Review**

#### *Historical Forest Food and Medicine Context*

Native Americans in the region managed, harvested, and used many species in the forest for food and medicine long before European colonization and much of this culture remains today (Fogelson and Sturtevant 2004; Moerman 2010). The Cherokee people, for example, used nuts from chestnut (*Castanea*), hickory (*Carya*), walnut (*Juglans*), and oak (*Quercus*) and harvested fruit from wild cherries (*Prunus*), pawpaw (*Asimina triloba*), mulberry (*Morus*), serviceberry (*Amelanchier*), and persimmon (*Diospyros virginiana*), among others (Fogelson and Sturtevant 2004). Ramps (*Allium tricoccum*) were also a significant food for many eastern tribes (Moerman 2010). Further, many of the native

botanicals that grace the floors of Appalachian forests were important medicinal plants for the Cherokee people, including bloodroot (*Sanguinaria canadensis*), goldenseal (*Hydrastis canadensis*), ginseng (*Panax quinquefolius*), and blue cohosh (*Caulophyllum thalictroides*) (Moerman 2009). While much of the knowledge about Native American uses of forest plants was lost during European colonization, many Native communities are reviving the cultural practices that survived (Turner and Turner 2008), including through organizations such as the Native American Food Sovereignty Alliance (<https://nativefoodalliance.org/>).

European colonization of Appalachia began in the 1700s (Yarnell 1998) and marked a significant change in the region's cultural and natural landscape. Colonizers brought a new worldview of harvesting plants to sell into broader markets (Schelbert 2003). American ginseng (*Panax quinquefolius*) was a prime example; while sometimes it was used for medicine in the home, it was mostly harvested as a cash crop to supplement farming income (Cavender 2003). Colonizers did, however, rely on other forest species in the home, especially those with analogs in Europe such as ramps (*Allium tricoccum*), wild ginger (*Asarum canadense*), American chestnut (*Castanea dentata*), American hazelnuts (*Corylus americana* and *C. cornuta*), and black walnut (*Juglans nigra*) (Wigginton et al. 1975; Cavender 2003; Rivers et al. 2014). Over time, a rich tradition of Euro-American folk medicine also developed in Appalachia. Practitioners of this folk craft used both native plants, such as sassafras (*Sassafras albidum*), slippery elm (*Ulmus rubra*), and may apple (*Podophyllum peltatum*), as well as medicinal plants from Europe that became naturalized, such as burdock (*Arctium* spp) and catnip (*Nepta cataria*) (Cavender 2003).

#### *Contemporary Forest Food and Medicine Context*

Forest food and medicine in Appalachia today reflects the region's cultural and natural history, yet the social landscape is shifting. The practice of wild harvesting NTFPs for supplementary income and personal use is still commonplace (Davis and Persons 2014).

However, younger generations are increasingly less connected to traditions of harvest and use since they rely less directly on the land (Rigg 2006) and many who hold this knowledge are aging or out-migrating from their communities (Obermiller and Howe 2013; Pollard and Jacobson 2015). At the same time, many newcomers to the region are joining in the harvest of Appalachian forest food and medicine, bringing new perspectives on rural life and stewardship of the natural environment (Chamberlain et al. 2009, Trozzo et al. 2014b), and sometimes living traditions of their own related to foraging and herbalism (Storl 2012; Robbins et al. 2008).

Whether they are new to the area or not, we know very little about what influences contemporary Appalachian residents to harvest forest food and medicine. Although, we do know that age, gender, financial benefits, lifestyle preferences, and concern for the environment affect NTFP harvesting. For example, younger people are often more interested in forest-based specialty crops (Strong and Jacobson 2005; Valdivia and Poulos 2009). Gender has also been observed as a driver, with females making up a significant base of those interested in NTFPs and agricultural systems that include them (Strong and Jacobson 2005; Gao et al. 2014; Trozzo et al. 2014a). Finally, while financial benefits are important, they are often secondary to lifestyle preferences and concern for the environment (Strong and Jacobson 2005; Barbieri and Valdivia 2010). Further, these motivations to harvest forest food and medicine may differ between those who have lived in the region all their lives and those who have recently migrated to the area.

Amenity migration is the “movement of people based on the draw of natural and/or cultural amenities” (Gosnell and Abrams 2011, p. 303). Globalization, along with cultural and demographic changes, have driven such trends in rural areas across the globe (Cadieux and Hurley 2011, Gosnell and Abrams 2011). The influx of newcomers focused on amenity consumption in rural areas can lead to cultural conflict with multigenerational residents

(Hurley and Walker 2004, Walker and Fortmann 2003). In particular, gentrification and development associated with this demographic shift can have measurable impacts on the local landscape and decrease resource access by multigenerational residents who depend on NTFPs for their livelihoods (Cadieux and Hurley 2011; Hurley and Halfacre 2011). On the other hand, benefits also are possible with in-migration of newcomers as they can bring wealth from elsewhere to invest in local initiatives and infrastructure (Gosnell and Abrams 2011). Appalachia is part of this global trend and current amenity migration in the region is changing the social landscape and perhaps influencing forest food and medicine culture (Leebrick 2015). For this reason, the multigenerational and newcomer dichotomy provides a useful framing for our study of forest food and medicine preferences, uses, and motivations in 21st century Appalachia.

Our empirical case study used qualitative methods to investigate the contemporary harvest and use of forest food and medicine in an Appalachian community. Our questions were designed to address three broad themes: Who are the people involved in harvesting forest food and medicine? What motivates them? Which species do they use and how do they use them? To answer these questions, we interviewed residents who were involved in harvesting forest food and medicine in one rural community in Southwest Virginia.

### **3.4 Methods**

#### *Study area*

For this study, we interviewed community members in Grayson County, Virginia. Grayson County is situated along Virginia's border with North Carolina in the Blue Ridge region of the South Central Appalachia Mountains (Figure 3.1). Like many Appalachian communities, Grayson County experienced the boom and bust of the timber industry in the first half of the 1900s, followed by the rise and fall of manufacturing in the second half of the century (Maynard and Holton 2013). In 2010, the county had a population of 15,533, which

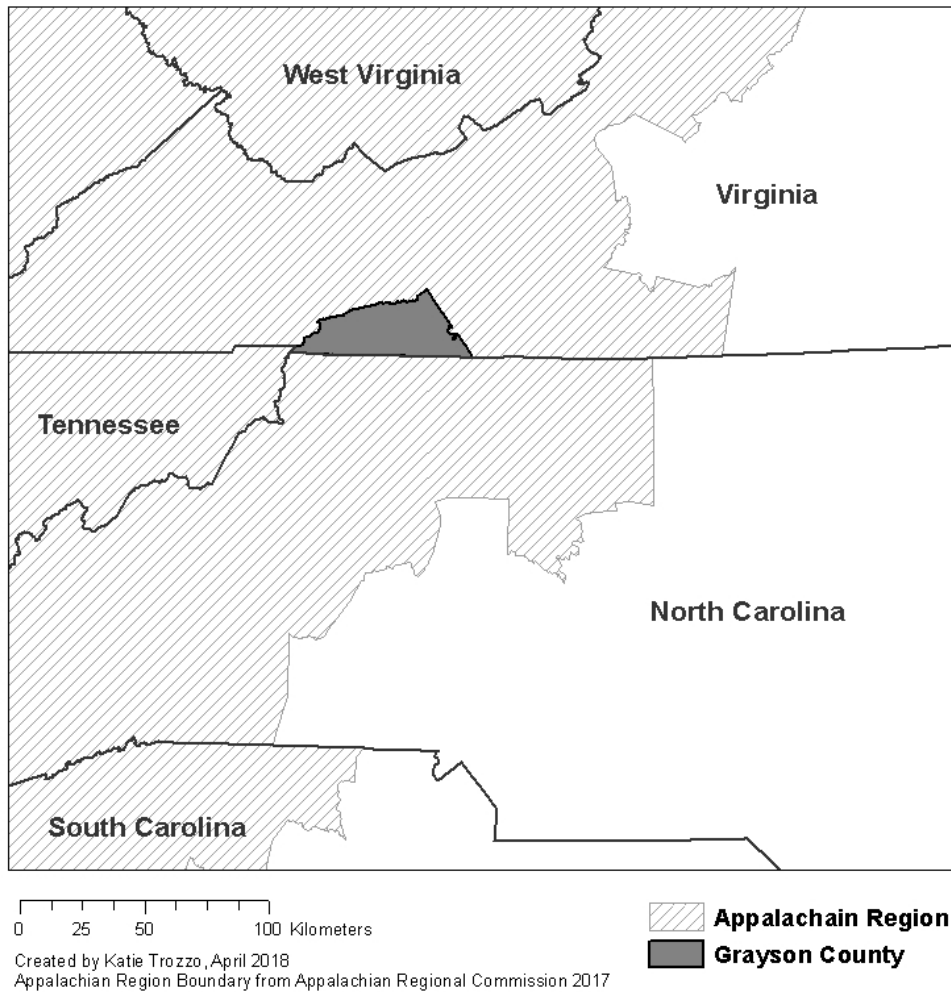


Figure 3.1 Grayson County is situated along Virginia's border with North Carolina in the Blue Ridge region of the South Central Appalachia Mountains. Case study data were collected through interviews with 16 county residents.

declined from 17,917 in 2000 due to a combination of death among an aging population and the out-migration of youth (US Census Bureau 2010; Maynard and Holton 2013). Current residents either travel outside the county for work, compete for limited jobs, or face unemployment (Maynard and Holton 2013).

Maynard and Holton (2013) analyzed land cover, economic impacts, and agricultural trends in Grayson County. Farms and forests almost evenly cover most of Grayson's land base. Farming and forestry each bring in over \$2 million to the local economy. Primary farming crops include dairy and beef cattle, hay, and Christmas trees; secondary crops include tobacco, cabbage, pumpkins, berries, fruit, and vineyards. Local food initiatives have

emerged over the last ten years, and include a successful farmers market in Independence, the county seat. Additionally, NTFPs are included as part of the counties strategic plan (Maynard and Holton 2013). Between 2014 and 2017, over 100 local stakeholders participated in a group focused on development of these products as part of a community-based component to an associated study (Trozzo, Munsell, Niewolny, and Chamberlain unpublished data).

### *Interview Protocol*

We conducted 16 semi-structured individual interviews with Grayson County residents between March and October of 2016. Interviewees included people who either directly harvested on public or private land or coordinated harvest on their land by others. We defined forest food and medicine as any plant or mushroom species that grows in the forest and has an edible or medicinal purpose. We selected interviewees from a pool of people who either joined the NTFP interest group formed in January 2014 or were part of a referral list created by group participants and who lived within Grayson County, Virginia. We used purposeful selection from this pool to maximize diversity. However, the sample was ultimately influenced by the characteristics of those drawn to involvement in the NTFP group—many of which were predisposed to market sales. Further, variation in gender and resident type was not necessarily representative of Grayson County.

Our interview protocol and questions were approved by the Virginia Tech Institutional Review Board (IRB# 16–005) prior to conducting the study (Appendix A, B). The interview protocol provided participants with a brief overview of the project and requested signed consent (Rubin and Rubin 2005; Appendix C, D). We designed interview questions to understand participant background, experience, motivations, and the species they harvest and use (Table 3.1; Appendix E). Questions were purposefully open-ended to allow respondents to engage and the interviews lasted between 45 and 90 minutes. Interviews were recorded, and later transcribed and analyzed using qualitative data analysis software

Table 3.1 Interview topics and questions asked of study participants. Questions were purposefully open-ended and responses were categorized to identify broader themes. References to the themes were then categorized into sub-themes and quantified.

| Interview Topics and Questions                                                                                     |
|--------------------------------------------------------------------------------------------------------------------|
| <b>BACKGROUND</b><br>When did you arrive in Grayson and what brought you here?<br>Where were you from before this? |
| <b>EXPERIENCE</b><br>What is your experience with NTFPs?                                                           |
| <b>MOTIVATIONS</b><br>Why do you work with NTFPs in general?                                                       |
| <b>SPECIES</b><br>What NTFPs do you currently grow or steward?                                                     |
| <b>USES</b><br>What do you do with your harvest?                                                                   |

(NVIVO 12 QSR International ® Australia).

Our coding method followed Saldanas (2013), where we used structural coding to organize raw data based on the predetermined line of questioning. Descriptive coding was then used to attribute a first cycle of codes to the structurally adjusted data. We then conducted second cycle analysis involving code mapping and pattern coding to organize codes first into categories and then into central concepts and themes. Additionally, we used matrix coding queries (following Bazeley and Jackson 2013), to conduct comparative pattern analysis between newcomers and multigenerational residents. This helped us describe these groups using their attributes and better understand their differences in codes.

We tracked categories, sub-categories, and emergent themes based on counts of participants who referenced them and derived percentages from the proportion of total references. We also analyzed attribute data to describe study participants by age, gender, and resident type (newcomer vs. multigenerational resident). We classified a participant as a ‘newcomer’ if they or their parents moved to the area during or after the 1970s wave of immigration to rural areas. ‘Multigenerational residents’ were those whose families were residents of the area before the 1970s and who either lived there all their lives or grew up there and moved back. The 1970s is a common cut off used for distinguishing newcomers and multigenerational residents and consistently provides a clear distinction between the two groups in rural areas of the US (Blahna 1990; Qin 2016). This cutoff was especially fitting for Grayson County because there was a significant demographic shift in the late 1970s into the 1980s prompted by a failed dam project that left more than 14,500 acres of land for purchase (Maynard and Holton 2013).

### **3.5 Results**

Sixteen people participated in this study (Table 3.2). Eleven self-identified as male and five self-identified as female. Four participants were between 30 and 50 years old (25 percent), eight were between 50 and 70 years old (50 percent), and four were over 70 years old (25 percent). Ten participants were newcomers to the area and six were multigenerational residents. Half (n=5) of newcomers identified as female and half (n=5) identified as male. All (n=6) multigenerational residents self-identified as male. Multigenerational residents had more participants over the age of 70 and fewer participants under the age of 50. Alternatively, newcomers had more participants between the ages of 50 and 70. Only multigenerational residents had lifelong experience working with forest food and medicine (since childhood).

Table 3. 2 Demographics and characteristics of all study participants and the breakdown of newcomers and multigenerational residents in a qualitative case study of forest food and medicine perspectives in Grayson County, VA.

| Variable                 | All Participants<br>(n=16) | Newcomers<br>(n=10) | Multigenerational Residents<br>(n=6) |
|--------------------------|----------------------------|---------------------|--------------------------------------|
| <b>GENDER</b>            |                            |                     |                                      |
| Female                   | 5                          | 5                   | 0                                    |
| Male                     | 11                         | 5                   | 6                                    |
| <b>AGE</b>               |                            |                     |                                      |
| 30-50 years old          | 4                          | 3                   | 1                                    |
| 50-70 years old          | 8                          | 6                   | 2                                    |
| Over 70 years old        | 4                          | 1                   | 3                                    |
| <b>EXPERIENCE LEVEL*</b> |                            |                     |                                      |
| Lifelong experience      | 4                          | 0                   | 4                                    |
| Beginner                 | 4                          | 4                   | 0                                    |
| Past experience          | 7                          | 3                   | 4                                    |
| <b>INVOLVEMENT</b>       |                            |                     |                                      |
| Directly harvest         | 14                         | 9                   | 5                                    |
| Coordinate harvest       | 2                          | 1                   | 1                                    |

\* Experience level emerged as a theme in the data rather than a planned categorical attribute variable collected for all participants, therefore, data is missing for some participants. Also, lifelong experience and past experience are not mutually exclusive, so some participants made reference to both categories.

No newcomers had lifelong experience; instead, four self-identified as beginners or expressed newness to the practice. However, three noted previous experience earlier in their adulthood. Fourteen were directly involved in harvest and two coordinated harvest by others on their land.

### *Motivations*

Four types of motivations were observed: financial benefits, nature, personal preferences, and social factors (Figure 3.2). Financial benefits—defined as motivations related to the financial capital used to meet the needs of an individual, family, or community (Flora et al. 2016)—was mentioned most frequently. Sub-themes included personal income—defined as money earned by an individual—and community support—defined as financial capital that supports community welfare (Flora et al. 2016). Frequency of mention of the sub-themes were similar, despite fewer people referencing community support. Personal income included references related to farm enterprise diversification or making side income. One participant explained “how do we generate some sort of income off of it? That is kind of what got me going on it.” Another noted “it is important that it makes sense as a business and has to be approached and thought out as such.” Some saw forest food and medicine as “part of the overall diversity plan for the farm” or one of many “lines of operation.” Along the same lines, another said “I am trying to do anything I can to make a little extra money.” One clarified that they saw this as being a portion of their income, not “what we do.”

Community support focused on supporting community welfare and creating livelihood opportunities by drawing upon forest food and medicine. People pointed to creating a model to share with others, including youth and new growers. Some also discussed how these species have helped raise “operating monies” for local services, such as fire departments. One participant noted that she considered forest food and medicine as a way to

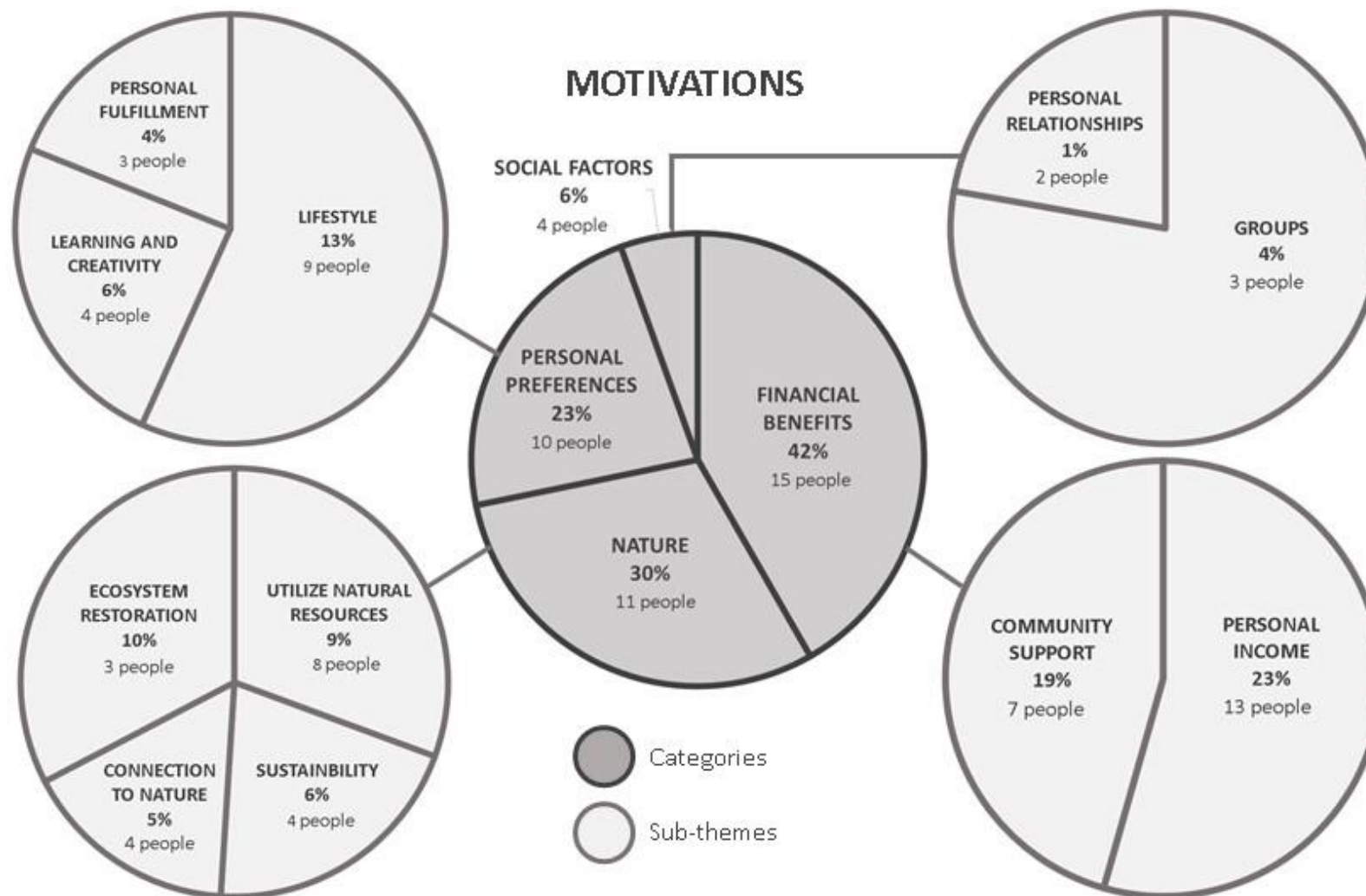


Figure 3.2 The four main categories of motivations to work with forest food and medicine species along with the percent of the total references to motivations and the number of people who referenced each category (center pie chart). Sub-themes are also shown for each category with their corresponding percent of the total references to motivations and number of people (peripheral pie charts).

“make positive changes in this area as far as improving the socioeconomic conditions” and that she wanted to “create a model that will pay so that other people can use it.” Another noted her desire to “find creative ways to earn a living on small acreage.” And yet another participant noted that he hoped “to give the young people in this area a reason to stay and raise their families here.”

Nature—defined as any motivation relating to the natural environment (Johnson et al. 1997)—was the second most common motivation. We found four sub-themes of nature including ecosystem restoration, utilizing natural resources, sustainability, and connection to nature. Ecosystem restoration was defined as motivations related to helping native forest ecosystems recover from degradation and/or damage (Society for Ecological Restoration 2004). Utilizing natural resources included motivations focused on capitalizing on resources available from the forest (Flora et al. 2016). Sustainability included motivations related to harvest of forest food and medicine in a way that maintains species populations and ecosystem function (Tinktin and Shackleton 2011). Connection to nature was defined as motivations related to emotional connections with nature (Perrin and Benassi 2009)

Ecosystem restoration had the highest number of proportional references, but was mentioned by only a small number of people; it included aspects of forest restoration and stewardship. One participant noted the history of her land as being “clear-cut, run for cows, pastured” and then converted into “a white pine plantation.” This motivated some in their efforts to restore ecosystem integrity by improving the diversity and health of native plant populations. The same participant really wanted “to see a thriving, diverse forest” and forest food and medicine species were noted as a pathway toward these objectives. “You are enhancing a native plant population and benefiting from it.”

Utilizing natural resources had similar proportional references as ecosystem restoration, but was referenced by a greater number of people. References to utilizing natural resources focused on availability and use of ample suitable forestland. One participant decided to focus on forest food and medicine by looking at her property “and realizing we have a lot of woodland, why not utilize it?” Another expressed a similar sentiment, “at first I was just wanting to do something with my woods. I have 20 acres here and probably at least half of it is in woods. And I wanted to use it and make it beautiful again and profitable. And just do something really great and different in my woods and use that land.”

Sustainability and connection to nature were referenced less frequently than ecosystem restoration and utilizing natural resources. Sustainability included expressions about the draw to work with these species in a way that maintains their populations and uses natural methods. One participant expressed how they wanted to approach production “in a way that doesn’t just denude the woods.” Another participant noted they would like to be able “to do it in a way that is sustainable” and another emphasized how they focused on natural production methods on their farm with a particular draw to biodynamics and perennial agriculture.

Connection to nature included references to love of nature, the land, the woods, and animals, and appreciation of beauty. One person explained that they want to work with forest food and medicine species “because we love the woods.” Another participant discussed how he saw others in his community working with these species because it was “an avenue for them to connect with the land and to be connected to the place they live.” Another person described her relationship with the plants and mushrooms she works with “it really does have a spiritual component for me. As does any kind of nature that you personally relate to...it’s like if you reach out to it in this way...and really put your heart and your sweat into it...it reaches back and really touches you in such a special way.”

Personal preferences were defined as any motivation related to what participants viewed as desirable (Warren et al. 2010) regarding their way of life, their activities, and their approaches to harvesting forest food and medicine. Personal preferences had three subthemes: Lifestyle, learning and creativity, and personal fulfillment. Lifestyle was defined as motivations related to participants' way of life (Sobel 2013). Learning and creativity were defined as motivations related to learning in action and overcoming challenges (Boshyk and Dilworth 2010). Personal fulfillment was defined as a sense of satisfaction and accomplishment (Keller 1987).

Lifestyle was the most significant sub theme and focused on appreciation for the work because of the approachability of the scale, the seasonal work schedule, and slower pace. One participant noted "the scale of it is more for one or two persons," and another described needing a seasonal break "I need that senescence at the end of the year slash the beginning of the year to restart and that is important to me." Beyond the work, others approached it as a way to be outside, a therapeutic activity, and tradition. One participant described it as "something to do for fun."

Learning and creativity, noted less frequently than lifestyle motivations, included references related to curiosity, the enjoyment of learning, creating, innovating, experimenting, and the challenge of working with these species. One participant described "I am just learning so much and learning different things, so it just makes you a better person I think...most people would look at this mess and just turn around and walk away, but to me it's a challenge." Another explained how he interacted with forest food and medicine "in terms of curiosity more than anything," and another described how "figuring out ways to make it do better" is one reason he is drawn to forest food and medicine.

Personal fulfillment also followed lifestyle in terms of references and focused on how this activity was a passion, a source of pride, and rewarding for participants. One noted "it's

exactly what I want to be doing.” Another described it as “just so fulfilling and great. So that is another reason, an important reason for me. It feeds me. It does.” Another participant explained “I think most of it has to do with personal pride.” He continued “you know the blackberry is ten times better when you have scars to show for it.”

The smallest number of references was related to social factors; defined as motivations related to social ties and networks (Gilchrist 2009). Sub-themes included groups—defined as a “collective of individuals who interact and form social relationships” (Abercrombie et al. 2006, p. 174)—and personal relationships—defined as interactions of an individual with another (Sweely 1998). The sub-theme of groups was more commonly referenced than personal relationships. References to groups were focused on the significance of the NTFP group in the community and how that inspired interest. One participant explained “we had spent a lot of years of exploring on our own and not really knowing how to interconnect.” Another noted “it’s definitely brought about a different way of thinking about what other opportunities that we may be able to do here on the farm.” Another described, “through the woodland growers I have got some inspiration.” Personal relationships focused largely on building relationships with others who have shared interests. One participant noted how they enjoyed “talking about it [harvesting forest herbs] to people.”

Motivations among newcomers and multigenerational residents differed in several ways (Table 3.3). Multigenerational residents focused more on financial benefits and most often referenced the associated sub-themes. Newcomers more frequently referenced nature and a greater number of its sub-themes beyond resource utilization. Personal preferences ranked a bit higher for newcomers, though multigenerational residents referenced learning and creativity slightly more often. Multigenerational residents did not mention personal fulfillment at all, although they mentioned social factors slightly more than newcomers. These distinct motivations for harvesting forest food and medicine are not mutually

Table 3.3 The breakdown of newcomer and multigenerational residents' references to each category and sub-theme that emerged around motivations to work with forest food and medicine. The percentages for each category were calculated from the proportion of total references to motivations.

|                             | Newcomers (n=10) | Multigenerational Residents (n=6) |
|-----------------------------|------------------|-----------------------------------|
|                             | Total references | Total references                  |
| <b>MOTIVATIONS</b>          | <b>114</b>       | <b>41</b>                         |
|                             | % references     | % references                      |
| <b>FINANCIAL BENEFITS</b>   | <b>31%</b>       | <b>66%</b>                        |
| Personal income             | 14%              | 46%                               |
| Community support           | 17%              | 20%                               |
| <b>NATURE</b>               | <b>38%</b>       | <b>10%</b>                        |
| Utilize natural resources   | 9%               | 10%                               |
| Sustainability              | 9%               | 0%                                |
| Connection to nature        | 7%               | 0%                                |
| Ecosystem restoration       | 13%              | 0%                                |
| <b>PERSONAL PREFERENCES</b> | <b>26%</b>       | <b>17%</b>                        |
| Lifestyle                   | 15%              | 10%                               |
| Learning and creativity     | 5%               | 7%                                |
| Personal fulfillment        | 6%               | 0%                                |
| <b>SOCIAL FACTORS</b>       | <b>5%</b>        | <b>7%</b>                         |
| Groups                      | 4%               | 5%                                |
| Personal relationships      | 1%               | 2%                                |

exclusive; many often co-exist to drive participant activity. Newcomers tended to balance motivations of financial benefits, nature, and personal preferences. Multigenerational residents more frequently mentioned financial benefits and they also cited utilizing natural resources (a sub-theme of nature) and lifestyle (a sub-theme of personal preferences).

### *Plant Species Harvested*

Medicinal forest species represented the greatest proportion of overall references and had the largest number of people mentioning them (Figure 3.3). Medicinal herbaceous plants made up the vast majority of the references to medicinal species and were noted by the most people. Medicinal plants mentioned most often included ginseng (*Panax quinquefolius*), goldenseal (*Hydrastis canadensis*), black cohosh (*Actea racemosa*), and mayapple (*Podophyllum peltatum*) (Table 3.4). Medicinal barks were the second most often referenced product and included black cherry (*Prunus serotina*) and witch hazel (*Hamamelis virginiana*). A very small percentage of references were made to tree leaves including witch hazel (*Hamamelis virginiana*) and bigwood leaves (species name unidentified). An even smaller percentage of references were made to tree buds, such as those of tulip poplar (*Liriodendron tulipifera*) and balm gilead (species name unidentified).

Edible mushrooms were the most commonly referenced edible species, followed closely by nuts. Four people mentioned harvesting wild mushrooms, such as morels (*Morchella* spp.). Nut tree species included oak (*Quercus* spp.), black walnut (*Juglans nigra*), chinkapins (*Castanea pumila*), and American chestnut (*Castanea dentata*) for its past significance. Fewer people referenced edible fruit, plants, and tree saps. Fruit species included native fruits such as pawpaw (*Asimina triloba*), persimmon (*Diospyros virginiana*), and spicebush (*Lindera benzoin*) as well as wild apples (*Malus* spp.). Edible forest plant species included nettles and ramps (*Allium tricoccum*). Sap tree species references were restricted to sugar maple (*Acer saccharum*).

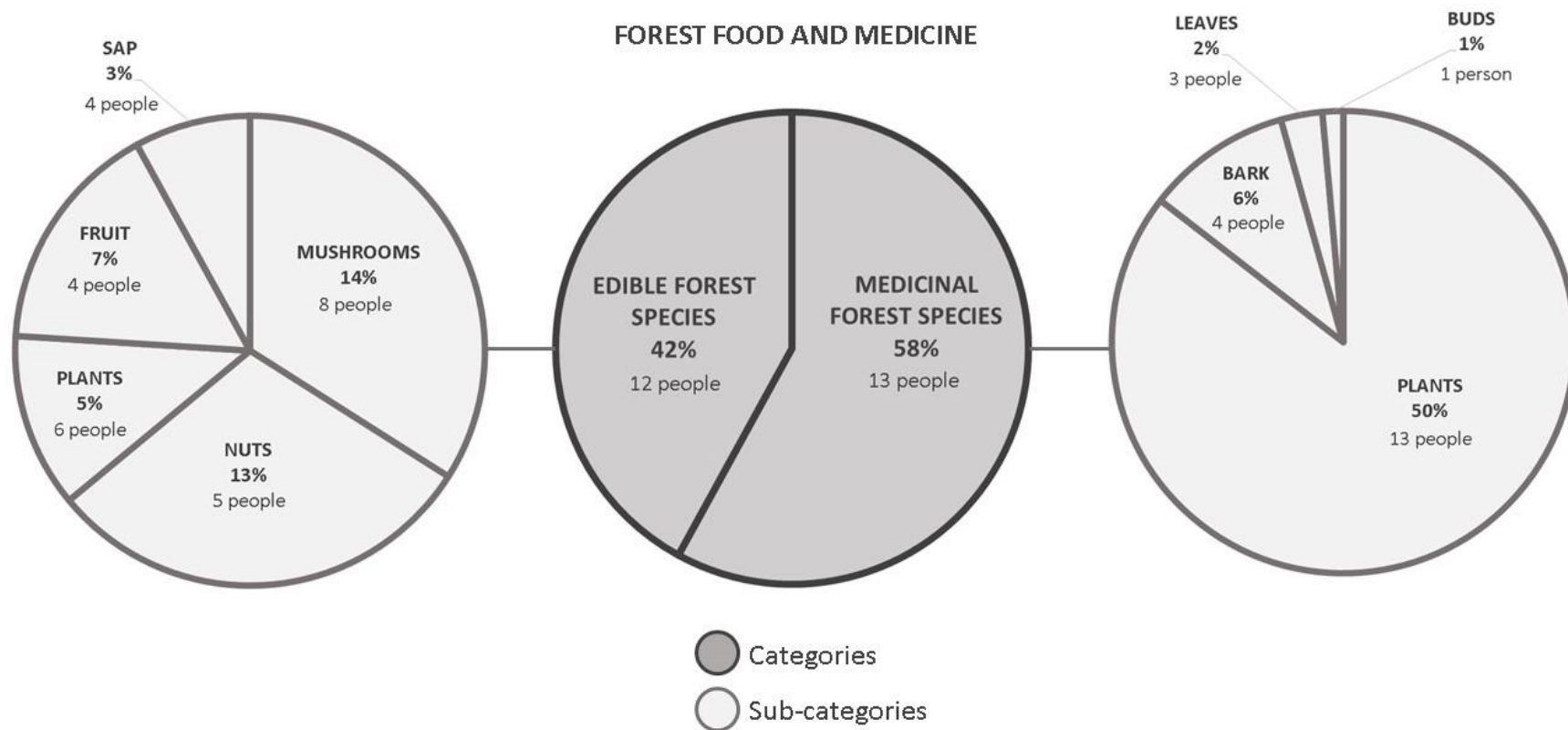


Figure 3.3 The breakdown of references to edible and medicinal forest species (center pie chart). Percent of total references for each category were calculated from the proportion of total references to species. Number of people who referenced each category is also included. Sub-categories of edibles and medicinal forest species are also included with their corresponding percent of total references to species and number of people who referenced (peripheral pie charts).

Table 3.4 The common name, scientific name, number of participants who referenced and frequency of references to medicinal forest species broken down by species type.

| Common Name        | Scientific Name                   | Number of participants who referenced | Frequency of references |
|--------------------|-----------------------------------|---------------------------------------|-------------------------|
| PLANTS             |                                   |                                       |                         |
| American ginseng   | <i>Panax quinquefolius</i>        | 10                                    | 11                      |
| Goldenseal         | <i>Hydrastis canadensis</i>       | 7                                     | 14                      |
| Black cohosh       | <i>Actea racemosa</i>             | 6                                     | 11                      |
| Mayapple           | <i>Podophyllum peltatum</i>       | 5                                     | 4                       |
| Bloodroot          | <i>Sanguinaria canadensis</i>     | 2                                     | 4                       |
| Lobelia            | <i>Lobelia</i> sp.                | 2                                     | 2                       |
| Blue cohosh        | <i>Caulophyllum thalictroides</i> | 1                                     | 1                       |
| Cranesbill         | <i>Gernanium maculatum</i>        | 1                                     | 1                       |
| Lily of the valley | <i>Convallaria majuscula</i>      | 1                                     | 2                       |
| Stone root         | <i>Collinsonia canadensis</i>     | 1                                     | 2                       |
| Wild ginger        | <i>Asarum canadense</i>           | 1                                     | 1                       |
| Wild yam           | <i>Dioscorea villosa</i>          | 1                                     | 1                       |
| BARKS              |                                   |                                       |                         |
| Wild cherry        | <i>Prunus serotina</i>            | 1                                     | 1                       |
| Witch hazel        | <i>Hamamelis virginiana</i>       | 1                                     | 1                       |
| BUDS               |                                   |                                       |                         |
| Tulip poplar       | <i>Liriodendron tulipifera</i>    | 1                                     | 1                       |
| Balm gilead        | Species name unidentified         | 1                                     | 1                       |
| Witch hazel        | <i>Hamamelis virginiana</i>       | 1                                     | 1                       |
| LEAVES             |                                   |                                       |                         |
| Witch hazel        | <i>Hamamelis virginiana</i>       | 1                                     | 1                       |
| Bigwood leaves     | Species name unidentified         | 2                                     | 2                       |

Newcomers and multigenerational residents differed in their references to these species and plant parts of import (Table 3.5). Newcomers stated equal preference for medicinal and edible species, focusing on nut, fruits, and medicinal plants. Multigenerational residents referenced medicinal forest species more frequently than edible species. With regard to forest medicine species, only multigenerational residents reported harvesting both herbaceous plants and parts of woody species, such as bark, leaves, and buds. Multigenerational residents also referenced mushrooms and sap more often than newcomers.

#### *Home Use Versus Market Sales*

Two general uses of forest food and medicine were referenced by participants: home use and market sales. Ten people harvested NTFPs for both home use and market sales, two only for home use, and two only for market sales. Newcomers referenced home use and market sales fairly equally, 56 percent and 44 percent respectively. Multigenerational residents dominated in references to market sales (81 percent). Home use included harvesting edible species such as mushrooms, apples, and berries for fresh eating, freezing, or dehydrating. It also included references to preserves and jams. Participants also mentioned making herbal medicine using elderberry, ginseng, and goldenseal. Interestingly, one participant used invasive forest species as fodder for her livestock. One person explained “I am much more homestead minded and that means I want to do a little bit of everything and support us first.” Another noted “we just ended up growing for ourselves” and another participant noted something similar “we didn’t sell any of it. What we got, it was used.”

Market sales included selling both raw harvested products and derived products such as teas, tinctures, and maple syrup. Participants discussed selling to intermediate buyers (e.g., local dealers or regional aggregators) or direct to consumers through farm stands, farmers markets, festivals, internet marketing, and store sales. Derived products underwent processing, which may include a combination of cleaning, cutting, or drying; in a few cases,

Table 3.5 The breakdown of newcomer and multigenerational residents' references to forest food and medicine species types. The percentages for each category were calculated from the proportion of total references to forest food and medicine.

|                          | Newcomers (n=10) | Multigenerational Residents (n=6) |
|--------------------------|------------------|-----------------------------------|
|                          | Total references | Total references                  |
| FOREST FOOD AND MEDICINE | 64               | 59                                |
|                          | % references     | % references                      |
| MEDICNIAL SPECIES TYPES  | 47%              | 66%                               |
| Plants                   | 47%              | 51%                               |
| Bark                     | 0%               | 10%                               |
| Leaves                   | 0%               | 3%                                |
| Buds                     | 0%               | 2%                                |
| EDIBLE SPECIES TYPES     | 53%              | 34%                               |
| Mushrooms                | 14%              | 19%                               |
| Nuts                     | 16%              | 7%                                |
| Fruit                    | 14%              | 0%                                |
| Plants                   | 8%               | 3%                                |
| Sap                      | 1%               | 5%                                |

chemical tests were conducted to measure the potency of medicinal roots. One participant expressed the challenge of processing medicinal roots as “the biggest physical thing we had with it was actually cutting the roots to dry. And getting the dirt and all the organics out of the root and getting it prepped to dry.” Another noted “it takes a lot of time. I mean a lot of time.” Derived products focused on adding value and shelf stability. One participant discussed how “probably the products that are dried are going to be the easiest for me just because the timeline between getting fresh leaves to market. I don’t know that I want that

stress.” Another noted how “a value added product is a great way to get to the market when you are pretty far away from the markets.”

### **3.6 Discussion**

This study identified key aspects of the contemporary Appalachian forest food and medicine culture in Grayson County, Virginia and explored motivational differences between newcomers and multigenerational residents. These results must be interpreted with an understanding of our sample since interviewees were drawn from a NTFP interest group—focused on products for sale—and their referrals. Additionally, the interviewees were skewed toward newcomers and males. Despite these limitations, our findings highlight important components of forest food and medicine harvesting in modern-day Appalachia.

#### *Motivations*

Similar to findings of Matthews et al. (1993), personal income was the most frequently mentioned motivator for harvesting. Multigenerational residents tended to focus more on income than newcomers. While this difference could be a product of our sample group, it could also relate to the persistent lack of economic opportunities in the study area. Moreover, newcomers often support themselves using financial capital they accrued elsewhere (Leebrick 2015), bringing to the region a wholly different economic condition. This is likely a key driver in newcomers’ tendency to express a wider range of motivations, similar to landowners and farmers interested in specialty forest crops in Pennsylvania (Strong and Jacobson 2005).

Newcomers and multigenerational residents both expressed financial motivations beyond personal income to support community services, initiatives, and the local economy using food and medicine resources available in the forest. Many who referenced community financial support saw forest food and medicine as a way to create livelihood opportunities for the community at large while also protecting the environment. This aspiration was not unlike

interest in NTFPs for joint objectives of livelihoods and conservation in other countries (Ros-Tonen and Wiersum 2005).

Factors related to the natural environment also motivated many participants and perhaps resemble historical relationships between people and the land in Appalachia (Cavender 2006; Davis and Persons 2014; Freedman 2017). Newcomers and multigenerational residents both noted utilization of natural resources, though newcomers also extended their focus to tending the environment and connecting with nature. This result was similar to Strong and Jacobson's (2005) findings that environmental benefits were important to those interested in specialty forest products. While multigenerational residents may also share concern for nature beyond what can be extracted, they may be less likely to express those perspectives in their actions (Jones et al. 2003). This does not necessarily mean that multigenerational residents are not good stewards of the land (Law and McSweeney 2013). Rather, newcomers may be more vocal about a diversified focus that includes environmental stewardship, sustainability, and connections to nature with financial opportunities.

Similar to findings published by Barbieri and Valdivia (2010) and Strong and Jacobson (2005), lifestyle was a common driver for harvesters of forest food and medicine. Notwithstanding subtle differences, lifestyle preferences were related to the nature of the work and embodied Appalachia's rural character. As Jones et al. (2003) and Leebrick (2015) pointed out, newcomers are attracted to rural Appalachia because of the lifestyle, but our findings also indicated that multigenerational residents appreciated the lifestyle in the region. Interestingly, the presence of learning and creativity as a motivating factor suggested that the complexity associated with forest food and medicine was actually a draw to some. The slightly greater proportion of multigenerational residents who referenced learning and creativity countered the stereotype that often ties these aspirations to newcomers out-

migrating from population centers. Personal fulfillment was rarely mentioned by multigenerational participants, which may suggest that these products were so ingrained in their lifestyle and culture that intrinsic motivators became less of a factor. On the other hand, newcomers may have found more personal fulfillment in a practice that was relatively new to them.

While our findings suggest that motivations related to income, nature, and personal preferences played a more substantial role than social factors, it does not necessarily mean that social factors are irrelevant (e.g., Rule et al. 2000; Flora et al. 2016, Bukowski and Munsell 2018). The slightly greater frequency that multigenerational residents mentioned social factors aligned with the tradition of harvesting among family and/or friends or of harvesting individually but being tied to a larger community of practice (Hufford 2003). Further, study participants noted that group interaction and networking around issues of Appalachian forest food and medicine gave them new ideas and spurred interest, which suggested community engagement can provide a springboard for action. Likewise, Trozzo et al. (2014a) found that social influences were an important factor that affected peoples' interest in agroforestry, which includes forest food and medicine species in production systems.

#### *Plant Species Harvested*

The attention on medicinal forest species among participants was likely influenced by the market focus of many, as well as the extensive role medicinal species play in the Appalachian NTFP industry (Chamberlain et al. 1998). Medicinal species mentioned most often—ginseng (*Panax quinquefolius*) and goldenseal (*Hydrastis canadensis*)—were also those with greatest profitability in the market (Burkhart and Jacobson 2009). Multigenerational residents more frequently mentioned them, which may have reflected their general interest in personal income-oriented uses and/or the embeddedness of these species in

Appalachian culture, including the tradition of wild harvesting medicinal plants like ginseng for supplementary income (Davis and Persons 2014). Their focus on products beyond herbaceous plants, such as barks, leaves, and buds, perhaps also demonstrates that familial and community traditions instilled in them local ecological knowledge that newcomers do not have (Emery 2001).

Multigenerational residents and newcomers shared a common interest in mushrooms, indicating a convergence of local traditions and newer perspectives. Newcomers focused more on nuts and fruits, possibly due to the popularity of foraging in developed areas (Robbins et al. 2008). Multigenerational residents may not have associated fruits as forest food and medicine since many forest trees only fruit with at least partial sun (e.g., forest edges or gaps). However, edible plants being less prevalent among them was unexpected because of the cultural history associated with species such as ramps (Davis and Persons 2014; Rivers et al. 2014). There is a chance they may not have mentioned these species because it was so common to them and/or because they responded with market products in mind. Either way, this suggests that newcomers may also be adopting regional cultural traditions around forest food and medicine. Finally, only multigenerational residents referenced maple syrup, perhaps due to their knowledge of potential sugar bushes and historical uses at smaller scales.

#### *Home Use Versus Market Sales*

Market sales and home use were both mentioned as fates for harvested forest food and medicine products. Home use was secondary, however, it is likely more extensive than our findings suggest because of the predisposition of many of the participants toward market sales. Either way, it still received a great deal of attention, which points to ‘diverse economies’ playing an important role in livelihoods and environmental stewardship despite often being marginalized relative to the market system (Gibson-Graham 2008). While

multigenerational residents focused more on market sales than home use, this finding may be skewed due to the lack of women among the multigenerational residents interviewed.

Newcomers' balance between market sales and home use suggested a group with mixed interests and perhaps a readied willingness to participate in other economies (e.g., Gibson-Graham 2008). Such non-economic leanings could signal the evolution of a contemporary forest food and medicine practice that includes the provision of edible forest species and a broad, inclusive perspective on foraging.

### **3.7 Conclusion**

Regional history combined with shifts in local demographics have influenced the contemporary state of Appalachia's forest food and medicine culture. The increasing number of people who have moved to the region paired with those that have out-migrated in search of economic opportunity is part of the current social backdrop influencing harvest. Shared motivations between multigenerational residents and newcomers—of personal income, community support, lifestyle and utilizing natural resources—offer a starting point for programs that address the needs of both multigenerational and newcomer harvesters. Opportunities are also ripe for regional programs that promote both market sales and home use. While medicinal species may be a dominant focus in the consciousness of communities, cultural change and a new period of homesteading combined with market sales of a variety of forest foods and medicines is well underway. As they navigate community and regional change, residents are collectively shaping the next legacy of forest food and medicine, one that can be respectful of the past, but responsive to evolving socioeconomic and environmental development goals.

Additional research is needed to understand the nature of forest food and medicine harvests in modern-day Appalachia and ways of supporting this practice to benefit both the people and the land. It will be important to further explore the extent of home uses compared

to market sales of forest food and medicine and more closely consider the gendered nature of these two distinct economies. Also important is learning more about sustainable harvesting approaches, such as forest farming, to help improve stewardship of edible and medicinal forest species. Understanding the obstacles Appalachian communities face when developing forest food and medicine opportunities is similarly critical, along with a clear sense of the resources and strategies needed to overcome them.

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## **CHAPTER 4: DEVELOPMENT OF NTFP LIVELIHOODS IN APPALACHIA**

### **4.1 Abstract**

Non-timber forest products have potential to serve as a livelihood opportunity in Appalachia in ways that also help conserve forest habitat and NTFP species. However, little is known about the ways in which communities may approach NTFP development. We conducted interviews of 16 producers, harvesters, and stakeholders in Grayson County, Virginia as part of a 3-year project to understand perceived assets, obstacles, and strategies for NTFP livelihood development. We used the community capitals framework to analyze our data and found references to natural, human, and cultural capital as both assets and obstacles. Financial capital was also one of the top obstacles whereas social capital was one of the top assets. Built and political capital received less attention as obstacles, assets, and strategies. References to strategies for NTFP livelihood development focused on social, human, and financial capital investments. Ultimately, communities in Appalachia may find success in drawing upon the cultural, natural, and human capital around NTFPs as well as the strong social and human capital often present in rural communities to further invest in social networking, education, financial incentives, and funding to support NTFP livelihood development.

### **4.2 Introduction**

Appalachia is known for its mountains, forests, beauty, and culture, but also for its natural resource extraction, lack of livelihood opportunities, poverty, and out migration of youth (Boettner et al. 2014a; Boettner et al. 2014b; Pollard and Jacobson 2015). Like other rural and urban areas, shifts in the global economy have left their mark (Anglin 2007; Flora and Flora 2008). Few manufacturing and coal jobs remain and tobacco no longer covers the hillsides and bottomlands as a cash crop (Anglin 2007; Stull 2009). Rural communities in Appalachia have an opportunity to navigate this new context through innovative approaches

that build livelihood opportunities which capitalize on and protect existing resources (Flora and Flora 2008).

Non-timber forest products (NTFPs) are one existing economic resource upon which to build livelihood opportunities (Greene et al. 2000; Leakey et al. 2005; Ros-Tonen and Wiersum 2005). NTFP is a common catchall acronym for any product other than timber that comes from the forest (Chamberlain et al. 2009). NTFP plants, vines, mushrooms and tree fruits, nuts and syrup grow wild in the forests of Appalachia (Greene et al. 2000), and well-known examples include black walnuts, ramps, elderberries, pawpaws, maple syrup, morel mushrooms, ginseng, black cohosh, galax, and grapevine. Appalachia is one of the most biodiverse ecoregions in North America (Ricketts et al. 1999) with a majority of the land in forest (Loveland and Acevedo 2016), which offers ample habitat for NTFPs.

The region also has a long history and culture of wild harvesting NTFPs (Hufford 2003). Generations of Appalachians have walked the hills to harvest these species for extra income. Wild harvesters usually sell to local or regional dealers who then aggregate and sell to commercial buyers (Greene et al. 2000; Kruger 2018). Over 25 medicinal NTFPs of the region commonly are traded and even more are sold for crafts and foods (Greene et al. 2000). Overall, Appalachian NTFPs feed into multi-million dollar industries that for the most part rely on wild harvested sources (Chamberlain et al. 1998). Expansion of this industry raises concerns about the sustainability of many NTFP plant populations sourced through informal modes of wild harvesting (Vaughan et al. 2013). Many of the most valuable herbs grow slowly in the forest understory and over time harvest has led to population decline of a number of species (McGraw 2001; Case et al. 2007). Ginseng is a prime example where concern about plant population sustainability led the federal government to list and regulate it as an endangered plant (Burkhart et al. 2012).

Forest Farming is the cultivation or stewardship of NTFPs in a forested setting and offers a way to establish, maintain, or improve NTFP species populations over time (Ros-Tonen and Wiersum 2005; Chamberlain et al. 2009). It is one of the six common temperate agroforestry practices. Agroforestry focuses on integrating agriculture and forestry by bringing trees into agricultural production systems and growing understory crops in existing forests (Gold and Garrett 2009). Agroforestry is defined as an “intensive land-use management that optimizes the benefits (physical, biological, ecological, economic, social) from biophysical interactions created when trees and/or shrubs are deliberately combined with crops and/or livestock” (Gold and Garrett 2009, p.46). Agroforestry practices merge production and conservation into a single system that meets both human and environmental needs (Trozzo et al. 2014a).

NTFPs from agroforestry and other systems have been promoted internationally as an alternative production opportunity that can help support sustainable rural livelihoods (Garrity 2004; Ros-Tonen and Wiersum 2005; Chakravarty et al. 2015). Sustainable livelihoods are “the ability to maintain and improve livelihoods while maintaining or enhancing the local and global assets and capabilities on which livelihoods depend” (Chambers and Conway 1992, p.6). NTFPs have long played a role in informal markets and cultural activities in Appalachia, but dedicated landscape-level efforts to leverage markets and local uses to build sustainable livelihoods either through forest farming or traceability of wild-harvesting have not been common. There are a number of obstacles that likely are the cause including lack of information about cultivation, stewardship, processing, and marketing, which can increase risk perceptions among potential producers (Rule et al. 2000; Gold et al. 2004; Trozzo et al. 2014; Chakravarty et al. 2015). Further, beyond a few select species mainstream NTFP industries often lack economic capacity to buy raw materials at a price that supports profitable cultivation (Burkhart and Jacobson 2009). Overall, there is great complexity and

diversity in the path to NTFP livelihoods, which will require equally diverse and complex social systems to overcome associated obstacles (Sanchez 1995; Rule et al. 2000; Flora and Flora 2008).

Our empirical case study focuses on understanding how communities can develop NTFP livelihoods in contemporary Appalachia. It uses the community capitals framework as a theoretical lens to explore stakeholder perceptions in a Southwest Virginia Appalachian community about the assets, obstacles, and strategies tied to developing NTFP livelihoods. We wanted to know what community resources are available for developing NTFP livelihoods in Appalachia? What obstacles stand in the way? And what strategies are necessary to utilize assets and overcome barriers for NTFP livelihood opportunities? Our literature review covers the community capitals framework, giving examples of how it has been used in other studies and describing each capital with examples of their relevance within Appalachia and the NTFP industry. Our methods follow this section outlining the research context and our process for conducting interviews with study participants to gather rich qualitative perspectives. We found that participant perceptions of community assets, obstacles, and strategies for NTFP livelihood development include a variety of capital themes, which lay the groundwork for discussing NTFP livelihood development in communities in Appalachia and beyond.

#### **4.3 Literature Review**

Community can be conceptualized as a location, a social system, or a common identity. In the case of NTFP livelihoods, community can fit within all three of these conceptualizations with many harvesters and producers identifying with their practice (e.g., wildcrafter, forest farmer). These harvesters and producers also form a social system wherein people have organized around crop production, uses, and sales. Lastly, the people involved in

NTEP markets and cultural practices often are tied to a specific harvest or production location.

Community development is what people do to improve their local quality of life (Flora and Flora 2008). It focuses on long-term betterment rather than singular economic growth (Green and Haines 2012). Resources provide a basis for community development. Communities can consume, store, or invest their resources and resources are capital when used to produce more or other resources (Rule et al., 2000; Green and Haines, 2012). Communities may need different capital investments as they progress in the development process (Fey et al. 2008; Flora and Flora 2008). All communities, regardless of their condition, have resources which they can use as capital (Flora and Flora 2008; Gutierrez-Montes 2009).

The community capitals framework offers an analytical tool to help communities identify and recombine their resources for community development (Flora and Flora 2008). Researchers have applied it in diverse fields and even conceptualized it within an agroforestry context (Rule et al. 2000; Flora and Flora 2008; Munsell et al. 2018). The framework includes seven forms of capital: human, social, financial, political, cultural, natural, and social. While sustainable livelihoods often draw upon five capitals in particular (natural, social, human, built, and financial capital) (Flora and Flora 2008), political and cultural capital are additions that increasingly are used in rural working lands research (e.g., Munsell et al. 2018).

Natural capital refers to assets and natural resources of a particular location such as weather, geographic isolation, and natural beauty, flora, fauna, biodiversity, water, land, and air (Emery and Flora 2006; Green and Haines 2012). Natural capital provides the foundation of all other capitals (Flora and Flora 2008) and can provide ecological function such as flood

control, water catchment, and wildlife habitat. Natural capital also can be leveraged for direct use or market outputs (NTFPs, timber, agricultural crops, etc.) (Green and Haines 2012). However, it can be spent down through natural resource extraction, which can have negative effects on human, social, built, and financial capital (Rule et al. 2000; Flora and Flora 2008). For example, in Appalachia, habitat and species loss, water and air pollution, and loss of entire mountains have destabilized communities (York 2016).

Cultural capital refers to how people know the world around them and defines what they see as problematic and changeable. It gives a sense of identity and reveals itself in traditions and language (Emery and Flora 2006; Flora and Flora 2008). “Cultural capital influences what voices are heard and listened to, which voices have influence in what areas, and how creativity, innovation, and influence emerge and are nurtured” (Emery and Flora 2006, p.21). It is essentially worldviews that parents pass down to their children about how society works (Flora and Flora 2008). Wild crafting (also called wild harvesting) NTFPs for side income is part of the cultural fabric in Appalachia passed down from early settlers (Hufford 2003; Davis and Persons 2014). Cultural capital in Appalachia related to NTFPs is influenced by the shift in the social fabric in Appalachia with many multigenerational residents leaving the area in search of economic opportunities at the same times as newcomers in-migrating in search of the amenities of the region (Obermiller and Howe 2013; Pollard and Jacobson 2015; Leebrick 2015). Trozzo et al. (2019) found these two groups viewed working with forest food and medicine species (NTFPs) differently, where newcomers were more likely to balance monetary, environmental, and lifestyle motivations, and multigenerational focused more on financial motivations and to a lesser degree lifestyle. However, Trozzo et al. (2019 in prep) found that no matter the motivation, newcomers and long-time residents, as well as absentee and vacationers increasingly are interested in forest farming NTFPs in Appalachia.

Human capital refers to the capacities or experiences of individuals such as education, background, job skills, creativity, health, interpersonal skills, leadership capacity, and talents (Rule et al. 2000; Flora and Flora 2008; Green and Haines 2012). Human capital helps build other resources for community change (Emery and Flora 2006, p. 21). Many multigenerational resident wild crafters have a significant base of knowledge about NTFPs acquired through years of harvest and observation (Emery 2001). However, much of this knowledge is being lost as youth are leaving their rural Appalachian communities (Heinemann and Hadler 2015). At the same time, newcomers bring with them skills, education, and experience acquired elsewhere and many are retired, giving them time to contribute to community or entrepreneurial efforts (Trozzo et al. 2019 in prep; Trozzo et al. 2019).

Political capital refers to organizational or group access to decision-making, power, voice, and reputation (Green and Haines 2012). Power drives political capital (Flora and Flora 2008). Community power is “the ability to affect the distribution of both public and private resources within the community” (Floral and Flora 2008 p.145). Communities can transform political capital into “built capital, social capital, cultural capital, and financial capital” (Flora and Flora 2008 p.167). Yet in many rural communities, the old guard often are project stoppers (Floral and Flora 2008). Further, absentee landownership and transition of land to newcomers impact land access for wild crafters to harvest NTFPs (Ginger et al. 2012).

Financial capital is defined as “the financial resources available to invest in community capacity-building, to underwrite the development of businesses, to support civic and social entrepreneurship, and to accumulate wealth for future community development” (Emery and Flora 2006, p.21). It is use of money for investment rather than consumption. Investment happens when a community uses purchases or financial instruments to build

additional value and can include stocks, bonds, derivatives, market future, and letters of credit (Flora and Flora 2008). Many Appalachian communities struggle with poverty and lack of financial resources for development (Schumann 2016). When communities do not have financial capital within they often look for investments at the state or federal level to fund community development strategies (Flora and Flora 2008). The growing base of newcomers to the region may also provide possibilities for community-based funding or at least the ability for these residents to pursue entrepreneurship on their own (Leebrick 2015).

Built or physical capital provides the infrastructure that supports all the other capitals and activities in a community (Emery and Flora 2006; Flora and Flora 2008). Built capital is the infrastructure resources including roads, houses, processing centers, and farm equipment. (Green and Haines 2012). An example of built capital in rural communities is local food hubs, which provides aggregation, shared processing, warehousing, coordinated distribution, and wholesale and retail sales to small- and medium-scale farmers (Horst et al. 2011). A number of shared use kitchens also have emerged to support the local and regional food systems (Tarasuk and Reynolds 1999). Scaling up production of NTFPs may require similar mechanisms for cleaning, drying, and further processing the harvest.

Social capital is defined as "features of social organization, such as trust, norms, and networks" that facilitate collective action (Putnam 1993, p. 167). It resides in relationships among people and acts as the glue that holds society together (Putnam 1993; Coleman 1988). Social capital is strongly linked with innovation and development of sustainable rural livelihoods (Warner et al. 1999; Pretty and Ward 2001; Westlund and Bolton 2003; Torri and Herrmann 2011; Green and Haines 2012). While many communities focus on built and financial capital, social capital has been found to spur a "spiraling up" process and, therefore, provides a critical entry point for increasing other capitals and creating community change (Emery and Flora 2006). Holtkamp and Weaver (2018) describe how a community in central

Appalachia used social capital to build economic opportunities through locally driven community development strategies. Increased social capital can decrease transaction costs and perceived barriers to adopting agroforestry practices and make communities more likely to display the innovation and collective action for economic success (Putnam 1993; Rule et al. 2000; Pretty and Ward 2001; Westlund and Bolton 2003).

Collective action is an action that requires two or more people to coordinate efforts (Sandler 1992; Putnam 1993; Ostrom 2000; Schmid 2000; Krishna 2004). It can build new social capital by forging networks, mobilizing resources, and building new organizational forms (Sturtevant 2006). Collective action is defined as "action taken by a group in pursuit of members' perceived shared interests" (Marshall 1998, p. 200) and is well-studied within a natural resource management context (McCarthy et al. 2000; Meinzen-Dick et al. 2004; Lubell and Fulton 2007). A number have explored it in relation to commercialization of underutilized species such as NTFPs (Meinzen-Dick et al. 2004; Devaux et al. 2009; Gruère et al. 2009; Hellin et al. 2009; Kruijssen et al. 2009; Markelova et al. 2009). Underutilized products that often start off with low market demand require collective actions such as "pooling resources, realizing scale economies, sharing information, and developing a community-based incentive structure" to create robust markets (Gruère et al. 2009, p. 44). Collective action can feed into smallholder market chain innovation and access (Devaux et al. 2009; Markelova et al. 2009). However, it cannot overcome insufficient market potential, therefore, choosing products with sufficient market demand becomes an important task to foster collective action (Gruère et al. 2009; Cernusca et al. 2012).

Two commonly referenced types of social capital exist. Bonding social capital refers to close ties that promote group cohesion. Bridging social capital refers to loose ties that connect different individuals, groups, organizations, and communities (Emery and Flora 2006; Green and Haines 2012). Communities that are more successful at collective action have both

bonding and bridging capital (Agnitsch et al. 2006). Therefore, networking inside and outside the community and fostering collective action offer key strategies for building social capital (Flora et al. 1997; Warner et al. 1999; Green and Haines 2012; Flora and Flora 2008).

The seven capitals interconnect and can enhance or detract from one another (Flora and Flora 2008). When one capital declines, others can follow suit (Gutiérrez-Montes 2005). Communities can strategically reverse a downward spiral by increasing stocks (assets within a capital), flows (when one capital is invested into another), and investment of capital (Emery and Flora 2008). This "spiraling up" refers to the process when "assets gained increase the likelihood that other assets will also be gained" (p. 22). Asset mapping offers an approach to guide communities to their own "spiraling up" strategy. Beyond discovering assets, it must include strategies to recombine assets to address an issue (Flora and Flora 2008).

The community capitals framework has been applied in agroforestry adoption and retention research. Rule et al. (2000) organized barriers to adoption of agroforestry practices using the community capitals framework including lack of experience among farmers (human capital), risk and complexity perceptions (human and cultural capital), limited accessibility to information (social capital), and lack of financial resources and longer term investments (financial capital). Munsell et al. (2018) used the community capitals framework to understand the impact of agroforestry practices in a post-adoption study in Cameroon. The authors found that increases in natural capital and financial capital were primary products of agroforestry adoption, whereas political and cultural capitals were less affected by associated practices.

NTFPs are extensively studied in relationship with sustainable rural livelihoods internationally (Garrity 2004; Ros-Tonen and Wiersum 2005; Chakravarty et al. 2015), but only a few studies focus on NTFP livelihoods in the United States (Emery and Pierce, 2005;

Shackleton and Shackleton, 2004) and there is a noticeable lack of studies conducted in Appalachia, a hotbed of NTFP production. Using the community capitals framework (following Fey et al. 2006), this study focused on mapping the context and pre-existing conditions and structures (assets and obstacles) to build upon by developing a sustainable livelihoods NTFPs strategy.

#### 4.4 Methods

##### *Research Context*

This study took place as part of a community-based research project in Grayson County, Virginia, which is situated along Virginia's border with North Carolina in the Blue

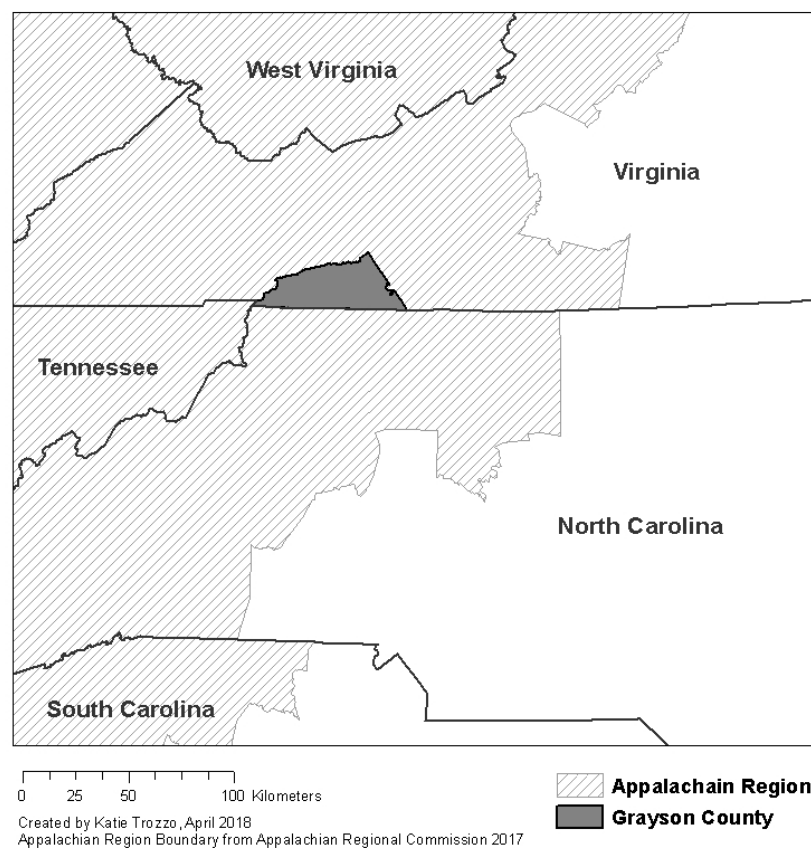


Figure 4.1 This qualitative case study took place in Grayson County, Virginia located in the Blue Ridge region of the South-central Appalachian mountain region. The hashed area represents the physiographic Appalachian Region. States are annotated and Grayson County is solid grey.

Ridge region of the South-Central Appalachian Mountains (Figure 4.1). Like many Appalachian communities, Grayson County has limited employment opportunities following the boom and bust of the timber industry in first half of the 1900s and the rise and fall of manufacturing in the second half of the century (Maynard and Holton 2013). The population declined from 17,917 in 2000 to 15,533 in 2010 due to combination of death among an aging population and the out-migration of youth (US Census Bureau 2010; Maynard and Holton 2013). Residents either travel outside the county for work, compete for limited jobs, or face unemployment (Maynard and Holton 2013). Farm and forestland make up almost the entire land base in the County and are almost evenly split, with farming and forestry each bringing in over \$2 million to the local economy. Primary farming crops include dairy and beef cattle, hay, and Christmas trees, and secondary crops include tobacco, cabbage, pumpkins, berries, fruit, and vineyards. Grayson differs from counties in the Alleghany Plateau region of Southwest Virginia because it is not subject to coal mining (Virginia Department of Mines, Minerals, and Energy 2015), and while it is at risk of being economically distressed according to the Appalachian Regional Commission (2018) for fiscal year 2019, it is not among the four distressed counties in Appalachia Virginia. Local food initiatives have emerged over the last ten years in Grayson, and include a successful farmers market in Independence, the county seat. Further, NTFPs are included as part of the counties strategic plan (Maynard and Holton 2013).

A local foundation funded this research to explore NTFP livelihood possibilities in the county and the community-based approach included organizing and involving community members in this discovery through a growers group called The Blue Ridge Woodland Growers (BRWG). Between 2014 and 2017, over 100 local stakeholders participated in this group through meetings, workshops, projects and research (Table 4.1). Participants included farmers, retirees and representatives of local non-profit organizations, county government and

state agencies. The majority resided in Grayson County, though a number of people joined from surrounding counties in Virginia (Wythe, Carroll, and Floyd) and North Carolina (Alleghany and Ashe).

Table 4.1 Timeline of meetings, workshops, projects and qualitative research conducted in Grayson County, Virginia between 2014 and 2017. These data provided the context and groundwork for our study of assets, obstacles, and strategies for NTFP livelihoods in the County. Activities were conducted by a group of individuals from Grayson County during community-based research focused on NTFP production and livelihoods. The group called themselves the Blue Ridge Woodland Growers (BRWG's).

| 2014                                                                                            |
|-------------------------------------------------------------------------------------------------|
| MEETINGS                                                                                        |
| January 20, NTFP interest meeting                                                               |
| March 15, NTFP growers meeting (general)                                                        |
| April 6, NTFP growers meeting (Lily of the valley production)                                   |
| June 4, NTFP growers meeting (general)                                                          |
| WORKSHOPS                                                                                       |
| February 25, Hybrid hazelnut orchard tour (5 participants)                                      |
| April 21, Growing woodland herbs (29 participants)                                              |
| June 10, Using the web soil survey (4 participants)                                             |
| June 11, Growing hybrid hazelnuts (22 participants)                                             |
| July 11, Growing ginseng and goldenseal (46 participants)                                       |
| PROJECTS                                                                                        |
| June, 15 Sixteen site visits with a forest service researcher to assess land for NTFP potential |
| April 6, Lily of the valley pilot project (8 participants planted 340 starts)                   |
| Fall, Ginseng (3.8 lbs of seed) and goldenseal (8.5 lbs of rootlets) planted                    |
| Sept 4-5, Hybrid hazelnut harvest (15bs harvested)                                              |
| Fall, Autumn olive Southwest VA regional harvest (37,000 lbs processed in hub in Grayson)       |
| 2015                                                                                            |
| MEETINGS                                                                                        |
| October 5, BRWG meeting (general)                                                               |
| December 7, BRWG meeting (general)                                                              |
| WORKSHOPS                                                                                       |
| April 13-14, Elderberry workshop (27 participants) and field tour (13 participants)             |

|                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROJECTS                                                                                                                                                        |
| Spring, 4 acres of elderberries planted; 3 acres of brambles planted                                                                                            |
| RESEARCH                                                                                                                                                        |
| June 25, Research proposal presented to community for feedback (11 participants)                                                                                |
| November 17, Community research advisory committee created                                                                                                      |
| 2016                                                                                                                                                            |
| MEETINGS                                                                                                                                                        |
| March 7, BRWG meeting (Forest botanical focus)                                                                                                                  |
| WORKSHOPS                                                                                                                                                       |
| February 1, Regional herb buyer presented about NTFP production (30 participants)                                                                               |
| May 16, Community food forests (22 participants)                                                                                                                |
| August 5-7, From the forest floor to the shelf: A 3-day forest farming conference (58 growers)                                                                  |
| PROJECTS                                                                                                                                                        |
| August 4, Technical expert and Forest Grown Verification representatives visited to assist growers in certification of their forest botanical plots (2 growers) |
| Fall, Black cohosh forest grown verified and organic certified pilot sale (2 growers, 55 lbs)                                                                   |
| Fall, Autumn olive harvest with youth (18 participants)                                                                                                         |
| RESEARCH                                                                                                                                                        |
| Spring, Conducted 16 interviews with community members in Grayson County                                                                                        |
| 2017                                                                                                                                                            |
| PROJECTS                                                                                                                                                        |
| Fall, Forest grown verified and organic certified black cohosh sale (1 grower, 100 lbs)                                                                         |

Table 4.2 Blue Ridge Woodland Growers vision, mission, and goals developed through a participatory process over 3 meetings (Oct 5, Dec 7, and Dec 23) in 2015 as part of community-based research focused on NTFP development in Grayson County, Virginia.

| VISION                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A strong local and regional network connects and supports growers, processors, buyers, and consumers of products from our fields and forests.                                                                        |
| MISSION                                                                                                                                                                                                              |
| Developing connections between growers, processors, buyers, and consumers in our community and region while sharing and learning skills important for successful entrepreneurship around non-timber forest products. |
| GOALS                                                                                                                                                                                                                |
| Learn                                                                                                                                                                                                                |
| Exchange and share skills and knowledge with one another.                                                                                                                                                            |
| Organize workshops to learn important skills related to growing, processing, and using NTFPs.                                                                                                                        |
| Conduct pilot projects to test potential products and the steps required to grow, process, and get to market.                                                                                                        |
| Organically form innovation circles to figure out ways to proceed through barriers we encounter.                                                                                                                     |
| Preserve and rebuild our local knowledge about these products and showcase historical contributions.                                                                                                                 |
| Join Forces                                                                                                                                                                                                          |
| Coordinate bulk purchases of planting stock.                                                                                                                                                                         |
| Make, acquire, and share specialized equipment to grow, process, and use NTFPs.                                                                                                                                      |
| Aggregate our products for processing and sales.                                                                                                                                                                     |
| Make Connections                                                                                                                                                                                                     |
| Build relationships with potential buyers through meetings and field visits.                                                                                                                                         |
| Collaborate with other local organizations and regional groups with interest in NTFPs to strengthen our network.                                                                                                     |

The primary researcher began organizing around NTFP livelihoods by hosting four of meetings in 2014 to identify NTFPs of interest. One thing noted early was that most people owned underutilized woodlands. As part of the project, an NTFP technician and the lead author/organizer visited 16 sites in the summer of 2014 to determine which NTFPs were available in the county among those interested in participating. Workshops and pilot projects (harvests and plantings) also were conducted to better understand possible production opportunities, including hybrid hazelnuts, autumn olives, and forest botanicals such as lily of the valley, ginseng, and goldenseal.

In 2015, meetings focused on organizational purpose and included drafting a vision, mission, and goals for the newly named group, BRWG (Table 4.2). The group aimed to focus on learning, joining forces, and making connections as primary goals for NTFP development in the community. A workshop was held on elderberry production, and two farms planted elderberries and one of the participating farms additionally planted brambles. We also drafted a research plan to help understand how to move forward with NTFPs in the community and held a session to receive feedback from the community, as well as created a community research advisory board to provide feedback during the research process.

Meetings slowed in 2016 and activities became focused on black cohosh as a key NTFP identified by the community. A 3-day forest farming training focused on production and marketing of forest botanicals occurred in collaboration with a multi-state regional collaboration called the Appalachian Beginning Forest Farmer Coalition (ABFFC). Through this training, participants of the BRWG were able to connect to experts in the field of forest botanicals and learn key skills in sustainable harvest, forest management, processing, and marketing. Collaboration with the ABFFC also allowed BRWG to host a university expert as well as forest farming certifiers.

Two growers' black cohosh stands were certified Organic and verified forest grown during the visit in preparation for harvests of black cohosh that fall. As a pilot project for both the county and for the forest grown verification program, the two growers harvested 55 lbs of black cohosh from stands they were stewarding. The forest grown verification and organic certification helped dramatically boost the price point for their raw material given it could be differentiated from wild harvested.

The forest farmer participants documented processes and costs related to harvest, replanting buds, washing, and drying raw material to help inform price points for future sales. They shared their results with Appalachian Sustainable Development (ASD) who used the information to develop their herb hub program in Duffield, Virginia and enroll a hand full of forest farmers in production within the forest grown verification and organic certification programs the year following.

#### *Data Collection*

We conducted semi-structured in-person one on one interviews with 16 individuals between March and October of 2016. Interviewees included Grayson County, Virginia residents involved with or interested in NTFPs, many of whom were involved in NTFP activities the two years leading up to the interviews. Therefore, interviewees were key players in creating NTFP livelihood opportunities in the community and had direct experience that informed their perspectives. Interviews focused on perceptions of community assets, obstacles, and strategies for creating NTFP livelihoods (Table 4.3). We defined NTFPs as any medicinal or edible product harvested from trees or forested ecosystems. We selected interviewees from a pool of people who were involved in the BRWG, along with referrals from those participants regarding key people outside the group to interview. We attempted purposeful selection from this pool to maximize diversity, but the sample was ultimately limited in gender and resident type variation because of the nature of those drawn to NTFPs.

Table 4.3 Focal topics and interview questions asked of 16 key informants in Grayson County, Virginia who are involved with development of NTFP livelihoods.

| Topic                | Interview Question                                                                          |
|----------------------|---------------------------------------------------------------------------------------------|
| Community Assets     | What characteristics and resources do you think Grayson has going for it to develop NTFPs?  |
| Community Obstacles  | If these resources are leveraged, what things do you think may stand in the way of success? |
| Community Strategies | What do you think are important steps for getting around these obstacles?                   |

Interviewees included people who had experience harvesting or growing NTFPs, as well as stakeholders, those who supported self-provisioning and commerce of these species in the community. We included stakeholders because they can influence and support the culture of NTFP harvesting through educational programming, technical advice, and networking. Their perspectives from playing this role can provide a broader understanding of the current state of NTFP livelihood opportunities in the community.

We developed an interview protocol that provided participants with a brief overview of the project and requested signed consent (Rubin and Rubin 2005; Appendix C, D). The interview protocol and questions were approved by the Virginia Tech Institutional Review Board (IRB# 16-005) prior to conducting the study (Appendix A,B). We designed interview questions to address development possibilities for NTFP livelihood opportunities by asking about participant perceptions of assets, obstacles, and strategies (Table 4.3; Appendix E). All questions were asked of each participant with similar phrasing and order, but were purposefully open-ended to allow respondents to engage and drive data discovery. Interviews lasted between 45 and 90 minutes.

Interviews were recorded and later transcribed and analyzed using the qualitative data analysis software NVIVO 12 QSR International ® Australia. Our coding method followed Saldanas (2013), where structural coding was used to organize raw data based on the

predetermined line of questioning. Descriptive coding was then used to attribute a first cycle of codes to the structurally adjusted data. Second cycle analysis using code mapping and pattern coding was then used to organize codes first into categories following the community capitals framework and then into central concepts and themes. We tracked community capitals categories for each question by recording counts among participants who referenced them and the percent of references each received of the total references in its corresponding topic.

We also analyzed attribute data for each participant to describe who was involved in the study. These variables included age, gender, resident type (newcomer vs. multi-generational resident), and their role related to NTFPs (producer vs. community stakeholder). We classified a participant as a ‘newcomer’ if they or their parents moved to the area during or after the first wave of in-migration to rural areas in the 1970s. ‘Multi-generational residents’ were those whose families were residents of the area before the 1970s and who either lived there all their lives, or grew up there and moved back. The 1970s is a common cutoff used for distinguishing newcomers and longtime residents, and consistently provides a clear distinction between the two groups (after Blahna 1990; Qin 2016). The 1970s cutoff is especially relevant to our study area because of a significant demographic shift that occurred during that time and into the 1980s due to a failed dam project that left over 14,500 acres of land for purchase in the county. This available land base drew many newcomers to the area during that era (Maynard and Holton 2013).

Sixteen residents of Grayson County participated in this study (Table 4.4). Eleven self-identified as male and five self-identified as female. Four participants were between 30 and 50 years old (25%), eight were between 50 and 70 years old (50%), and four were over 70 years old (25%). Ten participants were newcomers to the area and six were

Table 4.4 Demographics and characteristics of study participants in a qualitative case study of assets, obstacles, and strategies for NTFP livelihood opportunities in Grayson County, Virginia.

| Variable                    | All Participants (n=16) |
|-----------------------------|-------------------------|
| <b>GENDER</b>               |                         |
| Female                      | 5                       |
| Male                        | 11                      |
| <b>AGE</b>                  |                         |
| 30-50 years old             | 4                       |
| 50-70 years old             | 8                       |
| Over 70 years old           | 4                       |
| <b>RESIDENCY</b>            |                         |
| Newcomers                   | 10                      |
| Multigenerational Residents | 6                       |
| <b>INVOLVEMENT</b>          |                         |
| Producer                    | 14                      |
| Community Stakeholder       | 2                       |

multigenerational residents. Fourteen were producers (active growers, harvesters, or people with past experience) and two were community stakeholders.

#### 4.5 Results

Community assets were referenced 164 times by 16 interview participants (Table 4.5). Mention of natural capital as an asset made up 34% of asset references; cultural capital = 20%; human capital = 17%; social capital = 15%; political capital = 7%; financial capital = 5%; and built capital = 3%. Community obstacles were referenced 237 times by 16 interview participants. Mention of natural capital as an obstacle made up 32% of obstacle references;

human capital = 22%; cultural capital = 15%; financial capital= 13%; social capital = 11%; political capital = 5%; and built capital = 3%. Community NTFP strategies were referenced 136 times by 16 interview participants. Social capital made up 29% of strategy references; human capital = 26%; financial capital= 25%; Natural capital=11%; political capital = 4%; cultural capital = 3%; and built capital = 2%.

### *Community Assets*

Mention of specific assets that fell under natural capital were land, natural diversity of NTFPs, climate, water, and soil. Many participants noted the vast amount of forestland in the county, with one participant stating “anyone who has any amount of land pretty much has some woods as part of their property.” A number of people also referenced the amount of open and forestland allowing “room to experiment in the landscape with various NTFPs.” Other things mentioned about the land included the large tracts of protected public lands and the affordability of land in Grayson compared to places like Western North Carolina. Participants also noted a number of characteristics that allow the region to have ample suitable habitat for NTFPs including the climate, the readily available water resources that are thought to remain even as the climate changes, and the quality of the soils. The diversity of plants and mushrooms in the region also was described as a major asset for NTFP livelihood development with numerous NTFPs already growing readily and naturally. One participant noted “we don’t even have to try to grow these plants.”

Assets referenced that fell under social capital included different forms of bonding and bridging social capital, as well as mention of collective interest, social networks, and the recent “harmonic convergence” in the county. Bonding capital included reference to the close-knit communities “that have been isolated since the beginning of time,” and the more recent connection of like-minded newcomers over the last decade. Bridging capital included

Table 4.5 Frequency of reference among 16 interview participants in Grayson County, Virginia to qualitative responses to assets, obstacles, and strategies for NTFP livelihood development. References and frequencies are grouped according to seven capital investments in the community capitals framework.

|           | ASSETS    | OBSTACLES | STRATEGIES |
|-----------|-----------|-----------|------------|
|           | n=16      | n=16      | n=16       |
| CAPITALS  | # ref=164 | # ref=237 | #ref=136   |
| NATURAL   |           |           |            |
| n         | 14        | 14        | 8          |
| # ref     | 55        | 75        | 15         |
| % ref     | 34%       | 32%       | 11%        |
| SOCIAL    |           |           |            |
| n         | 8         | 7         | 12         |
| # ref     | 24        | 25        | 40         |
| % ref     | 15%       | 11%       | 29%        |
| HUMAN     |           |           |            |
| n         | 12        | 13        | 11         |
| # ref     | 28        | 53        | 35         |
| % ref     | 17%       | 22%       | 26%        |
| CULTURAL  |           |           |            |
| n         | 10        | 10        | 2          |
| # ref     | 32        | 36        | 4          |
| % ref     | 20%       | 15%       | 3%         |
| POLITICAL |           |           |            |
| n         | 5         | 6         | 3          |
| # ref     | 11        | 11        | 5          |
| % ref     | 7%        | 5%        | 4%         |
| FINANCIAL |           |           |            |
| n         | 8         | 10        | 10         |
| # ref     | 9         | 30        | 34         |
| % ref     | 5%        | 13%       | 25%        |
| BUILT     |           |           |            |
| n         | 5         | 6         | 2          |
| # ref     | 5         | 7         | 3          |
| % ref     | 3%        | 3%        | 2%         |

reference to collaboration between smaller communities within the county for services and events around cultural NTFPs such as ramps (*Allium tricoccum*), collaboration among organizations developed by newcomers around common interests, and how NTFPs offer potential for newcomers and multigenerational residents to connect. Other bridging capital references pointed to external connections such as regional resources, national programs, and university and extension information. Participants also mentioned the assets of the “tremendous interest” collectively in NTFPs, new social networking that was connecting residents to new buyers and different pricing, and a “harmonic convergence” of people pursuing alternative livelihoods.

Assets referenced that fell under human capital included the local knowledge among multigenerational residents, newcomers bringing new energy to the community, and the base of people interested and committed to the pursuit of NTFP livelihoods. One multigenerational resident commented that they began festivals around NTFPs to raise money for local services because they “knew how to do it,” from being “brought up from kids on it.” One newcomer interviewee observed:

“My neighbors have lived in and as a part of this land for 200 years. By that I mean, they have acquired an intelligence that gets passed down from generation to generation.... I with a graduate degree, will never have the degree of intimacy with my own farm that he [my neighbor] had. He not only lived in [*sic on*] it, but [*sic as*] he grew up, his father and grandfather and others around him were sharing that accumulated knowledge.”

Participants also noted in migration of newcomers as an asset for NTFP livelihood production. Two multigenerational residents noted “we have had several outsiders move in their retirement years,” many of whom become involved in local NTFP traditions. Another

multigenerational resident noted that “a lot of people coming in are more forward thinking.” And another explained “we have got a lot of second home and retiree peoples living here” with “land that they are not using for other uses” and who “work part time or live off a retirement...so if they have the desire, they definitely have the time to engage in [NTFP] activities.” The amount of interested and committed people also was noted. One participant said “I see a great number of people here that are committed to this kind of a project,” they are “dedicated, smart people who actually are doers.”

Assets related to cultural capital included references to Grayson being an agricultural community with cultural history and familiarity around NTFPs and innovative and hardworking people. Multiple people mentioned Grayson county’s “strong history in agriculture” noting it is “a community that prides itself on agriculture...and working with your hands.” Several also explained that many of the “traditions have carried on as far as walking in the woods and hunting and gathering” and when you talk to people about “gathering things, or even cultivating things, in a forest setting, it is not foreign to them.” One multigenerational participant noted that there “are a lot of people now that think outside of the box.” And two other multigenerational harvesters described their process of innovation in taking a home scale NTFP operation to a commercial scale and noted “it is a lot of good hard work.”

References to political capital assets noted a local government that is friendly to business and local agriculture development. One participant explained “local government is very open to agricultural ideas because they see agriculture as being the primary income source here.” Another noted “it’s a very pro agriculture local government,” and someone else cited “the fact that they are taking the old sheriff’s department and making it into an agricultural resource building.”

References to financial capital assets discussed how newcomers are bringing financial capital into a traditionally agriculture-based economy and that NTFPs already have well established buyers, limited up front financial investment, and provide an opportunity for supplemental income. One multigenerational participant noted that “a lot of people from away from here have money.” And when explaining why they wanted to help establish a model for NTFP production, one newcomer expressed “we are in a position to where we don’t have to make it pay” and how they wanted to create something that could help others in the community who may benefit from working with NTFPs as a livelihood. Further, NTFPs already have “established markets” in the area and many already look to them as an “opportunity to make some extra money” noting how “it doesn’t require a lot of capital investment.” One participant expressed that NTFPs can be grown “without much input....other than time and labor and energy....” and laughed saying that actually it is better said as “not much purchased input.”

References to built capital assets pointed to existing farm infrastructure, access to shipping routes, and existing community infrastructure. One participant pointed out that “the mechanical infrastructure and know how” related to production of agricultural crops such as the “use of farm equipment” is present in the community “so that has got to put us at a little bit of an advantage from other areas.” Another noted that “we have got the two main thorough fairs 77 and 81 [that are] pretty powerful for shipping.” Others noted how smaller communities within the county have their own community centers, some of which are already used in hosting festivals around NTFPs such as ramps and maple syrup. Further, a newly formed county agricultural center has opened with community meeting and office spaces, a “learning lab, a commercial kitchen, and youth spaces.”

## *Community Obstacles*

References to obstacles related to natural capital included production issues, poaching, sustainable harvest, and land access. Production issues mentioned included crop mortality, disease, damage from pests and deer browse, invasive species, and the need to rotate growing locations for forest botanicals, and the impact of weather. The long timeline, small yield, space intensiveness, and challenge accessing planting stock and locating suitable habitat also were mentioned. Poaching was another key issue with one participant explaining “the whole ginseng culture [is an obstacle], we used to have ginseng on our property, but it got poached.” Finally, sustainable harvest was mentioned as a challenge with many of these species thought to be overharvested in the wild and a lack of knowledge around the “sweet spot” for cultivation of planting enough so harvesting can be sustainable. Other participants mentioned land access as a challenge with changing landownership patterns that include both increase in public land acquisition over the last century and an increase in newcomers and absentees landownership. One participant noted “when I was growing up, most of the land in Grayson County actually belonged to locals and it was pretty much open country; you could just go about anywhere you wanted to.” A number of newcomer participants discussed how they allow access to locals to harvest NTFPs on their land. Participants also mentioned the difficulty of land access for youth interested in land-based entrepreneurship noting “that young people today have a very difficult time securing land.”

References to obstacles around social capital involved the critical mass needed to sell in larger quantities in emerging markets, limits of the existing social network, issues with volunteerism, and the differing interests that may slow down a collective approach to NTFP management. Participants questioned whether there was “critical mass” necessary “to get large enough quantity” to sell NTFPs to emerging specialty buyers. One noted “I know it’s feasible [NTFP livelihoods], I just don’t know if there are enough people seriously

interested.” Regarding the existing social network, one newcomer participant observed “it’s a handful of 50 or 60 people and those people work really well together, but expanding beyond that is going to be the challenge.” A number of participants also commented on volunteerism with the large base of volunteers aging out of service and the lack of interest among younger generations in volunteering through formal organizations. Beyond this, geographic distribution and coming to agreement can be an obstacle to organizing to form a critical mass. One participant reasoned “it is a little naive to think you can get 25 people together that have an interest of maybe making a little money off of their land with NTFPs and all 25 of them being able to agree on how to do it.” Another participant observed “it is a huge county and it just covers so much ground” so when people come out, they “have to travel pretty long distances.”

References to obstacles around human capital included loss of a generation of older wild harvesters, lack of knowledge among newcomers and younger generations, outmigration of youth, a small population, and the nature of working with NTFPs for livelihoods. One multigenerational participant expressed “I have noticed a decrease in people that do it [wild harvesting NTFPs] because all the older generation that used to do a lot of it have passed on.” Many newcomers to the area expressed their lack of knowledge about NTFP harvesting and production. One multigenerational wild harvester participant observed “a lot of people don’t know anything about it [NTFP harvesting].” Many multigenerational residents also noted the younger generation is less interested, expressing “we have a little problem with the younger generation now. They like to run the equipment, but they don’t like to do the work to pay for the equipment.” Many participants also cited issues around retaining youth. One described “a lot of the local people grow up and move away because they don’t see the economic opportunities here, and to a great extent they are right.” Another stated this is “where we have the biggest issues....providing meaningful, substantive education and experiential

opportunities for youth.” More generally, a few participants noted the small population itself as a barrier. One expressed “in 10 years, we lost 15% of our population,” another explaining “so there is only a very small percentage of the people that have the time or can dedicate the time to ...push a better collective future.” Further, many participants expressed the hard work required to work with NTFPs as a livelihood. One noting “it’s a lot of physical work” and another expressing “a lot of people don’t necessarily want to do all that work.” Another said the work is also “pretty complicated” and “not easy,” later adding “It’s just [like] following the most complicated recipe in any cookbook ever.”

References related to cultural capital obstacles included rural stagnation, loss of local knowledge, manufacturing focused development, and an individualistic approach. Rural stagnation included mention of close mindedness and lack of curiosity, innovation, motivation, and an interest to change as well as resistance to agricultural entrepreneurship, a limited perception of what farming is, and a distrust of alternative agriculture. One participant observed that “when you mention farming, everybody immediately thinks beef cattle” and that “is a mindset change that has got to be overcome” because “we have a limited amount of acreage that can be used for cattle and most of it is already being used for that, so what else can we do?” Another participant described how “alternative agricultural pursuits...carry a connotation, like a hippie dippie thing.” One long-term newcomer stated when they started market gardening early on, “most people laughed at the kinds of things we were doing.” One multigenerational participant said a barrier is that “we can’t see other ways of doing it.” One participant was a local historian and explained how history around dairy and chicken farming impacted the community:

“There was a time early in the 1960s, both the state and federal departments of agriculture promulgated a new set of sanitary regulations. At that time possibly half or

even more than half of the [dairy] producers quit. They stopped taking their 5-gallon cans to the end of the road. They had been milking by hand. They had been milking in barn stalls. Well they quit, and the remainder went to the bank and/or to their families and they built milking parlors. My understanding at the time was perhaps 15-20 cows. Even having borrowed that money and building those parlors, all but a half dozen still ended up failing. So that money, that investment, proved to be a mistake. Well there was a similar episode, a couple of people started building chicken houses, and they failed. Some people were induced to begin growing beans and potatoes. There was a market over in Jefferson for about 15 years in some of those crops. They all failed. And then that is a collective experience and there is a collective memory of that. And so there is some resistance. And I have heard it expressed a number of times. ‘There is no point in trying that. You are just going to lose and its going to fail. It ain't going to work.....’ I think now, there is almost a cultural resistance to entrepreneurialism and experimentation. And [lack of] curiosity about exploring these things.”

Reported previously in terms of human capital, the loss of local knowledge also affects cultural capital. One participant explained that despite living in an agricultural landscape many residents are very disconnected from an agricultural knowledge base. One participant described newcomers to the area who moved here over three decades ago as still “in investigative mode.” They explained how many old timers shared knowledge with newcomers during that initial wave, but as the old timers passed away there were fewer who were able and interested to share what they know. Participants also mentioned the individualistic mind set and the manufacturing focus of development as barriers to NTFP livelihood development. One multigenerational resident explained everybody wants “to do it their own way, keep it quiet, kind of that traditional mind set... There is some kind of cultural appeal to, ‘well we just want to go out and pick berries and be able to sell a few of them and

use the rest.’ I mean that is part of who we are, but that won’t pay bills.” Another participant noted “I think one of the challenges with our current economic development strategy is that it is very manufacturing focused. I think we have got to change that mindset and demonstrate that there is money to be made in agriculture.”

Obstacles related to political capital included government regulations, land taxation, and organic certification. One participant mentioned the challenges small farmers face in complying with agricultural sanitation regulations that favor large scale corporate agriculture. Further, new land taxation regulations have “made it tough” for farmers owning larger tracts of land. One participant noted he couldn’t pay his taxes from what he produced on his land and had to pay for it out of his retirement. A number of participants also identified organic certification as a hurdle. “The being certified...to do something...it can be intimidating for people.....Paperwork is intimidating for people.”

Obstacles related to financial capital included references to the local economy, capital investment for start-up, and navigating markets for NTFP products. Participants reflections on the local economy included how farming is not economically viable and that few income opportunities are available in the County. Many participants noted how “it’s really expensive to farm.” One explained that “even though we bought a farm it became evident even in the first few months that one could not obtain a living on the farm so I became a contractor.” Participants also noted the area is economically distressed with few employment opportunities, a persistent lack of access to financial capital, and steep challenges to starting up new land-based businesses. One participant referenced that “when you look at median family income, Grayson County is now one of the poorest in the state.” Another participant noted “doing anything new on your farm is going to require some kind of capital input and this is not.....per landowner, a really flush county. I mean there are a lot of people who are

just getting by and a lot of farmers who are working really hard to break even every year. To do a new project in general can be a big cash layout.” Another echoed that “start up costs could be an obstacle for some people. It would be for me. I am not saying I can’t overcome it because I always try to find a way.”

Markets also were identified as an important financial factor in developing NTFP livelihoods. One participant explained “market is really the biggest aspect of it and I don’t think that we have markets yet” and that they must be developed. Another noted that “you are immediately challenged with selling to an audience that is not local, it’s a regional audience” because there are “no outlets, no demand, and no population to serve” here. One multigenerational participant noted “I would almost think that part of those barriers might be the existing marketing channels” explaining that they may not like if the local dealers were taken out of the equation.

Obstacles in terms of built capital in the community included lack of processing facilities and reliable internet and power, and the amount of time it takes to transport product to market. One participant noted that processing equipment and facilities would be needed to clean, dry, and package NTFPs. They added “but I don’t see that as being a very large obstacle because...even though it is not here now doesn’t mean we won’t be able to develop it. I think its just strength of people.” The same participant also mentioned that transportation time could be a factor when getting certain perishable items to market. Another participant complained “I can’t even get high speed internet here. My internet service is intermittent. We have lost power here three times this year already.”

### *Community NTFP Strategies*

A number of strategies were referenced related to natural capital. One participant stated that “if we can figure out ways to preserve and accentuate that [biodiversity] while also

being able to harvest and sustain...and build the community, that that would be great.”

Similarly, another noted they “would like to see alternatives being offered that support the woods and the timber industry, but in a different way.” Others explored land access through leases and the opportunity provided by the current generational agricultural and forest land transfer. One participant explained “it’s pretty well known that the current farming population is aging...[and] by 2030, 50% of the farms are going to transition from this generation to the next or into something else. So there is some real energy out there behind, how do we transition the land and how do we make better use of the land.”

Participants also discussed specifics of NTFP production. One explained that they thought “production trials where people are going to be planting things and finding out what works and what doesn’t work,” would be important. Another suggested permits to harvest forest botanicals on public lands, such as black cohosh (*Actaea racemosa*) and may apple (*Podophyllum peltatum*), might be something to explore. One participant suggested creating “a short inventory” of possible NTFPS that grow in the County and have reliable markets. Another participant identified black cohosh as one of those potential species, stating “everybody seems to have cohosh in a fair quantity, why don’t we utilize that one?” One participant also explored the potential of approaching the state’s Department of Game and Inland Fisheries to deal with deer overpopulation that impacts agriculture, NTFP production, and forest regeneration.

Social capital strategies included focusing on bridging capital, community networking, and organizational development. Bridging capital included ideas about connecting with individual communities within the county, bridging the distinct clans, becoming involved in local community events, and creating more connection between newcomers and locals. Bridging capital strategies also included tying into the agricultural education center, extension, and connecting with buyers. One participant described “there is a

tendency for clannishness here and while that can be a very good thing because each clan is going to support its own and sustain its own there needs to be a bridge and this structure [organizing around NTFP livelihoods] can be that bridge.” She continued that it was important to “be willing to go into the communities.” A number of participants also mentioned community building and networking as important places to focus efforts. One participant noted “that [what] we need to work on the most is building the community, continuing to get people more interested and demonstrating what can be done.” Similarly, another stated “to get enough people interested would be the main thing.” Many also noted the need for additional organizational development in the BRWG including hiring a coordinator, focusing in on common interests, and capitalizing on the possibilities for organization to help make NTFP livelihoods more viable.

References to strategies related to human capital included reaching out to old timers, creating educational opportunities, and focusing on youth. One participant stated “Creating skills [is], big big big...huge.” Another explained the way to get around most of the obstacles in the way of NTFP livelihoods “is just learning. I mean we have just got a learning curve that we have got to get through I think.” Another experienced NTFP harvester noted there needs to be “someone to teach them [new producers] and show them how to do it so when they harvest the herbs they can dry them in a good place and take care of them.” A number of participants also noted focusing in on providing educational opportunities for youth around NTFPs through crafts, food, and hands on activities outside and generally ways of “going out and collecting different things and using your hands and using your imagination and putting them together into something.” Another participant explained how he wants to help “them [young people] go out and get started and make a living and keep their upfront costs down by letting them have access to it [my land].”

Financial capital strategies included product development, market development, business planning, and ideas for funding. One participant stated “the market is really the key. If you don’t have a market, it doesn’t make a difference what you have got.” Another participant explained that “I think we have to begin to harvest and market and figure out that part of this before we can really do a good business plan to figure out how much we can make.” Another reflected on how “a highly diverse economic plan” is important citing when he first moved to the county,

“the farmer wasn’t just the farmer. The farmer also had skills like plumbing skills, building skills, (and) drove a school bus so that they had insurance for the family. And everybody was diverse. Every other family had some chickens or a hog. And everybody hunted. It’s just that diversity. And I really think in order to live well in a place like this that still should be the strategy.”

A number of people also started brainstorming options for financial incentives and funding sources including tax incentives for NTFP production, seeking grant funding, asking local non-profits to serve as a clearinghouse for grants, seeking financial assistance from local government, fundraising from local donors, and collective investment. One participant explained,

“you have a County that is in pretty good fiscal shape so they have some economic development dollars that could be pointed towards businesses in agriculture....You [can] present a business plan and the financial documents required of a business plan to the county administrator and solicit a grant for your business and in that demonstrate how many jobs you are going to have and what your tax revenue is going to be....What better use of tax dollars is there than to take the money and give it back

to a resident for them to grow a business or start a business that is going to employ themselves and potentially others.”

They continued by sharing that any of the local 501C3s could be approached to serve as a clearinghouse for grants that less formal organization may not be in a position to submit. Another person explained they “believe in civics” and that important community projects “shouldn’t be left to government” and that they would open to personally investing.

References to political capital strategies included ideas of requesting governmental support and finding a “from here” spokesperson. Looking at federal government support of Tobacco as a historic crop, one participant explained that it:

“became an important part of the agriculture economy in Grayson County from the mid 1930 up until 1982. Much of its [tobacco’s] prosperity is owed to the role that the government played in teaching people how to grow it, in helping people to find quotas for example so that large family interest didn’t come to control this commodity. It became a very democratized activity. People were limited to an acre. But that acre was hugely important to people. In many instances, it was what they really needed in addition to salary or wages at the plant and what limited money the cattle brought in. It was just that added amount to make it all work.”

Another participant noted that “if you are looking for county help...you have got to come to the county and ask, tell them what it is you need from them, rather than expecting the county to do something for you.” They continued, “I have always found that if you go to whoever you think controls a particular resource and tell them what it is you want to do, they are probably more likely to support you than they are if you come to them and say, I have a problem and I need you to solve it.” The same participant recommended providing an informational brief to the board of supervisors, letting them know what is happening around

NTPF livelihoods. They noted beyond the possibility to garner interest among county government around this revenue opportunity, that this also is a way to get the word out more broadly, as local media covers the meetings. Lastly, one participant noted it could be important to find a “from here” spokesperson, “someone with huge standing in the community and name recognition” to share NTPF livelihood possibilities with people in the community.

Fewer and less detailed references were made to cultural and built capital as strategies for NTPF livelihood development. References to cultural capital strategies included participating in local food fairs, flea markets, and church events to get the word out about NTPF livelihood opportunities in the county. References related to built capital strategies included website development to support community organizing and investment in processing equipment, especially considering how equipment can help overcome issues with transporting products to markets outside of the community.

#### **4.6 Discussion**

This study identified potential assets, obstacles, and strategies of NTPF livelihood development in a community in Grayson County, Virginia. We interpreted our results with the understanding that interviewees were drawn from an NTPF interest group—focused on products for sale—and their referrals. Additionally, the interviewees were skewed toward newcomers and males. Nevertheless, findings highlight important assets, obstacles and potential pathways for NTPF livelihood development in Appalachia.

Of assets referenced by study participants, natural capital was most frequently cited followed by cultural, human, and social capital. Built, financial, and political capital were referenced less frequently. Participants generally pointed to obstacles more than assets or strategies. Of those references, the same capitals rose to the top for obstacles as those that did

for assets (natural, human, cultural, and social) with the addition of financial capital. Political and built capital rarely were mentioned as obstacles. References to capitals differed when participants were asked about strategies, with social, human, and financial rising to the top and some focus on natural capital. Like obstacles and assets, political and built capital rarely were mentioned as strategies.

These findings differ slightly from Flora and Flora (2008) who found sustainable rural livelihoods most often involve natural, social, human, built, and financial capitals and Munsell et al. (2018) who found these capitals to be central outcomes of agroforestry implementation in Cameroon. In our study, cultural capital emerged as an asset and obstacle and there was less emphasis on built capital. Though, similar to Munsell et al. (2018) and Flora and Flora (2008), there was less emphasis on political capital.

### *Assets*

The Appalachian region is well known for its natural resources and culture (Boettner et al. 2014a; Boettner et al. 2014b; Pollard and Jacobson 2015). Thus, it was no surprise participants most commonly referenced natural and cultural capital assets. The presence and value of natural capital in the form of forested land, water, climate, soil, and NTFP diversity was obvious to most participants. Cultural capital also was identified with an emphasis on cultural history and familiarity with NTFPs among multigenerational residents, and the community's ethic of work and innovation. Participants also readily identified the value and importance of human capital, citing local knowledge of multigenerational residents, newcomer immigration, and NTFP interest and commitment. Trozzo et al. (2019 in prep) and Trozzo et al. (2019) reported similar results, which point to a notable rate of interest in forest farming no matter the length of residency, and that newcomers and multigenerational residents share complimentary experiences, skills, and resources related to NTFPs.

Similar to Smith et al. (2012) participants identified the close-knit communities of Appalachia (bonding social capital) as a strength, as well as the ability of and power in communities, organizations, and newcomers and multigenerational residents to collaborate and draw on resources from regional, national, and federal programs (bridging social capital). Other references to social capital included a collective interest in NTFPs, which are critical for collective action (Marshall, 1998), recent social networking that connects buyers and growers, and a critical mass of people migrating to the area that allows new activities and structures to emerge. The lack of reference to financial and built capital as assets is congruent with the state of many rural communities in Appalachia (Schuman 2016). Few references were made to political capital as well.

### *Obstacles*

Natural capital also emerged as the most frequently cited obstacle due to issues with production, poaching, sustainable harvest, and land access. Findings are similar to Rule et al. (2000) and Chakravarty et al. (2015) who note that a lack of knowledge about cultivation often stands in the way of successful NTFP and agroforestry operations. They also align with oft-cited issues of poaching and sustainability to creating viable forest farming enterprises (Burkhart et al. 2012) and Ginger et al.'s (2012) argument that increased private landownership decreases access to resources among the people who have traditionally relied on the land for livelihoods. Human capital was the second most frequently cited obstacle because of loss of local knowledge, outmigration of youth, a small population, and the challenging nature of working with NTFPs. These findings reflect the larger trend of youth moving elsewhere in search of economic opportunities and the resultant population loss (Heinemann and Hadler 2015).

Cultural capital obstacles suggest that trends such as rural stagnation and reliance on manufacturing exacerbates past agricultural entrepreneurial failures thus reinforcing the community's memory of hollow promises and distrust in innovation. Yet, some participants identified, as did Flora and Flora (2008), that attracting manufacturing jobs has become a less reliable and dependable approach to community development and innovative approaches such as alternative agricultural entrepreneurship are needed. Beyond that, the culture of approaching things individualistically was identified as a potential barrier to NTFP livelihood development.

As in many rural Appalachian communities, financial capital was identified as a challenge for NTFP livelihood development (Schuman 2016). The community was described as lacking access to financial capital, beset by few employment opportunities, and generally lacking farm viability. Similar to Burkhart et al. (2009), participants voiced that finding markets with higher price points was an obstacle. Further, some expressed concerns over creating new markets that have the potential to shift the structure of the market chain in the community in ways that might exclude local dealers. Political capital was referenced less frequently, but the challenges of government regulations that favor large scale producers, land taxation, and organic certification were noted by participants. Regarding built capital, lack of processing facilities was mentioned as an obstacle, but people did not consider it a significant barrier with faith that people could rally to develop needed equipment. Of note, also was that reliable internet service and power was considered a challenge for many people in the community which could influence what is possible for NTFP livelihoods.

### *Strategies*

Social capital strategies were referenced most frequently, which reflects findings of Emery and Flora (2006) who identified social capital as a primary point of entry for

community development efforts that can create a spiraling up effect where increases in social capital lead to increases in other capitals. Our study revealed NTFP livelihoods were considered a way to create bridges within the county, among individual communities and between newcomers and locals. Community building and continued social networking was mentioned as a means of getting enough people interested, which reflects the concept how a critical mass of motivated people drives collective action (Marwell and Oliver 1993). Further, the need for organizational development for greater impact reflects findings of Shepard (2014) where organization among farmers is looked to for improving economic opportunities.

Human capital also was a key focal point for NTFP livelihood development. Findings are also similar to those of Emery and Flora (2006), who reported human capital as another primary entry point for spiraling up in communities. Participants revealed strategies of reaching out to old timers to see if there is interest in entering into formal arrangements for transitioning traditional knowledge, which resembles farmer-to-farmer mentorship programs that spread alternative agricultural knowledge (Niewolny and Lillard 2010). A focus on youth reflects a common thread of activity in rural communities that aim to create viable livelihoods with retention in mind. Such a strategy proved successful in Emery and Flora's (2006) case study, where youth leadership training emerged as a key strategy to fuel community change. Learning was another strategy identified by participants as a means to overcome obstacles of NTFP livelihoods, which reflects social theories pointing to collective learning through activity as a catalyst for change (Wells 2011).

Financial capital also was a strategy noted among participants, similar to other community development projects (Flora and Flora 2008). Market development, product development, and business planning were identified as important starting points, which aligns with arguments in Gold et al. (2004) that market development is central to successful agroforestry production. Another suggestion was to leverage the historical nature of rural

livelihoods in the study area that have long been supported through diverse economic activities. Thus, NTFPs are not necessarily seen as a source of production that can, by itself, support a livelihood. Instead, they generally are considered one economic opportunity among a diverse suite that can increase income and improve rural livelihoods. Indeed, Trozzo et al. (2019) found that NTFPs were viewed as a secondary source of income among contemporary harvesters and growers in Appalachia, which reflects the similar notion within international development of promoting diversification for rural livelihoods (Ellis 1998).

Participants also pointed to a number of potential financial incentives and funding sources. Tax incentives for NTFP production was discussed as a means to provide financial incentives for NTFP cultivation and stewardship, which in many ways is similar to incentives received for Christmas trees or farming more generally. Beyond calling for support from local 501c3s to serve as grant clearinghouses, participants also suggested petitioning for support from local government, fundraising from local donors, and collective investment. This local financial investment strategy is one that has proven successful in other community development projects focused on capacity building within local financial institutions to promote bequests and gifts during wealth transfers (Emery and Flora 2006). Yet when communities lack financial resources for such forms of development, seeking assistance from the state and federal level also is important (Flora and Flora 2008).

Natural capital investments leaned toward finding modes of production that likewise regenerate and preserve forestland assets. Suggestions reflect concepts and values of agroforestry, which systematizes conservation and production in forestlands (Gold and Garrett 2009). Discussion of land access and land transfer also was an important topic, reflecting larger conversations focused on what will happen regarding land stewardship and production (Butler and Leatherberry 2004). And references to willingness to lease reflect findings that point to a larger potential of leasing forest land to forest farmers in Southwest

Virginia (Trozzo et al. 2019 in prep). Many of the natural capital strategies suggested by participants during the study ultimately were enacted by the community either before or afterward, such as production trials (lily of the valley, elderberry, black cohosh), inventorying marketable NTFPs, focusing on black cohosh as a key species, and exploring methods for reducing deer browse (deer enclosures).

Political and cultural capital investments were less frequently discussed. Political capital strategies focused on reaching out to local government as an ally and requesting help for creating NTFP businesses and initiatives. This is reflected in other community development processes wherein engaging local government systems and structures provides legitimacy and support for initiatives (Flora and Flora 2008). Cultural capital strategies mostly focus on participating in local events such as food fairs, flea markets, and church gatherings to spread the word about NTFPs.

Built capital also was secondary and not as frequently referenced, which differs from many community development efforts that often focus on investing in built infrastructure as a starting point (Flora and Flora 2008). That approach has led to many failed projects, such as the trail of failed community kitchen projects that give credence to calls for reconsidering the adage of “build it and they will come.” This study and others (e.g., Emery and Flora 2006), suggests that investing in social and human assets is needed first, followed by built infrastructure which is defined and created by empowered communities.

#### **4. 7 Conclusions**

Community capitals play an important role in understanding approaches to improving NTFP livelihoods in Appalachia. We learned that a the most frequently mentioned assets and obstacles fell under the same capitals (natural, cultural, human) perhaps meaning these capitals are where much is at play with NTFP livelihoods in communities. For instance, cultural capital being perceived as both asset and obstacle may be due to the deep cultural

heritage associated with NTFPs in the region (Hufford 2003). Further, financial capital was referenced more as an obstacle and social capital more as an asset, possibly reflecting the greater trend of close-knit communities and lack of financial capital in many communities in Appalachia. Compared to other projects, built capital received less attention and points to a greater need for “building” social and human capital. Ultimately, this study pointed to the need to draw on the social, human, and cultural capital within the people and communities in Appalachia while capitalizing on NTFPs readily available as natural capital as a way of overcoming financial barriers often present in the region around livelihood opportunities.

We found that the key stakeholders in Grayson County, Virginia thought to invest the most attention for developing NTFP livelihood opportunity into building social capital, human capital and financial capital. Specific strategies identified include: 1) social networking and community building to find a critical mass for production, 2) organization of growers, 3) formal and fair arrangements to foster exchange of knowledge between multigenerational residents, newcomers, and youth, 4) market development, product development, and business planning, 5) educational programs that address forest farming as one of many rural income opportunities, 6) tax incentive programs for forest farmers, 7) promoting local bequests and fundraising for programming and infrastructure, 8) development of leasing programs for landless forest farmers, 9) collaborating with local government for legitimacy and support, and 10) participating in local cultural events. These findings may serve as a guide to other communities in Appalachia looking to build NTFP and other natural resource-based livelihood opportunities.

We plan to publish this manuscript in the *Journal of Community Development* or another process focused journal that may have interest in the subject matter/context, such as the *Journal of Extension*. Additional research driven by the community focused on working with NTFP species, developing products and markets, and collectively organizing could

support improvement of NTFP livelihoods for Appalachian residents as part of a diverse economic portfolio. Community based research approaches are worth exploring so communities can determine the most meaningful research topics, collect and analyze data, and disseminate findings that directly informs on-the-ground actions. However, the commitment is significant from both researchers and community members, and must be responsibly and respectfully approached.

## **CHAPTER 5: FOREST FARMING: WHO WANTS IN?**

### **5.1 Abstract**

Forest farming is an agroforestry practice where non-timber crops are cultivated or stewarded in a forest setting. It is an alternative to wild harvesting, and can supply non-timber crop dependent industries and reduce pressure on these species. Appalachia is home to numerous understory non-timber species that source a worldwide specialty woodland crop market valued in the billions. However, cross-sectional, randomized surveys of forest landowner perspectives and preferences about forest farming are scant. This is particularly true in Appalachia. We surveyed family forest landowners in 14 Appalachian counties in Southwest Virginia who owned five acres or more of forests to measure the extent to which they are interested in forest farming or leasing land for forest farming. Another goal of the research was to group respondents according to their residency, roots in the region, and farming status to test whether their interest in forest farming and likelihood of leasing portions of their forests for this practice differ across owner groups. We found that 45% of all respondents were interested or extremely interested in forest farming and owned nearly 47% of the forestland. Those that were likely or extremely likely to lease their land accounted for 36% of all respondents and owned 43% of the forestland. Four groups of landowners were identified: Absentee and vacationers, newcomers, longtime farming residents, and longtime non-farming residents. While the groups differed demographically, their interest in forest farming or leasing did not. Our findings suggest that the potential for growth in the forest farming sector in Appalachia is not exclusive to one type of forest landowner. If supported by technical service providers, policy, and industry, forest farming could provide increased options for forest landowners seeking to profitably and sustainably manage forest ecosystems in this broad physiographic region.

**Keywords:** cluster analysis; non-timber forest products; forest landowners

## 5.2 Introduction

Humans have long harvested food, medicine, and craft materials from Appalachian forests (Hufford 2003; Cavender 2006; Moerman 2009; Moerman 2010; Freedman 2017). Non-timber forest products (NTFPs) is a catchall term defined as products other than timber that humans derive from woodland plants, trees, or fungi (Chamberlain, Teets, and Kruger 2018). Appalachia is an NTFP harvesting hotbed because its vast forests include prime habitat for many commonly traded medicinal, culinary, craft, and landscaping products (Greene et al. 2000). Well-known examples include black walnuts, ramps, elderberries, pawpaws, maple sap, morel mushrooms, ginseng, black cohosh, galax, and grapevines.

Appalachian NTFPs are common in herbal and cosmetic retail products, as well as household decorations and culinary products. Together these uses constitute a multi-billion dollar industry that supports a vast enterprise of wild harvesting, local trade, product aggregation, and global sales (Greene et al. 2000; Hufford 2003; Kruger 2018). Some NTFPs can handle extensive and continual harvesting, but many cannot (Bierzychudek 1982) and overall population decline is an issue of concern given rapid growth in sectors that depend upon these products (Sanders and McGraw 2005; Albrecht and McCarthy 2006; Van Der Voort and McGraw 2006). A growing number of NTFP-dependent companies seek sustainable, high-quality raw materials because they and many of their customers increasingly place high importance on the environmental responsibility of their products (Craker and Gardener 2005; Laird et al. 2005).

Forest farming is an agroforestry practice that involves intentionally cultivating or stewarding understory NTFP species in a forest (Chamberlain et al. 2009; Mudge and Gabriel 2014) and forest farmers are the people who grow and sell marketable crops in these systems (Chamberlain et al. 2009). Agroforestry is defined as an “intensive land-use management that optimizes the benefits (physical, biological, ecological, economic, social)

from biophysical interactions created when trees and/or shrubs are deliberately combined with crops and/or livestock” (Gold and Garrett 2009, p.46). Agroforestry practices, such as forest farming, merge production and conservation into a single system that meets both human and environmental needs (Trozzo et al. 2014a).

Interest in forest farming among landowners in the United States is thought to be largely tied to ecological and economic benefits between or in lieu of timber harvesting (Workman et al. 2003; Valdivia and Poulos 2009; Barbieri and Valdivia 2010). However, only a few species can be profitably farmed when sold at wild harvested prices (Burkhart and Jacobson 2009). Forest farming is an avenue for sourcing raw material that NTFP-dependent companies can procure to manufacture and confidently sell products that can be traced back to a point of origin and forest management regime, but higher price points are necessary for farmers to succeed. Verification and labeling programs recently have been developed to certify forest farming trade in Appalachia and early adopters of these programs have sold raw materials at price points that far exceed historical pathways for wild harvested products and results in profitable forest farming of multiple species.

Trade in raw material from forest farms in Appalachia is relatively small compared to that sourced through wild harvesting, but the potential for growth and economic impact in the region is substantial. Most sub-regions, like the Blue Ridge and Alleghenies, are heavily forested (Loveland and Acevedo 2016) and these vast canopy-covered landscapes support the growth of numerous native NTFPs that have evolved in its climate, topography, and elevation. A key feature of these forestlands is that about 75% of the acreage is privately owned (Hicks 1998), mostly by families, and if national trends (e.g., Butler et al. 2007; Kaetzel et al. 2012) are an indicator, then it is highly likely that a substantial portion of these owners value non-timber objectives (e.g., aesthetics, biodiversity, and privacy) over timber production.

A number of socioeconomic factors also may influence the growth of forest farming in Appalachia. For one, rural flight and amenity migration are key features of the region's social fabric, which involves long-time residents from farming and non-farming families leaving for economic opportunities only to be replaced by newcomers in search of rural lifestyles and bucolic landscapes (Gosnell and Abrams 2011). At the same time, the United States is in the midst of the nation's largest-ever intergenerational transfer of forestland, which is shifting the nature and needs of owners (Butler and Leatherberry 2004). Another factor is that the number of absentee forest owners nationwide exceeds 25% and continues to grow (Butler and Leatherberry 2004; Butler et al. 2007). Appalachian NTFP wild harvesting is likely to remain strong, but changes in consumer demographics and forest ownership patterns are shaping new approaches to product preference and sourcing, which includes the use of forest farming practices (Trozzo et al. 2019) and leasing arrangements similar to agriculture (Hamilton 2011).

In this study, we measured and compared the extent to which Appalachian forest owners in 14 counties in Southwest Virginia were interested in practicing or leasing a portion or all of their forestland for forest farming. We also studied whether forest owners in the study area differ in terms of their land use and residency characteristics, and how differences relate to their interest in farming or leasing. Our goal was to understand which types of owners are interested in forest farming and why, and also to account for the magnitude of forests they own.

### **5.3 Literature Review**

Landowner interest in forest farming has been studied before. Workman et al. (2003) surveyed landowners in six Northwest Florida counties and found that 40% of the respondents wanted to learn more about forest farming. Similarly, Strong and Jacobson (2005) found that 36% of landowner respondents in their survey research in Pennsylvania

were interested in NTFP agroforestry practices such as forest farming and Barbieri and Valdivia (2010) observed that almost 40% of forest landowners in their study in Missouri were interested in forest farming. These studies demonstrate that landowners are interested in forest farming, yet cross-sectional and randomized research has not been conducted on forest landowners in Appalachia, which is at the heart of global trade in NTFPs harvested from United States forests.

Research on the factors affecting adoption, such as forest farming, suggest that age, gender, income, education, parcel size, farming status, and knowledge and experience relate to interest. In most studies, younger respondents are more interested in agroforestry and likely to view forest farming as an income-viable practice (Pattanayak et al. 2003; Strong and Jacobson 2005; Arbuckle et al. 2009; Valdivia and Poulos 2009). However, some studies did not find an association between age and interest (Matthews et al. 1993; Trozzo et al. 2014a). Strong and Jacobson (2005) observed that women were more often interested in specialty crop production over other production possibilities such as timber and livestock, yet Matthews et al. (1993) found that gender and agroforestry adoption are unrelated. Both Arbuckle et al. (2009) and Pattanayak et al. (2003) reported that respondents with higher levels of education were most interested in agroforestry. Though not altogether consistent, these findings suggest gender, age, education, and income potentially relate to landowner interest in agroforestry.

Several studies found that farmers are less interested in agroforestry practices when compared to non-farming owners (Arbuckle et al. 2009; Barbieri and Valdivia 2010; Trozzo et al. 2014a; Trozzo et al. 2014b). Further, Trozzo et al. (2014a) observed that owners of large parcels were less interested in agroforestry practices compared to holders of smaller lots, though other studies found no association between parcel size and interest (Matthews et al. 1993; Valdivia and Poulos 2009). Perhaps more important is that several studies found

that higher levels of awareness may matter more because landowners who are familiar with agroforestry practices, regardless of parcel size, often are the most interested in them (Arbuckle et al. 2009; Valdivia and Poulos 2010; Trozzo et al. 2014a). These findings suggest that parcel size and land use are important determinants of initial agroforestry interest, but that increased awareness changes the position of some.

Trozzo et al. (2014b) studied interest in multifunctional riparian buffers among landowners in Southwest Virginia and evaluated associated riparian zones where agroforestry plantings were possible. The authors found that producer respondents (livestock farmers) were least interested in agroforestry, but that this could change if supporting mechanisms such as cost-share are readily available. Non-producers were more motivated by non-monetary objectives, such as wildlife habitat, and were most interested in agroforestry. Similarly, Arbuckle et al. (2009) found that landowners who value recreation and environmental objectives often are more interested in agroforestry. In general, however, Trozzo et al. (2014b) observed that it was uncommon for respondents to completely dismiss agroforestry regardless of their land use behavior. Rather, appropriate supporting mechanisms and goals may need to be conveyed to meet their interests.

Social marketing has been used to design outreach messages that are meaningful to specific landowner groups (e.g., Butler and Leatherberry 2004), and its role in agroforestry adoption research and outreach is common (e.g., Jacobson 2005; Barbieri and Valdivia 2010; Strong and Trozzo et al. 2014b). This technique typically includes population segmentation and message design (Tyson et al. 1998) and two agroforestry studies have been conducted that specifically focus on interest in forest farming (Strong and Jacobson 2005; Barbieri and Valdivia 2010). Strong and Jacobson (2005) segmented Pennsylvania forest owners into four groups based on product-specific adoption preferences: timber, livestock, specialty crops, and non-adopters. Specialty crop respondents (36%) were most

interested in growing NTFPs in forest farming systems. In general, people in this segment worked off farm (77%) or were retired (18%), and many owned smaller parcels (2.5 to 10 acres). They also were mostly female (60%). Specialty crop owners were more interested in quality of life factors such as providing food for their family and land stewardship goals like improving wildlife habitat.

Barbieri and Valdivia (2010) segmented landowners in Missouri into two groups based on recreation activities: Productivists and Ruralists. Ruralists respondents (47%) primarily participated in contemplative recreation (e.g. walking/hiking and nature/wildlife contemplation) and were more interested in forest farming (47%) when compared to Productivists (25%), who focused more on extractive (e.g. hunting) activities. Ruralists share similarities with Strong and Jacobson's (2005) specialty crop segment in that both were most interested in forest farming when presented with a suite of potential land uses and agroforestry practices. In addition, respondents in both groups were mostly non-farmers (72%) focused on working and interacting with their land as part of a holistic rural lifestyle. This is in line with findings reported in Valdivia and Poulos (2009), where monetary motivations were not primary drivers of interest in forest farming.

Social marketing has also been used to characterize forest landowners and their management preferences and approaches (Kluender and Walkingstick 2000; Butler and Leatherberry 2004; Kendra and Hull 2005; Butler et al. 2007; Majumdar et al. 2008; Munsell et al. 2008). Many of these studies clearly identify forest owners that value their forests for lifestyle and connection to the environment over other objectives, or who balance these with economic aims rather than solely focusing on financial goals. For example, Kendra and Hull (2005) found that a new generation of forest landowners are more motivated by lifestyle goals and characteristics of the "back-to-the-land" movement. Similarly, Butler et al. (2007) found their largest population segment (Woodland retreat

owners) valued amenity over financial goals, and Kleunder and Walkingstick (2000) identified substantial segments of environmentally oriented (Resident conservationists) and lifestyle motivated owners (Affluent weekenders). Majumdar et al. (2008) and Kuipers et al. (2013) reported most forest landowners in their studies were motivated by a mix of both consumptive and non-consumptive goals. Salmon et al. (2006) and Butler et al. (2007) both identified forest landowner segments interested in amenity and income opportunities.

The growing phenomenon of contemporary amenity migration is likely reflected in the commonality of lifestyle and environmental objectives observed by researchers among forest landowners. Amenity migration is defined by Gosnell and Abrams (2011) as the “movement of people based on the draw of natural and/or cultural amenities” (p. 303). It is considered a result of globalization expressed through the out-migration of longtime residents in search of economic opportunities and in-migration of many urbanites and suburbanites seeking a rural life or escape (Gosnell and Abrams 2011). This shift often is called “rural restructuring,” and can significantly change in the demographics and land management of rural regions (Nelson 2002, p.905). Newcomers also bring with them different ideas for land management, which can conflict with the long-standing practices of local residents (Yung et al. 2003; Wulforth et al. 2006). Newcomers have been found to cultivate new economies in rural areas and make way for new livelihood practices (Nelson 2002). This change can improve local economies, but also may close off long-standing land use traditions (Hurley and Halfacre 2011) because newcomers often align more with recreational, aesthetic, or conservation land uses without a great deal of concern for profit (Gosnell et al. 2007; Yung and Belsky 2007).

Amenity migration has been found to influence forest management and NTFP harvesting. Trozzo et al. (2019) studied contemporary forest food and medicine harvesting and use in Appalachia and observed that motivations differed between newcomer and long-

time resident harvesters. Newcomers were more likely to balance monetary, environmental, and lifestyle motivations, whereas long-time residents primarily stressed financial motivations, but also emphasized lifestyle though to a lesser degree. Similarly, Majumdar et al. (2009) found that multi-generation forest landowners actively manage their forests and focus more on timber than single generation owners drawn more so to non-timber uses. Similarly, Butler and Leatherberry (2004) found newer owners are less likely to have timber production as a key objective and Kaetzel et al. (2002) observed that landowners most likely to engage in forest management lived closer to their land, had greater length of ownership, and/or inherited it.

Total forest area has been found to positively correlate with timber harvest and newcomers often have smaller parcels, leaving them with fewer traditional forest management options (Butler and Leatherberry 2004; Rickenbach and Kittredge 2009). Some express concern over newcomers establishing roots in rural areas because it can lead to increased parcelization and development, and constrain forest management across the landscape (Levitt 2002; Kittredge 2004). However, forest farming is possible on smaller parcels and can serve as an entryway to work with newer landowners on diversifying and expanding forest management. In addition to parcel size, absenteeism also affects forest management because the motivations and actions of absentee owners often differ from resident owners (Conway et al. 2003).

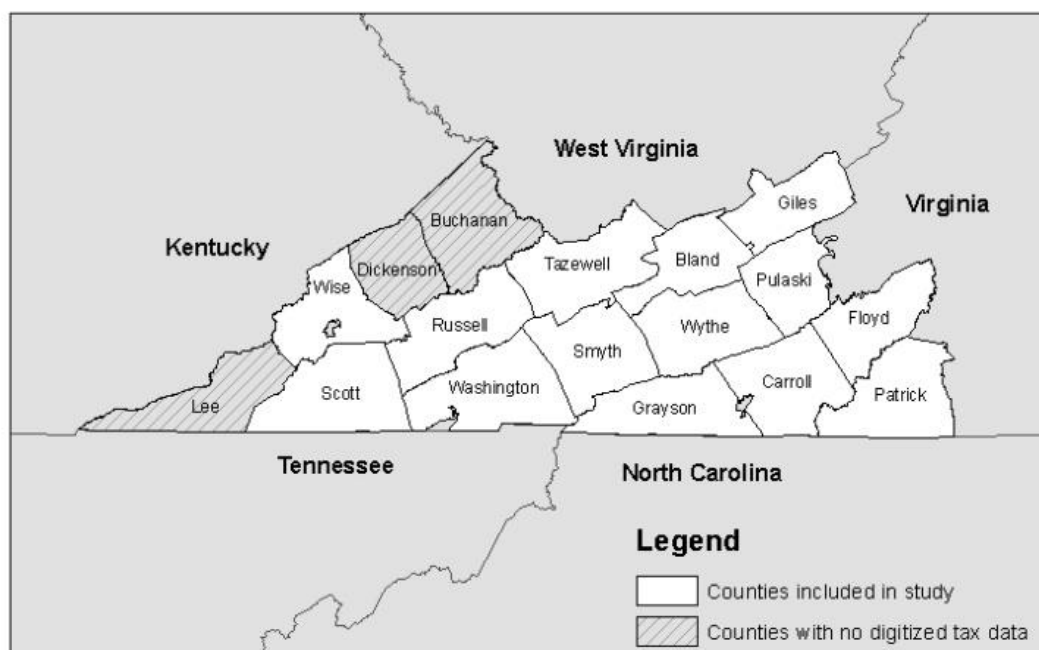
Absentee forest landownership is on the rise in the United States (Butler and Leatherberry 2004; Butler et al. 2007), with many living in urban areas owning land for amenity, not livelihood reasons (Petrzelka et al. 2013). These owners are less likely to maintain working forests because they have little interest in timber production and are notoriously hard to motivate (Conway et al. 2003; Rickenbach and Kittredge 2009). Many of absentee owners also have stated conservation objectives (Bond et al. 2018), but the

reality is that they consistently fall behind resident owners when it comes to implementing associated practices (Kendra and Hull 2005; Rickenbach and Kittredge 2009). Some argue that the lack of direct management by absentee owners can negatively affect forest ecosystem health (e.g., Fischer 2011). However, up to 30% of forest landowners in the South lease their forestland for managed uses, mostly for hunting and grazing, but some for timber production and other recreational activities (Butler et al. 2008).

There is little in the way of randomized, cross-sectional forestland owner research pertaining to participation in Appalachia's emerging forest farming markets, be it studies of direct farming or leasing land for production. This also is true for other regions in the United States, particularly in terms of leasing (Chamberlain et al. 2009). In light of this research gap, we set out to systematically study a segment of the Appalachian physiographic region with its longstanding NTFP markets and explore the potential for increasing cultivated supply in the contexts of cultural legacy, parcelization, intergenerational land transfers, amenity migration, and absenteeism to understand potential trends in the Appalachian region. Understanding how these factors relate to forest farming and leasing preferences among forest landowners in Appalachia will inform perspectives on market growth and bio-economic development policies in Appalachia, and forest farming adoption and growth in the United States more broadly.

## 5.4 Methods

We surveyed forest landowners in 14 Southwest Virginia counties who own five or more acres of forests. Southwest Virginia was chosen as a focus region because of proximity to Virginia Tech and a regional NTFP focused NGO organization that could benefit from the survey findings and because it has representation from three different physiographic provinces in Appalachia (Blue Ridge, Ridge and Valley, Alleghany Plateau). Counties included in this study maintained digitized tax parcel boundaries and associated metadata that were used to generate our study population; counties without this data were therefore excluded (Figure 5.1). Five acres was selected as the lower sampling threshold because forest farming is possible on small parcels (Burkhart and Jacobson 2009; Chamberlain et al. 2009). We also delimited sampling to five acres and above because this parcel size offers sufficient information for remotely assessing forest habitat using a geographic information system. ARC Map 10.4 was used to identify the forest landowner



Created by Katie Trozzo, November 2017

Figure 5.1 The 14 Appalachian Counties in Southwest Virginia included in study are named and coded white.

population by overlaying digitized county tax parcel data with the 2011 National Land Cover Dataset. We removed all public lands and company holdings to focus on family owners and aggregated the acreage among landowners who own multiple parcels in one county.

The final study population included 44,736 family forest landowners. We stratified the population before sampling to proportionally represent counties in the study area, followed by a second stratification of county sub-populations to represent different acreages of forestland. Acreage categories were exponential and ranged from 5-9, 10-19, 20-39, 40-79, 80-159, 160-319, 320-639 and more than 640 acres. We randomly sampled 1,040 family forest landowners from the double stratified population frame. Sampling was based on a 95% confidence level projection with an assumed 0.03 margin of error (Dillman et al. 2009). The resulting sample frame was surveyed according to Dillman et al. (2009) in a process that was reviewed and approved by the Virginia Tech Institutional Review Board (IRB# 17-951). This included a pre-notice letter, survey, and thank you/reminder post card sequence, followed by a replacement survey for non-respondents (Appendix G, H, I, J). We assessed non-response bias by comparing demographic data between early and late respondents (after Groves et al. 2002).

We designed the survey to collect information about respondent residency (i.e., absentee, fulltime, part time) and connections to the study area (i.e., do they come from the study region?) (Appendix K). The survey also collected data on demographics and land management activities, including age, gender, education, income, farming and retirement status, and the frequency with which they visit their forestland. We conducted geospatial analyses in ArcMap 10.4 to calculate respondent parcel size, forest acreage, and percent forested acreage.

We also studied whether owner objectives were consumptive or non-consumptive by asking respondents to select the top-three reasons they own land (adapted from Butler et al. 2016). Consumptive motivations included growing and selling timber, hunting, making money, growing and selling specialty woodland crops, diversifying financial portfolios, and land investment. Non-consumptive motivations included scenery, nature, wildlife protection, personal recreation, keeping land in the family, and privacy. Respondents were categorized as either consumptive or non-consumptive based on how they chose their top-three objectives. If they chose two or more consumptive objectives, they were grouped consumptive and vice versa.

We gauged respondent interest in forest farming and their likelihood of leasing land to others using Likert-type scales. The survey included an image of an intensive forest farming operation (Figure 5.2) along with a definition (Table 5.1), from which respondents based their responses. The image clearly distinguished forest farming to ensure respondent comprehension. We measured all responses on a 5-point Likert-type uni-polar interest scale.

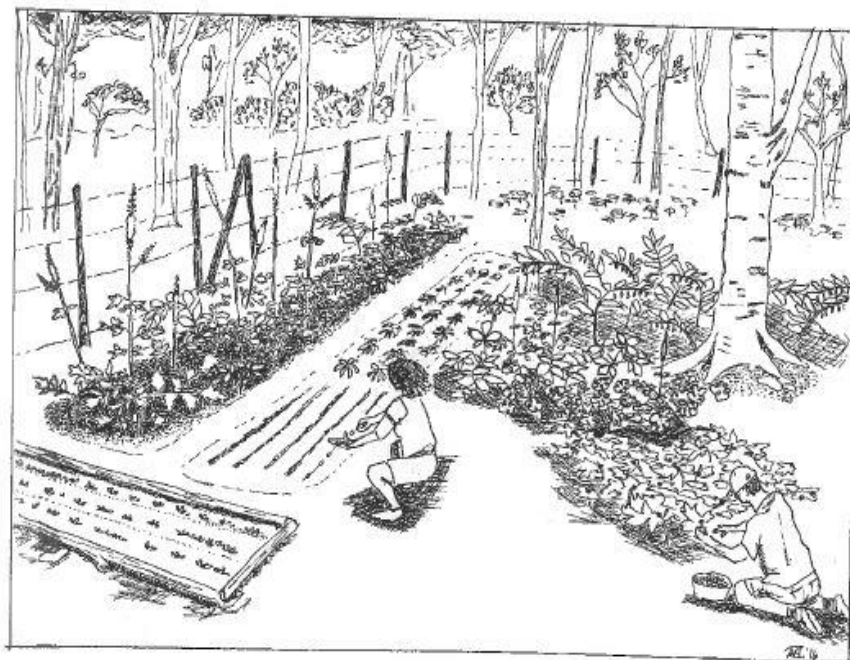


Figure 5.2 Scene of forest farming included in a survey of Appalachian forest landowners in 14 Southwest Virginia Counties.

Table 5.1 Forest Farming and non-timber forest products (NTFPs) definitions provided in a survey of Appalachian forest landowners in 14 Counties in Southwestern Virginia.

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Forest Farming          | Forest Farming is a practice where people intentionally grow or manage non-timber crops to sell in woodlands (See image). Forest farmers invest time and money in their operation like any other farmer and generally seek to sell their products at the best prices possible. It is different from wild harvesting because crops are cultivated or actively managed in their native forest habitat. Most crops are generally slow growing but forest farming can complement a variety of forest management objectives by providing products to sell between timber harvests or an alternative to cutting timber all together. |
| Non-timber forest crops | Non-timber forest crops are marketable forest products other than timber that grow naturally in wooded habitats. Crop types include food, medicine, decorative materials, and landscaping materials. Examples include elderberry, black walnuts, ramps, tree saps for syrup, pawpaw, edible mushrooms, black cohosh, ginseng, goldenseal, galax, grapevine, and pine straw.                                                                                                                                                                                                                                                    |

Interest in forest farming was measured using: 1=not at all to 5=extremely. Likelihood of leasing their land for forest farming was measured using: 1=no way to 5=absolutely. To simplify the scale for trend-oriented analysis, responses to the five-point scale were collapsed to create a 3-point scale spanning from 1=not interested or likely (1 and 2), 2=Neutral (3), and 3=interested or likely (4 and 5). They also were asked to assess their experience with harvesting NTFPs with a dichotomous response option of yes or no (definition in Table 5.1).

We analyzed survey data in IBM's SPSS 26.0 using descriptive statistics, two-step cluster analysis, and a non-parametric Kruskal-Wallis test. Descriptive statistics were calculated to depict the percentage of respondents that are interested in forest farming and leasing, and to cross-tabulate interest levels with owned forest acreage. Interest in forest farming and likelihood of leasing were cross tabulated to study the extent to which respondents are interested in one or the other, or both. Demographics were used to describe each segment including age, gender, education, income, and retirement status. We also reported the differences between groups in terms of whether they have harvested non-timber

forest products before, how often they visit their woods, and their reasons for owning land. Using data from geospatial analysis, we reported the differences between the groups in the average parcel size, forest size, and percent of the parcel that is forested.

Two-step cluster analysis was used to segment respondents into homogenous sub groups (following Trozzo et al. 2014b). The procedure allows for segmentation using both continuous and categorical data, and the silhouette measure of cohesion and separation indicates cluster quality. A silhouette between 0.5 and 1.0 indicates that intra-segments are adequately similar and inter-segments are adequately different. Drawing from the literature, we clustered respondents based on their residency in Southwest Virginia, whether they grew up in the region, and if they farm. We tested for statistically significant differences in ordinal interest and leasing likelihood responses between clusters using a Kruskal-Wallis test. The Kruskal-Wallis test is a non-parametric analog to a one-way ANOVA and is appropriate for non-normal parametric data and non-parametric data from measures such as ordinal Likert-type survey scales (Field 2005).

## **5.5 Results**

Twenty-five surveys were returned unusable because the respondent noted they do not own forestland due to change in ownership since the latest tax records or error in the geospatial measurements. Our usable sample was accordingly adjusted to 1,015. We received 293 usable surveys for a response rate of 28.9%. We found no significant difference between early and late respondents in their age, gender, income, education, retirement status, farming status, parcel and forest acres owned, Southwest Virginia residency, childhood residency, and interest in leasing land for forest farming. However, interest in forest farming differed between early and late respondents. More early respondents were interested or extremely interested in forest farming (49.3%) when statistically compared to late respondents who

were interested or extremely interested in forest farming (34.2%); meaning early respondents had 15% more people who were interested in forest farming.

We found that 45.4% of all respondents were interested or extremely interested in forest farming. They own 4,942 acres of forestland, which accounts for 46.6% of respondent forests (Table 5.2). Respondents that were not interested (32.2%) or neutral (22.5%) account for the majority of the respondent pool. Thirty-six percent of the respondents were likely to lease their land for forest farming. This group owned 4,355 acres of forestland, which accounts for 43.4% of land owned by respondents. The percentage of those interested in leasing is less than those that are not interested (42.1%) or neutral (21.9%), but the forests owned by those interested is greater than that among those that are not interested.

Respondents that were not interested in either forest farming or leasing land for this practice comprised 20.3% of respondents (Table 5.3). Twenty-five percent of those interested in forest farming also reported being likely to lease for the same purpose. Just over 10% were

Table 5.2 Responses to Likert-type questions in a survey of Appalachian forest landowners in 14 Southwest Virginia Counties. Questions pertained to their interest in forest farming and likelihood they would lease their forest for this purpose. Also reported are acreages owned by respondents across interest and likelihood responses.

|                                                                 |                        | Not at all interested |         | Extremely Interested |
|-----------------------------------------------------------------|------------------------|-----------------------|---------|----------------------|
| Categories                                                      |                        | Not interested        | Neutral | Interested           |
| <b>Forest Farming</b>                                           | Respondents (%)        | 32.2%                 | 22.5%   | 45.4%                |
|                                                                 | (n=289)                | (n=93)                | (n=65)  | (n=131)              |
| Does forest farming interest you?                               | Forest Acres Owned (%) | 28.0%                 | 25.5%   | 46.6%                |
|                                                                 | (Total=10,619)         | 2971                  | 2706    | 4942                 |
|                                                                 |                        | Not at all likely     |         | Absolutely Likely    |
|                                                                 |                        | Not likely            | Neutral | Likely               |
| <b>Leasing</b>                                                  | Respondents (%)        | 42.1%                 | 21.9%   | 36%                  |
|                                                                 | (n=278)                | (n=117)               | (n=61)  | (n=100)              |
| Would you lease your woods for others you trust to forest farm? | Forest Acres Owned (%) | 34.2%                 | 22.3%   | 43.4%                |
|                                                                 | (Total=10,031)         | 3437                  | 2239    | 4,355                |

\*Percentages have been rounded so may not add up to 100.

neutral regarding both farming and leasing, and 11.6 % were only interested in forest farming. Only 4.3% were likely to lease but not interested in forest farming, and 6.9% were likely to lease and neutral to the idea of forest farming equaling over 13% of the respondents. Almost 10% reported being neutral about forest farming and not likely to lease, and over 5% reported being neutral about leasing and not interested in forest farming. Neutral respondents on both fronts comprised 6.5% of the respondents, indicating that 21.5% of the respondents were neutral or below when it comes to forest farming or leasing.

Four forest landowner clusters were identified based on residency, roots in the region, and agricultural operations. The silhouette measure of cohesion and separation was 0.7, indicating a good fit. Groups included absentee and vacationers (n=61; 23.3%), newcomers (n=46; 17.6%), longtime farming residents (n=60; 22.9%), and longtime non-farming residents (n=95; 36.3%) (Table 5.4). Well over 80% of the absentee and vacationers do not live in Southwest Virginia (85.2%), and the remaining live there part time. In this same group, two-thirds (65.6%) did not grow up in the region and none actively farm. Almost all respondents in the newcomer group live in the region full-time (93.5%), and none of them grew up in the region (100%) but the majority actively farm (58.7%). Longtime farming residents almost all live in the region full-time (96.7%), grew up in the region (100%), and actively farm (100%). All longtime non-farming residents live in the region full-time (100%) and grew up in the region (100%), but none of them actively farm (100%).

Age distribution was generally similar across the clusters, but longtime farming residents have more respondents under the age of 39 (Table 5.5). In addition, newcomers and longtime non-farming residents have more respondents between the age of 40 and 59 and over 80 than the other groups. While gender across the clusters is generally similar, newcomers had the greatest percentage of female respondents and longtime farming residents

Table 5.3 Cross tabulation of survey measurements of interest in forest farming and likelihood of leasing for this purpose among Appalachian forest landowner respondents in 14 Southwest Virginia Counties.

| <b>Interest in forest farming</b>       | <b>Likelihood of leasing</b>    |              |                             | <b>Total</b>  |
|-----------------------------------------|---------------------------------|--------------|-----------------------------|---------------|
|                                         | Not at all likely<br>Not likely | Neutral      | Likely<br>Absolutely likely |               |
| Not interested at all<br>Not interested | 20.3% (n=56)                    | 5.4% (n=15)  | 4.3% (n=12)                 | 30.1% (n=83)  |
| Neutral                                 | 9.8% (n=27)                     | 6.5% (n=18)  | 6.9% (n=19)                 | 23.2% (n=64)  |
| Interested<br>Extremely interested      | 11.6% (n=32)                    | 10.1% (n=28) | 25.0% (n=69)                | 46.7% (n=129) |
| <b>Total</b>                            | 41.7% (n=115)                   | 22.1% (n=61) | 36.2% (n=100)               | 100% (n=276)  |

Table 5.4 Four groups of Appalachian forest landowners from 14 Southwest Virginia Counties. Groupings were determined by two-step cluster analysis using survey measurements of residency, roots in the region, and farming status. The percent and number of respondents for each variable are listed for each landowner group.

| Two-Step Cluster Landowner Groups (n=262) |            |                                               |                             |                                                    |                                                         |
|-------------------------------------------|------------|-----------------------------------------------|-----------------------------|----------------------------------------------------|---------------------------------------------------------|
| Variables                                 | Categories | Absentee<br>and Vacationers<br>(23.3%) (n=61) | Newcomers<br>(17.6%) (n=46) | Longtime<br>Farming<br>Residents<br>(22.9%) (n=60) | Longtime Non-<br>Farming<br>Residents<br>(36.3%) (n=95) |
| Live in SW<br>VA                          | Full-time  | 0% (n=0)                                      | 93.5% (n=43)                | 96.7% (n=58)                                       | 100% (n=95)                                             |
|                                           | Part-time  | 14.8% (n=9)                                   | 2.2% (n=1)                  | 3.3% (n=2)                                         | 0% (n=0)                                                |
|                                           | No         | 85.2% (n=52)                                  | 4.3% (n=2)                  | 0% (n=0)                                           | 0% (n=0)                                                |
| Grew up in<br>SW VA                       | Yes        | 34.4% (n=21)                                  | 0% (n=0)                    | 100% (n=60)                                        | 100% (n=95)                                             |
|                                           | No         | 65.6% (n=40)                                  | 100% (n=46)                 | 0% (n=0)                                           | 0% (n=0)                                                |
| Farm                                      | Yes        | 0% (n=0)                                      | 41.3% (n=19)                | 100% (n=60)                                        | 0% (n=0)                                                |
|                                           | No         | 100% (n=61)                                   | 58.7% (n=27)                | 0% (n=0)                                           | 100% (n=95)                                             |

had the greatest percentage of male respondents. Percentages also are similar for those who are retired in each cluster, though newcomers have a slightly higher percentage. Absentee and vacationers and newcomers have higher percentages of respondents with bachelor's or graduate degrees (60% and 71.1%, respectively) compared to longtime farming (40.7%) and non-farming residents (31.9%). They also have a higher percentage of respondents that make more than \$100,000 per year, (38.3% and 47.4%, respectively) compared to 22.9% of longtime farming residents and 20% of longtime non-farming residents. Absentee and vacationers have the highest percentage of respondents making greater than \$150,000 and newcomers have the highest amount making \$100,000 to \$149,000. Longtime farming residents have the highest percentage that make between \$50,000 to \$99,000 per year, and longtime non-farming have the highest percentage earning between \$25,000 to \$49,000 per year.

Respondent groups also differed in terms of their experience harvesting NTFPs, the frequency they visited their woods, and their reasons for owning land (Table 5.5).

Newcomers and longtime farming residents had the greatest percentage of respondents who had harvested NTFPs in their woods (37.2% and 33.9% respectively) compared to longtime non-farming (21.6%) and absentee and vacationers (7.4%). Newcomers had the greatest percentage of respondents who visited their land often or all the time (83.7%), followed by longtime farming residents (67.9%) and longtime non-farming residents (65.9%). Absentee and vacationers had the greatest percentage of respondents who visited their woods rarely to never (46.3%) or sometimes (38.9%). Absentee and vacationers, and newcomers had a greater percentage of members reporting non-consumptive reasons for owning land (84.6% and 83.7%, respectively) when compared to longtime farming and longtime non-farming residents (73.6% and 76.7%, respectively).

Table 5.5 Demographics and characteristics of respondents in four Appalachian forest landowner groups from 14 Counties in Southwest Virginia. Percent or mean are reported for each category.

| Variables               | Categories             | Absentee and Vacationers (%) (n=61) | Newcomers (%) (n=46) | Longtime Farming Residents (%) (n=60) | Longtime Non-Farming Residents (%) (n=95) |
|-------------------------|------------------------|-------------------------------------|----------------------|---------------------------------------|-------------------------------------------|
| Age (y)                 | ≤ 39                   | 1.8% (n=1)                          | 2.3% (n=1)           | 5.2% (n=3)                            | 2.2% (n=2)                                |
|                         | 40 to 59               | 30.9% (n=17)                        | 36.4% (n=16)         | 25.9% (n=15)                          | 33% (n=30)                                |
|                         | 60-79                  | 60% (n=33)                          | 50% (n=22)           | 63.8% (n=37)                          | 53.8% (n=49)                              |
|                         | ≥ 80                   | 7.3% (n=4)                          | 11.4% (n=5)          | 5.2% (n=3)                            | 11% (n=10)                                |
| Gender                  | Female                 | 28.1% (n=16)                        | 31.8% (n=14)         | 22% (n=13)                            | 28.6% (n=26)                              |
|                         | Male                   | 71.9% (n=41)                        | 68.2% (n=30)         | 78% (n=46)                            | 71.4% (n=65)                              |
| Education               | High school or less    | 10% (n=6)                           | 8.9% (n=4)           | 30.5% (n=18)                          | 29.7% (n=27)                              |
|                         | Some College           | 20% (n=12)                          | 13.3% (n=6)          | 15.3% (n=9)                           | 23.1% (n=21)                              |
|                         | Associates/Tech Degree | 10% (n=6)                           | 6.7% (n=3)           | 13.6% (n=8)                           | 15.4% (n=14)                              |
|                         | Bachelor's Degree      | 28.3% (n=17)                        | 42.2% (n=19)         | 28.8% (n=17)                          | 19.8% (n=18)                              |
|                         | Graduate Degree        | 31.7% (n=19)                        | 28.9% (n=13)         | 11.9% (n=7)                           | 12.1% (n=11)                              |
| Income                  | ≤ \$24,999             | 4.2% (n=2)                          | 10.5% (n=4)          | 10.4% (n=5)                           | 12.9% (n=9)                               |
|                         | \$25,000-\$49,999      | 21.3% (n=10)                        | 18.4% (n=7)          | 14.6% (n=7)                           | 40% (n=28)                                |
|                         | \$50,000-\$99,999      | 36.2% (n=17)                        | 23.7% (n=9)          | 52.1% (n=25)                          | 27.1% (n=19)                              |
|                         | \$100,000-\$149,999    | 10.6% (n=5)                         | 31.6% (n=12)         | 14.6% (n=7)                           | 10% (n=7)                                 |
|                         | ≥ \$150,000            | 27.7% (n=13)                        | 15.8% (n=6)          | 8.3% (n=4)                            | 10% (n=7)                                 |
| Retired                 | Yes                    | 50.8% (n=30)                        | 59.1% (n=26)         | 51.7% (n=31)                          | 54.8% (n=51)                              |
|                         | No                     | 49.2% (n=29)                        | 40.9% (n=18)         | 48.3% (n=29)                          | 45.2% (n=42)                              |
| Harvested NTFPs         | Yes                    | 7.4% (n=4)                          | 37.2% (n=16)         | 33.9% (n=19)                          | 21.6% (n=19)                              |
|                         | No                     | 92.6% (n=50)                        | 62.8% (n=27)         | 66.1% (n=37)                          | 78.4% (n=69)                              |
| Visit Woods             | Often—All the time     | 14.8% (n=8)                         | 83.7% (n=36)         | 67.9% (n=38)                          | 65.9% (n=58)                              |
|                         | Sometimes              | 38.9% (n=21)                        | 14% (n=6)            | 28.6% (n=16)                          | 19.3% (n=17)                              |
|                         | Rarely—Never           | 46.3% (n=25)                        | 2.3% (n=1)           | 3.6% (n=2)                            | 14.8% (n=13)                              |
| Reasons for owning land | Non-consumptive        | 84.6% (n=44)                        | 83.7% (n=36)         | 73.6% (n=39)                          | 76.7% (n=66)                              |
|                         | Consumptive            | 15.4% (n=52)                        | 16.3% (n=7)          | 26.4% (n=14)                          | 23.3% (n=20)                              |

\*Total n within categories does not always add up do total n within the clusters due to non-response for certain variables.

We also observed differences in parcel size, forest size, and percent of the parcel forested for respondents in each group (Table 5.6). Longtime farming residents had the largest parcel sizes (48.4 median acres), but shared similar forest sizes with the other groups because their parcels have a smaller percentage of forest area (61.2%). Absentee and vacationers had a slightly larger percentage of forested area (88.7%) compared to newcomers (79%) and longtime non-farming residents (76.4%). Kruskal-Wallis test results indicated that forest landowner clusters do not differ significantly with respect to their interest in forest farming and likelihood of leasing (Table 5.7).

While not significant, trends among the different groups with respect to their interest in forest farming and likelihood of leasing were apparent (Table 5.8). Longtime non-farming residents were slightly less interested in forest farming compared to other groups. Absentee

Table 5.6 Descriptive statistics pertaining to parcel size, forest size, and percent of parcel that is forested for four Appalachian forest landowner groups from 14 Southwest Virginia Counties.

| Cluster                               | Descriptive | Parcel Size (ac) | Forest size (ac) | % Parcel Forested |
|---------------------------------------|-------------|------------------|------------------|-------------------|
| Absentee and Vacationers (n=61)       | Median      | 27.6             | 20.1             | 88.7              |
|                                       | Stdev       | 52.9             | 38.8             | 16.7              |
|                                       | Min         | 5.5              | 5.0              | 27                |
|                                       | Max         | 294.5            | 178.1            | 100               |
| Newcomers (n=46)                      | Median      | 28.6             | 18.8             | 79.0              |
|                                       | Stdev       | 84.0             | 73.1             | 20.0              |
|                                       | Min         | 5.0              | 5.0              | 32                |
|                                       | Max         | 537.0            | 469.6            | 100               |
| Longtime Farming Residents (n=60)     | Median      | 48.4             | 19.3             | 61.2              |
|                                       | Stdev       | 79.0             | 46.9             | 27.0              |
|                                       | Min         | 9.2              | 6.3              | 4                 |
|                                       | Max         | 356.8            | 207.9            | 100               |
| Longtime Non-farming Residents (n=93) | Median      | 27.0             | 18.7             | 76.4              |
|                                       | Stdev       | 41.9             | 34.1             | 24.4              |
|                                       | Min         | 5.2              | 5.2              | 12                |
|                                       | Max         | 218.2            | 182.8            | 100               |

Table 5.7 Kruskal-Wallis tests for statistical significance between four forest landowner groups from 14 Southwest Virginia Counties regarding forest farming interest and likelihood of leasing. Mean scores reported for each group also are reported.

| Variable                 | Cluster means                   |                  |                                   |                                       | Kruskal-Wallis Test |                    |
|--------------------------|---------------------------------|------------------|-----------------------------------|---------------------------------------|---------------------|--------------------|
|                          | Absentee and Vacationers (n=61) | Newcomers (n=46) | Longtime Farming Residents (n=60) | Longtime Non-Farming Residents (n=95) | t-statistic         | Asymptomatic Sign. |
| Forest farming interest* | 3.08                            | 3.47             | 3.35                              | 3.05                                  | 2.63                | 0.45               |
| Likelihood of leasing**  | 3.25                            | 2.75             | 2.90                              | 2.68                                  | 5.54                | 0.14               |

\* Response scale is 1 to 5 with 1 being not interested at all and 5 being extremely interested

\*\* Response scale is 1 to 5 with 1 being not at all likely and 5 being extremely likely

Table 5.8 Percent responses for forest farming interest and likelihood for leasing measures among four Appalachian forest landowner groups from 14 Southwest Virginia Counties.

| Variable                |                       | Absentee and Vacationers (n=61) | Newcomers (n=46) | Longtime Farming Residents (n=60) | Longtime Non-Farming Residents (n=95) |
|-------------------------|-----------------------|---------------------------------|------------------|-----------------------------------|---------------------------------------|
| Forest farming interest | Not interested at all | 32.8% (n=20)                    | 15.6% (n=7)      | 28.3% (n=17)                      | 34% (n=32)                            |
|                         | Not interested        |                                 |                  |                                   |                                       |
|                         | Neutral               | 18% (n=11)                      | 33.3% (n=15)     | 23.3% (n=14)                      | 22.3% (n=21)                          |
| Likelihood of leasing   | Interested            | 49.2% (n=30)                    | 51.1% (n=23)     | 48.3% (n=29)                      | 43.6% (n=41)                          |
|                         | Extremely interested  |                                 |                  |                                   |                                       |
|                         | Not likely at all     | 31.1% (n=19)                    | 52.3% (n=23)     | 33.9% (n=20)                      | 48.4% (n=46)                          |
| Likelihood of leasing   | Not likely            |                                 |                  |                                   |                                       |
|                         | Neutral               | 21.3% (n=13)                    | 18.2% (n=8)      | 28.8% (n=17)                      | 21.1% (n=20)                          |
|                         | Likely                | 47.5% (n=29)                    | 29.5% (n=13)     | 37.3% (n=22)                      | 30.5% (n=29)                          |
| Likelihood of leasing   | Absolutely likely     |                                 |                  |                                   |                                       |

and vacationers also had the greatest percentage reporting higher likelihoods in terms of leasing their forests for farming (47.5%), followed by longtime farming residents (37.3%). Newcomers (29.5%) and longtime non-farming residents (30.5%) were less likely to report probable leasing.

## **5.6 Discussion**

Close to half of forest landowner respondents in this study were either interested or highly interested in forest farming (45.4%). This rate was higher than that in studies by Workman et al. (2003) in northern Florida (40%), Barbieri and Valdivia (2010) in Missouri (38.6%), and Strong and Jacobson (2005) in Pennsylvania (38.6%). In terms of land base, interested or highly interested respondents owned 46.6% of the forested acreage among survey respondents. Early and late respondents were similar across most study variables (e.g., age, gender, likelihood of leasing forestland for forest farming), but interest in forest farming was significantly higher among early respondents, suggesting that rates likely taper off among non-respondents and the overall average is lower than observed.

Thirty-six percent of forest landowners in this study were interested in leasing a portion of their land for forest farming. These owners possessed 43.4% of the forested acreage among the respondents. This potential is similar to that among forest landowners in the South who rent land out for grazing, hunting, and timber production (30%) (Butler et al. 2008). It also points to the existence of a potential and likely promising form of forest leasing that has not been explored as a broad strategy in the study region to date. Interestingly, the percentage of forested acreage tied to owner respondents who reported being likely or highly likely to lease forestland for forest farming is higher than the proportion of agricultural land rented in Appalachia (35%) (Bigelow et al. 2016).

Twenty-five percent of the respondents that were interested or highly interested in forest farming also were likely or highly likely to lease their land for this practice, which

differs from trends in farmland rentals across the US where only 8% is rented by owners who also farm (Bigelow et al. 2016). Most people that rent farmland are not actively involved in farming themselves, but the duality of farming interest and leasing likelihood among one-quarter of respondents indicates that an additional level of agreement and social cooperation may be necessary to navigate lease terms and balance collaborative forest farming endeavors.

Trends of absenteeism and amenity migration are apparent in our study with clear differences between forest landowner groups based on residency, roots in the region, and farming status (absentee and vacationers=23.3%, newcomers=17.6%, longtime farming residents=22.9%, and longtime non-farming residents=36.3%). All longtime farming residents and longtime non-farming residents lived full time on their land and had deep family ties to the region. On the other hand, no absentee and vacationers lived full time on their land, nor did they actively farm and about two thirds did not come from the region. Almost all newcomers lived full time in the region, with only a small percentage residing part-time or not at all in the study area. Those who were not full-time residents may have purchased land for use as vacation presently, but also may intend to live there full-time in the future (Stewart 2002). Just over half of the newcomers indicated that they farm, which reflects amenity migrant diversity, some of whom want to farm while others move for benefits such as scenery, rural lifestyle, or to raise a family (Kendra and Hull 2005).

More absentee and vacationers, and newcomers had bachelor or graduate degrees compared to both longtime resident groups. These groups also had more respondents making greater than \$100,000 per year when compared to longtime residents. Longtime residents were more likely than newcomers, and absentee and vacationer groups, to own land for consumptive reasons, such as income and investment. Though lower, longtime farming and non-farming residents also more regularly reported non-consumptive over consumptive forest

ownership values, which deviates from extractive characterizations of longtime resident land use perspectives (e.g., Law and McSweeney 2013).

Newcomers differed slightly from the other groups regarding gender, retirement status, and forest visitation. They had a greater amount of females, especially compared to longtime farming residents, which may be a product of the recent increase in female farmers in the United States (Perdue and Hamer 2019). Newcomers also have a slightly higher percentage that are retired compared to other groups, perhaps reflecting the fact that many amenity migrants are retirees (Nelson et al. 2004). They also had the greatest percentage that frequently visited their forest. This finding may relate to the novelty of ownership among these new owners and that natural and lifestyle amenities are a major draw for many (Kendra and Hull 2005).

A substantial portion of longtime farming and non-farming residents also frequently visited their forest, perhaps due to proximity or longstanding family traditions. However, longtime non-farming residents were less likely to report harvesting NTFPs, which may be due to the fact that they are not as actively involved in production when compared to longtime farming residents and many of the newcomers. It also may be a natural progression for those farming to eventually look to their forests for products to harvest.

Despite different rates of forest visitation, all owner segments possessed a similar amount of average forested acres. Longtime farming residents tended to own larger parcels, but due to a smaller percent of average forest cover, often in relation to their additional possession of open agricultural land, they ended up owning similar amounts of forested acreage compared to the other owner groups. Absentee and vacationers owned parcels with the greatest percent of forest cover, perhaps because their land is not used as a primary residence and does not have additional land uses associated with such ownership.

Forest farming interest and likelihood of leasing did not differ significantly between the four groups of Southwest Virginia Appalachian forest landowners identified in this study. In other words, results indicate that no “type” of forest landowner was significantly more interested in forest farming or likely to lease over others, though the distribution of interest and likelihood was not always equally balanced for any given respondent. Nevertheless, results were statically similar across owners with diverse residency, regional connections, and farming backgrounds. Interested and likely respondents made up less than half of the total forest landowner respondents, but their interest and leasing potentially signal that evolving forest farming markets may parallel a spectrum of producer interest across a broad base of forest landowners in Appalachia, from rooted farmers to recently settled amenity migrants.

Our findings differ from much of the agroforestry and forest management literature, where at least one group in a population is found to be less interested in a potential production system (Butler et al. 2007; Majumdar et al. 2008; Trozzo et al. 2014b). It also differs from much of the agroforestry literature that suggests that gender, farming status, education, and income influence adoption (Pattanayak et al. 2003; Strong and Jacobson 2005; Arbuckle et al. 2009; Barbieri and Valdivia 2010; Trozzo et al. 2014a; Trozzo et al. 2014b). Forest farming generally may resonate among a percentage of forest landowners regardless of their backgrounds and management characteristics, suggesting that interest stems from motivations across the conservation and production spectrum, with both ideology and markets driving growth in forest farming (Chamberlain et al. 2009). It also stands to open other forest management doors for forest landowners that are important for sustaining healthy and productive forests that provide multiple products and services.

Absentee and vacationers were just as interested and likely to lease as those who live in the study area full-time. The fact that they were despite having little experience with NTFPs may relate to their higher levels of education and income, which as Arbuckle et al.

(2009) and Pattanayk et al. (2003) reasoned, can reduce barriers to implementing interesting production opportunities. While it is common for absentee owners to be drawn to practices related to conservation (Bond et al. 2018), some studies have found they are less likely to actually enact these practices (Kendra and Hull 2005; Rickenbach and Kittredge 2009). This may explain why their leasing likelihood was slightly higher on average given it could be a way to participate without the associated management hurdles. Forest farming also could be a novel practice that draws in absentee and vacationers in ways that timber management does not.

The leasing likelihood levels among longtime farming residents could be due to familiarity through participation in the agricultural sector, while their interest may be tied to longstanding cultural and market traditions associated with numerous regional NTFPs. The same also could be true for longtime non-farming residents when it comes to their interest and likelihood, which Trozzo et al. (2014a) argued often relates to experience with and awareness of NTFPs. Significant amounts of newcomers also were interested in leasing their land for forest farming, but ultimately may not do so at high rates. Yung and Belksy (2007) reason that newcomers often are stricter about property rights compared to longtime residents and thus less likely to allow neighbors to access their land. It is possible newcomers in Appalachia are less interested in leasing because they cherish their recently acquired land and feel more protective especially when they may not have well established relationships with neighbors.

## **5.7 Conclusion**

The level of interest in forest farming and likelihood of leasing we observed in this study may have important implications in the evolution and growth of NTFP supply chains in Appalachia and beyond. While we didn't study the entirety of the Appalachian region, many rural areas in the region experience similarities in broader trends of demographics,

economics, and land use. If our results are any indicator of overall interest in Appalachia, then the potential land base available for forest farming by both landowners and lessees could be substantial and eventually supply NTFP-dependent industries with enough cultivated raw material to develop large-scale forest farmed product lines. Positive economic impacts in the region could be significant, particularly given that studies increasingly find consumers demand the types of sustainable and traceable herbal products that are possible through forest farming (Craker and Gardener 2005; Laird et al. 2005). Further, the opportunity for established leases may open up the possibility for understory production among traditional wild harvesters, which also could improve sourcing and sales.

However, future research should focus on the unique factors at play in coal producing counties in the Alleghany Plateau in Appalachia. Three of the four Southwest Virginia counties most impacted by coal mining were not included in this study because they lacked digitized county tax parcel data very likely because they are most economically distressed counties in Virginia (Appalachian Regional Commission 2018). If forest farming is to benefit those who are most in need, specific attention must be paid to coal counties.

Another possible implication of our research is that forest farming may offer a gateway into forest ecosystem management among the next-generation of Appalachian forest landowners, regardless of whether they are absentee and vacationers, newcomers, or longtime residents. It appears forest farming is a draw to owners who are not typically interested in timber production (newcomers and absentees and vacationers) and those who have traditionally been characterized as being more open to timber production (longtime residents). In that regard, results from this study suggest that from a forest management perspective, forest farming is compatible with various sets of owner objectives. Supporting forest landowners through technical assistance, cost-share, insurance programs, and

supporting policies is a way to help improve forest health and stakeholder engagement across Appalachia, as well as support forest-dependent communities in transition.

## CHAPTER 6: CONCLUSION

### 6.1 Summary

This research explored facets of NTFP production as a livelihood opportunity in Appalachia using an embedded case study approach. We first studied key aspects of the contemporary Appalachian forest food and medicine culture in Grayson County, Virginia and explored motivational differences between newcomers and multigenerational residents. We also researched NTFP livelihood development assets, obstacles, and strategies in the community. In addition, we conducted a regional study to understand Southwest Virginia forest landowner interest in forest farming and leasing land for forest farming and if those interested differed based on demographic or land characteristics.

We answered our research questions about who is harvesting NTFPs in our contemporary context, what motivates them and their species preferences and uses by comparing interview data from newcomers and multigenerational NTFP harvester and stakeholders in Grayson County, Virginia. Financial benefits, nature, and personal preferences (personal fulfillment, learning and creativity, and lifestyle) were key motivators. Multigenerational residents emphasized income through market sales of medicinal forest species, noting harvest of multiple product types (plants, bark, leaves, buds). They also mentioned edible species (mushrooms and nuts), but to a lesser degree. On the other hand, newcomers were more likely to balance their focus between medicinal and edible forest species, as well as home use and market sales. When compared to multigenerational participants, newcomers were more inclined toward a broad suite of edible species (mushrooms, nuts, fruit, plants). However, for medicinal forest species they limited harvesting to herbaceous plants.

We answered our research question focused on the perceived assets, obstacles, and strategies for NTFP development in an Appalachian community by analyzing interview data

of key stakeholders collected within the context of a 3-year action research process. We found references to natural, human, and cultural capital as both an asset and an obstacle. Financial capital was also one of the top obstacles whereas social capital was one of the top assets. Built and political capital received less attention as an obstacle, asset, and strategy. References to strategies for NTFP livelihood development focused on social, human, and financial capital investments.

Our regional survey helped us answer our research question focused on the extent of interest in forest farming and leasing land for this practice and whether those who are interested differ based on demographic and land characteristics by surveying forest landowners in 14 Southwest Virginia Counties. We found that 45% of the respondents were interested or extremely interested in forest farming. These interested owners possessed nearly 47% of the forestland. Those that were likely or extremely likely to lease their land accounted for 36% of all respondents and owned 43% of the forestland. Four groups of landowners were identified based on residency in the region and farming status: Absentee and Vacationers, Newcomers, Longtime Farming Residents, and Longtime Non-Farming Residents. While the groups differed demographically, their interest in forest farming or leasing did not.

## **6.2 Implications**

This study has taken place during a dynamic period in NTFP industry with markets responding to emerging demand for sustainably sourced and high quality NTFPs. The considerable and broad interest in forest farming among forest landowners indicates the potential for widespread supply to discerning buyers if consumer demand increases. Higher price points in these markets could support the viability of a range of NTFP species in forest farming systems to support livelihoods in the region beyond those NTFPs that have traditionally proven themselves (i.e. American ginseng). Further, landowner interest in leasing land for forest farming could provide possibilities for landless harvesters to transition

into stewardship and cultivation via leasing of forest land and to further support a critical mass of growers. Traditionally, NTFP wild harvesting has been approached as a source of side income and our study shows people still view it and forest farming in a similar manner meaning this endeavor may be one of a number of livelihood generating activities that people are navigating.

The shifting social landscape of Appalachia also influences NTFP livelihood opportunities with newcomers and multigenerational residents increasingly interconnecting in communities. These groups together have their impact on the contemporary state of NTFPs in the region with multigenerational residents focused more on financial benefits and an increasing focus on environmental and lifestyle motivators as newcomers take root. Further, medicinal species are a primary focus for many with a monetary focus, but edible species are also of interest to many, which indicates possibility to explore a wider range of forest farmed products if the markets were to support it. Beyond market uses, many also use edible and medicinal NTFPs in the home, indicating a significant aspect of NTFPs livelihoods may reside outside of the market. Communities in Appalachia may find success in drawing upon the cultural, natural, and human capital around NTFPs as well as the strong social capital often present in rural communities to further invest in social networking, education, financial incentives, and funding to support NTFP livelihood development.

This research also has implications for the forests of Appalachia. It appears a broad array of forest landowners are interested in forest farming and leasing, including those traditionally not drawn to timber management. Forest farming and NTFPs may provide an entry way to greater attention and stewardship of forested ecosystems in the region amongst the current intergenerational land transfer.

### **6.3 Practical recommendations**

A few practical recommendations have emerged from this research around educational programming, networking, and leasing agreements. Based on our findings, educational programming may offer a primary route for building NTFP livelihood opportunities in Appalachia and is a way of building human and social capital. This research points to the need for programming that covers both market and home/non-market uses of NTFPs and includes both edible and medicinal species. I also recommend including forest farming and NTFP programming within other comprehensive land management programs such as whole farm planning or sustainable farming trainings and targeting broader audiences of those who have land-based businesses (e.g. agri-tourism, farming).

Another recommendation emerging from this research is development of an NTFP/Forest farming leadership and outreach program. The National Wildlife Foundation has developed a “Cover Crop Champions” program in the Midwest that compensates and trains farmers willing to provide outreach to others in their communities about cover crops. Strategies outlined by Grayson County NTFP stakeholders pointed to increasing social and human capital as a primary entry point for building NTFP livelihoods. An NTFP/Forest Farming leadership and outreach program may provide opportunities to invest in both of these capitals through training of these leaders and networking among the cohort, within their communities, and with technical experts. This approach could also begin weaving a larger social network around NTFPs and forest farming regionally and could be led by an organization such as the Appalachian Beginning Forest Farmer Coalition.

Finally, the development of a land leasing program for forest farming, perhaps led by regional NGO organizations, could provide a system for forest landowners and forest farmers to connect. A leasing program could interface at an intensive or extensive level, but because these types of arrangements are relatively uncommon it could be beneficial to pilot at least a

few lease agreements and translate that process for others. Technology could also have a place in assessing habitat suitability of forest land for NTFPs remotely. If the market demand grows for forest farmed NTFPs, land access could be a limiting factor and leasing programs may be critical to providing steady and sustainable supply.

#### **6.4 Recommendations for Future Research**

Additional research is needed to understand the nature of NTFP harvests in modern-day Appalachia, and to outline ways of supporting forest farming to benefit both Appalachian communities and landscapes. It will be important to explore the extent of home use compared to market sales and more closely consider the gendered nature of these two distinct economies. Also important is learning more about sustainable harvesting, such as better yield projections for forest farming operations across diverse ecotypes. Further, research driven by the community that determines how to work with NTFP species, develop products and markets, and collectively organize stakeholders could increase the role of NTFPs in diversified economic portfolios among many Appalachian communities. Additional research on forest farming also is needed to better understand viable price points that adequately support NTFP cultivation. Also helpful would be studies of various land lease arrangements and modifications needed for leasing land to forest farmers.

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## APPENDIX A. IRB APPROVAL LETTER FOR QUALITATIVE PROTOCOL



Office of Research Compliance  
Institutional Review Board  
North End Center, Suite 4120, Virginia Tech  
300 Turner Street NW  
Blacksburg, Virginia 24061  
540/231-4606 Fax 540/231-0959  
email [irb@vt.edu](mailto:irb@vt.edu)  
website <http://www.irb.vt.edu>

### MEMORANDUM

**DATE:** February 12, 2016  
**TO:** John F Munsell, Katie E Trozzo  
**FROM:** Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)  
**PROTOCOL TITLE:** Social Organization for Non-Timber Forest Product Economic Development in Appalachia  
**IRB NUMBER:** 16-005

Effective February 12, 2016, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

### PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 5,6,7**  
Protocol Approval Date: **February 12, 2016**  
Protocol Expiration Date: **February 11, 2017**  
Continuing Review Due Date\*: **January 28, 2017**

\*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

### FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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## APPENDIX B. RENEWED IRB APPROVAL LETTER FOR QUALITATIVE PROTOCOL



Office of Research Compliance  
Institutional Review Board  
North End Center, Suite 4120, Virginia Tech  
300 Turner Street NW  
Blacksburg, Virginia 24061  
540/231-4606 Fax 540/231-0959  
email [irb@vt.edu](mailto:irb@vt.edu)  
website <http://www.irb.vt.edu>

### MEMORANDUM

**DATE:** January 25, 2018  
**TO:** John F Munsell, Katie E Trozzo  
**FROM:** Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)  
**PROTOCOL TITLE:** Social Organization for Non-Timber Forest Product Economic Development in Appalachia  
**IRB NUMBER:** 16-005

Effective January 25, 2018, the Virginia Tech Institutional Review Board (IRB) approved the Continuing Review request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

### PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 5,6,7**  
Protocol Approval Date: **February 12, 2018**  
Protocol Expiration Date: **February 11, 2019**  
Continuing Review Due Date\*: **January 28, 2019**

\*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

### FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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## **APPENDIX C. QUALITATIVE RESEARCH PROTOCOL**

1. Introduce myself
2. Explain the project and why I wanted to interview them
  - a. NTFPs=
3. Describe what will happen in the interview
  - a. A series of questions about NTFPs
  - b. Will record the interview if that is okay, tell why important
4. Obtain signed consent
  - a. Explain why it is needed
  - b. Review the consent form
  - c. See if they have questions
  - d. Collect signed consent
5. Okay to start recording?
  - a. Start recording
6. Interview questions
7. Any questions for me?
8. Stop Recording
9. Willing to review my notes? Make sure I got the information correct or to add anything else.
10. Okay to be in touch with additional questions?
11. I will share a summary of the results with them when I finish
12. Thank you for your time

## APPENDIX D. INFORMED CONSENT FOR QUALITATIVE PROTOCOL

### Informed Consent Form

Please read the following information to determine if you are willing to participate in this study by conducting an interview. If yes, please sign to indicate your consent on page 2.

**Title of Study:** Social Organization for Non-Timber Forest Product Economic Development in Appalachia

**Researchers:** Katie Trozzo and John Munsell of Virginia Tech

**What the study is about:** This study aims to understand community member's interest and experience in producing and marketing specialty products from the woods and fields aka non-timber forest products (examples: hazelnut, elderberry, black walnut, black cohosh, ginseng). It also seeks to understand resources Grayson has and strategies to overcome barriers.

**What we will ask of you:** We will ask you to review and sign this consent form before the interview. The interviews will be audio recorded and we will ask you questions about your interests, experiences, thoughts about non-timber forest products and your perspectives about resources and barriers in Grayson County. The interview should last no longer than 1.5 hours. After the interview, I will type up the notes from the audio recording and will give you the opportunity to read through them to make sure I correctly captured your responses and add anything you find missing. We ask that you allow your pooled and summarized confidential responses to be shared with the community.

**Risks:** This study was reviewed and approved by the Virginia Tech Institutional Review Board. The risks associated with this study are considered minimal. For growers and harvesters, the minimal risk of others finding out about highly valuable crops you may be growing has been accounted for by ensuring your interview remains confidential.

**Benefits:** There are no financial benefits or compensation for participating in this interview. However, you may receive the indirect benefit of a more comprehensive action plan for moving forward with non-timber forest products in Grayson County.

**Confidentiality:** Your interview will remain confidential unless you specifically wish for others to know your identity in community and academic publications. With your permission, we may use quotations from your interview, but will use a pseudonym (false name). *If you are a representative of a community organization*, you may want to consider sharing your identity for your response about the role you may be willing to play to move non-timber forest products forward in Grayson.

**Safety of Your Information:** We will store all audio recordings and transcriptions on a password-secure computer and/or external hard drive. Any audio we record of the interviews we will use strictly for analyzing results and checking notes. The only people that will have access to the recording will be Katie Trozzo and John Munsell. After transcription, we will destroy the audio recordings.

We will use codes or pseudonyms (i.e. false names) for your name and any other individuals you mention. Any details in the interview recordings that could identify you will also be altered during the transcription process. These codes/pseudonyms will also be used in preparing all written reports of the research, unless you consent to sharing your identity for public documents.

It is possible for the Institutional Review Board (IRB) at Virginia Tech to view this study's collected data for auditing purposes. The IRB is responsible for overseeing the protection of human participants involved in research.

**Your Participation is Voluntary:** Your participation in this study is entirely voluntary. You can refuse to participate and are free to choose not to answer any question or to withdraw from this research at any time. If you choose to withdraw from the research, any information about you and any data not already analyzed will be destroyed.

### Questions or Concerns

Should you have any questions about this research, please contact:

Katie Trozzo, PhD Candidate  
Forestry, Virginia Tech  
828-553-3008  
ketrozzo@vt.edu

John Munsell, Associate Professor  
Forestry, Virginia Tech  
540-231-1611  
jfmunsel@vt.edu

Should you have questions about your rights, and whom to contact in the event of a research-related injury, please contact:

Dr. David Moore, Associate VP for Research Compliance and IRB Chair.  
(540) 231- 4991  
[moored@vt.edu](mailto:moored@vt.edu)

### Consent to Participate in the Study –COMPLETE BEFORE THE INTERVIEW

Please read the statement below and sign your name if you consent to participating in the study. Please indicate whether you consent to the use of your quotations by checking yes or no.

*"I have read the above information and have received answers to any questions I asked. I consent to take part in the study."*

☐ Yes ☐ No I consent to the use of my quotations using a pseudonym (optional)

Your Signature \_\_\_\_\_ Date \_\_\_\_\_

Your Name (printed) \_\_\_\_\_

### Consent to Use Your Identity (optional)—COMPLETE AFTER THE INTERVIEW

If you consent to the use of your identity, please check your preferred choice below and then sign your name. Please note that the use of your identity means community members and others reading published articles will know your identity and the response you gave.

- ☐ I consent to the use of my identifying information in public documents for all my responses
- ☐ I consent to the use of my identifying information in public documents for only my response about my potential role in moving forward specialty products in Grayson.
- ☐ I consent to the use of my identifying information in public documents for only my responses about the following topics:

\_\_\_\_\_  
\_\_\_\_\_

Your Signature \_\_\_\_\_ Date \_\_\_\_\_

## APPENDIX E. INTERVIEW QUESTIONS

1. When did you **arrive** in Grayson and what **brought** you here? Where were you **from** before this?
2. What is your **experience** with NTFPs? Grow, harvest, buy, or sell? **How long? Any stories?** Things that **went really well** or things that have **gone wrong**?  
Examples=dandelion wine and blueberries
3. **What NTFPs** do you currently grow, harvest, buy and sell? **Why these crops?** Are there **other NTFPs** you are considering? **Why?**
4. **Why** do you do it **in general**?
5. **How** do you harvest or grow NTFPs? Any specific **guidelines, principles, techniques, practices?**
6. What do you **do with your harvest?** Personal or commercial? Small or Large Scale?
7. What **characteristics and resources** do you think Grayson has going for it to further develop an industry around these products?  
Resources in the land and plants? The people? The culture? Local politics? Money and access to financing? Physical infrastructure? Relationships and connections between different groups?
8. Which of these resources do you think are **most important** for building and accessing NTFP markets?
9. If we leverage these resources, what things do you think may still get in the way? **Obstacles?** Barriers?
10. What do you think are **important steps** for getting around these obstacles? Is it working together?
11. How would you characterize the overall **community's ability to work together** for NTFPs? Why do you think that is? Any examples of successes or failures in the community in general?
12. Are you **interested and willing to work with others** (agency, growers, sellers, harvesters) to grow/harvest/market NTFPs? **Why or why not? And how?**
13. How do you see **BRWG fitting or not fitting** in now and in the future?
14. Is there **anything I didn't ask** that you think I should have?

## APPENDIX F. IRB APPROVAL LETTER FOR QUALITATIVE PROTOCOL



Office of Research Compliance  
Institutional Review Board  
North End Center, Suite 4120, Virginia Tech  
300 Turner Street NW  
Blacksburg, Virginia 24061  
540/231-4606 Fax 540/231-0959  
email [irb@vt.edu](mailto:irb@vt.edu)  
website <http://www.irb.vt.edu>

### MEMORANDUM

**DATE:** October 11, 2017   
**TO:** John F Munsell, Katie E Trozzo  
**FROM:** Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)  
**PROTOCOL TITLE:** Forest Farming in SW Virginia and SE West Virginia  
**IRB NUMBER:** 17-951

Effective October 11, 2017, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

### PROTOCOL INFORMATION:

Approved As: **Exempt, under 45 CFR 46.110 category(ies) 2,4**  
Protocol Approval Date: **October 11, 2017**  
Protocol Expiration Date: **N/A**  
Continuing Review Due Date\*: **N/A**

\*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

### FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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## APPENDIX G. PRE-NOTICE LETTER FOR SURVEY



Department of Forest Resources and  
Environmental Conservation  
Katie Trozzo  
310 West Campus Dr. Rm 228  
Chatham Hall  
Blacksburg, Virginia 24061  
Email: ktrozzo@vt.edu

October 20, 2017

<<Address Block>>

Dear Woodland Owner,

Have you ever thought about products that are harvested in woodlands other than timber? A lot of people harvest wild non-timber crops such as ginseng, mushrooms, and goldenseal, but more and more folks are talking about farming them in the wooded areas where they grow.

We are writing because we are very interested in what you think about the idea of farming or managing non-timber crops in your woodlands. We also want to know what you think about the idea of leasing sections of your woodlands to someone else who wants to grow non-timber crops, similar to when people lease fields for hay or some other farming activity. Whether you like the idea or think it seems kind of crazy, your input will help inform reasonable discussions about non-timber crop farming in the woodlands of Southwest Virginia.

We put together a very short survey that gets at these questions and in about a week you should receive it in the mail. We would be grateful if you could take a few minutes to answer the questions and send it back at no-cost to you in a business reply envelope. If you want to know the results of this regional study, you can include your contact information with the completed survey and we will mail them to you once all responses are in.

We wanted to notify you in advance about all this because we don't want to surprise you. Your input is very important for the project's success and your responses will remain confidential. Also, participation is completely up to you and you can back out at any time. If you have any questions, please feel free to email me at ktrozzo@vt.edu or call at 828-553-3008.

Thank you for your time and consideration. We look forward to hearing from you.

Respectfully,

Katie Trozzo, Virginia Tech

John Munsell, Virginia Cooperative Extension

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## APPENDIX H. SURVEY COVER LETTER



Department of Forest Resources and  
Environmental Conservation  
Katie Trozzo  
310 West Campus Dr, Rm 228  
Chestnut Hall  
Blacksburg, Virginia 24061  
Email: ktrozzo@vt.edu

October 27, 2017

NAME  
ADDRESS LINE  
CITY STATE ZIPCODE

Dear Woodland Owner,

We wrote to you about a week ago to notify you about the survey in this packet. We are very interested in what you think about the idea of growing marketable non-timber crops such as ginseng, mushrooms, and ramps in your woods or leasing to someone else who wants to. Like we said, whether you like the idea or not, your input will help drive realistic discussions about the possibility of farming non-timber products in woodlands in Southwest Virginia.

Your woodlands were randomly selected from publicly available tax parcel records and we hope you are willing to take a few minutes to respond to the survey. Because we have selected only a limited amount of woodland owners, your participation is very important. In the case that you do not own woodlands and were selected in error, there is no need to complete the survey. Please write "no woodlands" in the comment section at the end of the survey and return it in the business reply envelope so we make sure to remove you from the mailing list.

You'll see that the questionnaire is only a few pages and should take about 15 minutes to complete. We have included a code on your survey to be able to remove you from our list once you have responded, but all your responses will remain confidential. Your participation is completely voluntary and you can back out from participation at any time.

This project has been reviewed and approved by Virginia Tech's Institutional Review Board, which protects the rights of participants in Virginia Tech projects. Should you have any questions or concerns about the study's conduct, your experience, or your rights as a research participant, you may contact the VT IRB Chair, David M. Moore at [moored@vt.edu](mailto:moored@vt.edu) or (540) 231-4991.

We will pool your responses with other landowners and make the general findings publically available. If you would like a summary of the study, please write your name and email address or mailing address on the enclosed card and return it with your completed questionnaire.

If you have questions or concerns do not hesitate to email me at [ktrozzo@vt.edu](mailto:ktrozzo@vt.edu) or call at 828-553-3008. Thank you very much for your time, effort, and consideration. I look forward to hearing from you.

Respectfully,

Katie Trozzo  
Virginia Tech  
John Munsell  
Virginia Cooperative Extension

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## APPENDIX I. SURVEY REMINDER CARD

November 3, 2017

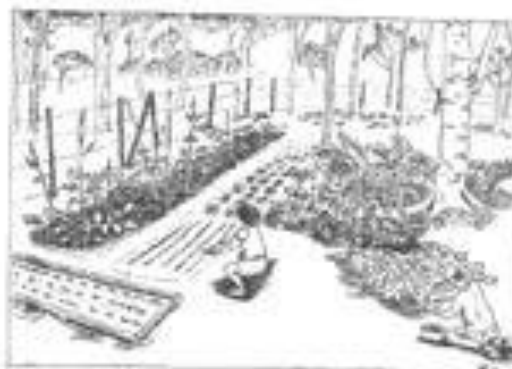
Dear Woodland Owner,

We recently mailed a questionnaire to you about growing food, medicine, and crafts in the woods.

If someone has already returned the survey, thank you very much. If not, we would be grateful if you could find a little time to complete and return the questionnaire.

If you did not receive the questionnaire, please email me at [ketrozzo@vt.edu](mailto:ketrozzo@vt.edu) or call at 828-553-3008 and we will send you another one right away.

Many Thanks,



Katie Trozzo, Virginia Tech

John Munsell, Virginia Cooperative Extension

## APPENDIX J. REPLACEMENT SURVEY COVER LETTER



Department of Forest Resources and  
Environmental Conservation  
Katie Trozzo  
310 West Campus Dr. Rm 22K  
Charlton Hall  
Blacksburg, Virginia 24061  
Email: ktrozzo@vt.edu

December 1, 2017

Name  
Street address  
City, State Zipcode

Dear Woodland Owner,

We sent a short survey in the mail to you a little over a month ago and wanted to send a replacement in case you did not receive it or misplaced it. We are still very interested in what you think about the idea of growing marketable non-timber crops such as ginseng, mushrooms, and ramps or leasing land for this type of production. Your opinions will help inform realistic discussion about what support and programming is needed in the region. Like we said, even if you are not interested, your input will help. If you have returned the survey already, thank you so much and please disregard this letter.

As a reminder, your woodlands were randomly selected from publicly available tax parcel records. Because we have selected only a limited amount of woodland owners, your participation is very important. In case you are wondering, any primary decision maker for the forestland owned by the addressee can answer the survey. In the case that you do not own woodlands and were selected in error, there is no need to complete the survey. Please write "no woodlands" in the comment section at the end of the survey and return it in the business reply envelope so we make sure to remove you from the mailing list.

You'll see that the questionnaire is only a few pages and should take about 15 minutes to complete. We have included a code on your survey to be able to remove you from our list once you have responded, but all your responses will remain confidential. Your participation is completely voluntary and you can back out from participation at any time.

This project has been reviewed and approved by Virginia Tech's Institutional Review Board, which protects the rights of participants in Virginia Tech projects. Should you have any questions or concerns about the study's conduct, your experience, or your rights as a research participant, you may contact the VT IRB Chair, David M. Moore at moored@vt.edu or (540) 231-4991.

We will pool your responses with other landowners and make the general findings publically available. If you would like a summary of the study, please write your name and email address or mailing address on the enclosed yellow card and return it with your completed questionnaire.

If you have questions or concerns do not hesitate to email me at ktrozzo@vt.edu or call at 828-553-3008. Thank you very much for your time, effort, and consideration. I look forward to hearing from you.

Best regards,

Katie Trozzo  
Virginia Tech

John Munsell  
Virginia Cooperative Extension

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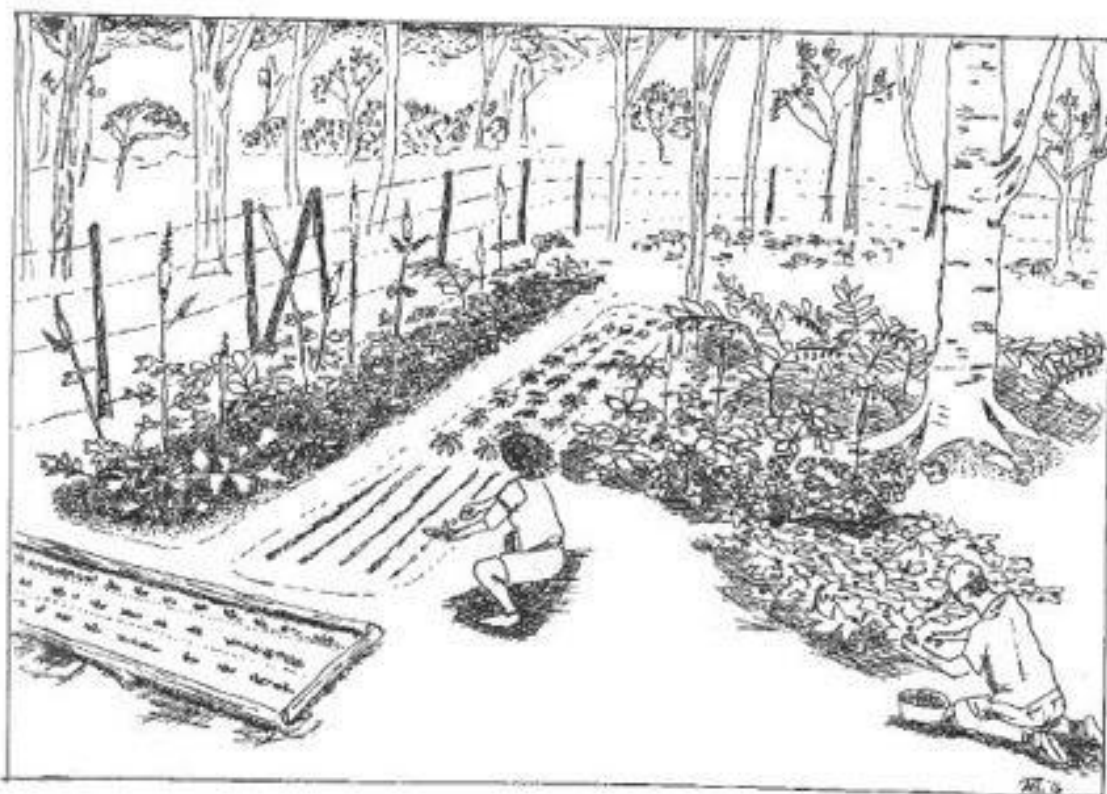
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## APPENDIX K. SURVEY INSTRUMENT

# Forest Farming

## Growing non-timber crops in the woods

A short survey for Southwest Virginia woodland owners



## **We want to hear from you.**

Whatever your opinions may be, they will help us piece together an honest picture of what Southwest Virginia woodland owners think about growing non-timber crops in the woods.

This survey should take **less than 15 minutes** to complete and your responses will remain **confidential**. We will not share any of your responses or your contact information.

We will compile all **the responses** we get back and present general trends that can help determine how best **to move forward** with support for producing non-timber crops in Southwest Virginia.

**If you would like a summary of the results** please fill out your name and contact information on the separate card included with the survey. Please enclose the card in the return envelope with the completed survey and we will send a summary of the results when the survey is complete.

**Thank you very much for participating!**

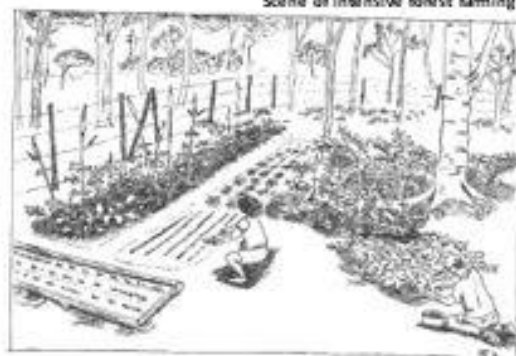


**Forest farming** is a practice where people intentionally grow or manage non-timber crops to sell in woodlands (See image). Forest farmers invest time and money in their operation like any other farmer and generally seek to sell their products at the best prices possible. It is different from wild harvesting because crops are cultivated or actively managed in their native forest habitat. Most crops are generally slow growing but forest farming can complement a variety of forest management objectives by providing products to sell between timber harvests or an alternative to cutting timber all together.

Please use the description of forest farming above and your own personal experience to answer the questions below.

(Please circle only one response per question)

Scene of intensive forest farming



|                                                                                          |                 |   |   |   |   |   |                      |                  |
|------------------------------------------------------------------------------------------|-----------------|---|---|---|---|---|----------------------|------------------|
| What do you think of forest farming as described above?                                  | A terrible idea | 1 | 2 | 3 | 4 | 5 | opinion improves     | A fantastic idea |
| Does forest farming interest you?                                                        | Not at all      | 1 | 2 | 3 | 4 | 5 | interest increases   | Extremely        |
| How often have you thought about farming non-timber woodland crops?                      | Never           | 1 | 2 | 3 | 4 | 5 | frequency increases  | All the time     |
| Would you farm non-timber crops in your woodlands?                                       | No way          | 1 | 2 | 3 | 4 | 5 | likelihood increases | Absolutely       |
| Would you lease your woodlands for forest farming to someone you trust?                  | No way          | 1 | 2 | 3 | 4 | 5 | likelihood increases | Absolutely       |
| Would you allow non-timber crops to be harvested on your land before you harvest timber? | No way          | 1 | 2 | 3 | 4 | 5 | likelihood increases | Absolutely       |

If you were to farm or are farming in your woodlands, which crops are most interesting to you?

(Please check off any that apply to you below)

- |                                                    |                                                    |                                            |
|----------------------------------------------------|----------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> Edible Plants             | <input type="checkbox"/> Fruits                    | <input type="checkbox"/> Nuts              |
| <input type="checkbox"/> Edible Mushrooms          | <input type="checkbox"/> Materials for Landscaping | <input type="checkbox"/> Medical Mushrooms |
| <input type="checkbox"/> Medicinal Plants          | <input type="checkbox"/> Floral <u>products</u>    | <input type="checkbox"/> None              |
| <input type="checkbox"/> Materials for decorations | <input type="checkbox"/> Tree Sap                  |                                            |

Please write down any plants or fungi that you are interested in or are currently farming in your woodlands.  
(Skip this one if you don't care to farm anything)

Possible Future Crops: \_\_\_\_\_

Current Crops: \_\_\_\_\_

Forest farming is often, but not always, done on a smaller scale than hay and timber production. In many cases forest farming operations are under a few acres total. With this in mind\_\_\_\_

What is the lowest amount below at which you would **forest farm one acre** of your woods? Assume the prices below are what you could make per acre per year after all your costs were accounted. (Please **circle the lowest amount**)

\$800      \$2,000      \$3,200      \$4,400      \$5,600      \$6,800      None of these prices

What is the lowest amount below at which you would **lease** your woodlands to others you trust to forest farm? Assume the prices below are what you could make per acre per year. (Please **circle the lowest amount**)

\$1    \$50      \$125      \$200      \$275      \$350      \$425      None of these prices

How many acres would you **lease**, if any? \_\_\_\_\_ acres

### About you – just a few final questions about you and your interests.

Do you currently farm agricultural products on your land? ☐ Yes ☐ No *If no*, skip to next question

*If yes*, what percentage of your income do you receive from farming? \_\_\_\_\_ %

And, what agricultural products/commodities do you farm?

\_\_\_\_\_

Do you currently live in Southwest Virginia?

☐ Yes, full time (9 months or more a year) ☐ Yes, part time (Less than 9 months a year) ☐ No

*If yes*, how many years ago did you move here? \_\_\_\_\_ years

Did you grow up in Southwest Virginia? ☐ Yes ☐ No

What is the earliest year that your family dates back to Southwest Virginia? \_\_\_\_\_ or ☐ Not applicable

Are you retired? ☐ Yes ☐ No

What year were you born? \_\_\_\_\_ What is your gender? \_\_\_\_\_

What is the highest level of school that you have completed? (Please **check only one**)

☐ Some high school                      ☐ High school graduate or GED                      ☐ Some college  
☐ Associate/technical degree                      ☐ Bachelor's degree                      ☐ Graduate degree

What was your household's annual income before taxes in 2016? If you don't feel comfortable we understand, but please know we will keep your information completely confidential if that helps. (Please **check only one**)

☐ Less than \$10,000                      ☐ \$25,000-\$49,999                      ☐ \$100,000-\$149,999  
☐ \$10,000- \$24,999                      ☐ \$50,000-\$99,999                      ☐ \$150,000 or more

**Almost done!**

How strongly do you believe in the following statements about forests?

(Please circle only one response for each statement)

|                                                                                               | Do Not Believe |   | belief increases |   | Strongly Believe |
|-----------------------------------------------------------------------------------------------|----------------|---|------------------|---|------------------|
| Forests should be managed to meet as many human needs as possible                             | 1              | 2 | 3                | 4 | 5                |
| Forests rejuvenate the human spirit                                                           | 1              | 2 | 3                | 4 | 5                |
| The primary function of forests should be for products and services that are useful to humans | 1              | 2 | 3                | 4 | 5                |
| Forests give us a sense of peace and well-being                                               | 1              | 2 | 3                | 4 | 5                |
| Forests are sacred places                                                                     | 1              | 2 | 3                | 4 | 5                |
| Forests that are not used for the benefit of humans are a waste of our natural resources      | 1              | 2 | 3                | 4 | 5                |
| Wildlife, plants, and humans should have equal rights to live and develop in forests          | 1              | 2 | 3                | 4 | 5                |
| Forests should exist mainly to serve human needs                                              | 1              | 2 | 3                | 4 | 5                |
| It is important to maintain forests for future generations                                    | 1              | 2 | 3                | 4 | 5                |
| Forests let us feel close to nature                                                           | 1              | 2 | 3                | 4 | 5                |

Kind of like a game! Please indicate the **balance for you** between the two “end-point” options finishing each statement. 3 is a perfect mixture of both. 1 and 5 lean completely one or the other. (circle only one number)

*When it comes to projects on my land...*

|                         |   |   |                    |   |   |                            |   |
|-------------------------|---|---|--------------------|---|---|----------------------------|---|
| I do all the work       | 1 | 2 | perfectly balanced | 3 | 4 | I don't do any of the work | 5 |
| I do a lot of them      | 1 | 2 | perfectly balanced | 3 | 4 | I don't do any             | 5 |
| I own all the equipment | 1 | 2 | perfectly balanced | 3 | 4 | I don't own any equipment  | 5 |

*When it comes to outdoor recreation...*

|                                    |   |   |                    |   |   |                                    |   |
|------------------------------------|---|---|--------------------|---|---|------------------------------------|---|
| I organize a lot of activities     | 1 | 2 | perfectly balanced | 3 | 4 | <u>I never</u> organize activities | 5 |
| I own lots of recreation equipment | 1 | 2 | perfectly balanced | 3 | 4 | I own no recreational equipment    | 5 |
| I am very interested               | 1 | 2 | perfectly balanced | 3 | 4 | I am generally not interested      | 5 |

*When it comes to issues in my community...*

|                                       |   |   |                    |   |   |                                      |   |
|---------------------------------------|---|---|--------------------|---|---|--------------------------------------|---|
| I always share my opinions            | 1 | 2 | perfectly balanced | 3 | 4 | I never share my opinion             | 5 |
| It <u>feel</u> obligated to speak out | 1 | 2 | perfectly balanced | 3 | 4 | I do not feel obligated to speak out | 5 |
| I am very active                      | 1 | 2 | perfectly balanced | 3 | 4 | I rarely get involved                | 5 |

**Are you interested in connecting with regional networks** that can provide information about farming non-timber forest crops and connect you to buyers of forest farmed products? ☐ Yes ☐ No

If yes, please write your contact information on the attached form.

**You can also find more resources** at the Appalachian Beginning Forest Farmer Coalition website where you can sign up for information about forest farming [www.appalachianforestfarmers.org](http://www.appalachianforestfarmers.org)

**Do you have any final comments you would like to share?**

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**Please return the survey at no expense to you** by folding it and mailing it to us in the self-addressed business reply envelope. Recall, if you would like a summary of the results, please fill out your contact information on the included form.

**Finished, thank you very much!**