PRIVATE FOREST LANDOWNERS IN VIRGINIA AND ECOSYSTEM MANAGEMENT: AN ANALYSIS OF ATTITUDES AND OPPORTUNITIES

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(ABSTRACT)

The purpose of this study was to analyze landowner perceptions of an ecosystem management program proposed by The Nature Conservancy. This creation of this program, The Forest Bank, is an attempt to protect the unique ecological and biological resources of the Clinch River Valley of Southwest Virginia. This study analyzed the attitudes and characteristics of landowners that contributed to their decision to enroll in such a program. Data were collected with an 8-page mail questionnaire sent to 1,813 landowners in a five-county area of Southwest Virginia. The final sample size resulting from this effort included 816 landowner surveys, representing an overall response rate of 45%.

Two separate analyses were undertaken with respect to this data, each representing a unique and informative approach to landowners and The Forest Bank. The first analysis summarizes how landowners perceived the individual components of the program, their level of interest in enrollment, and what types of landowners would be most likely to express interest in such a program. Twenty-three percent of landowners expressed interest in enrolling in The Forest Bank at some time. In general, those interested in enrollment perceived the individual components of the program differently than those

who were not interested in enrolling. Landowners who expressed enrollment interest were more likely to be younger, more affluent, and more educated than those who did not express interest in enrollment.

The second analysis employed a structural equation model in order to determine what attitudes and motivations influence attitudes toward an ecosystem management program such as The Forest Bank. Variables such as attitudes toward property rights, environmental attitudes, trust in sources of information, and level of community attachment were included in this model. Results indicate that while attitudes toward property rights and the environment were not as important as previous literature suggested, landowner reasons for owning land were key indicators in determining attitudes toward The Forest Bank.

Results from this study provide valuable information to managers and researchers concerning landowner attitudes toward ecosystem management and their level of interest in enrolling in an ecosystem management program. This information will help managers better understand how landowners perceive individual components of these types of programs, as well as determining the types of landowners who would be interested in enrolling. These findings can then be used to tailor programs that are more consistent with landowner objectives, and to better understand the complex attitudes and characteristics of private forest landowners.

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CHAPTER ONE

INTRODUCTION

Introduction

Non-industrial private forests (NIPFs) have been and will continue to be an important feature on the American landscape. Aside from providing timber products, these lands are becoming increasingly important for other reasons, such as recreation, wildlife habitat, and simply as a place to live. Regardless of the use or reason for owning, landowners will want to manage their lands in such a way as to maximize their desired outcomes.

There is a long research tradition within forestry concerning NIPF landowners. While perhaps initially motivated by the large amount of forestland held privately, research has continued in part because the characteristics and attitudes of NIPF landowners have been so difficult to define. Presently, the ownership structure of many NIPF lands is undergoing a fundamental shift. With new landowners and their diverse and complex objectives moving into a landscape that is becoming increasingly fragmented, new concerns are being raised about how to manage these lands in a sustainable manner. Recently, ecosystem management has emerged as one response to this increasingly fragmented forest resource and its diverse ownership. Ecosystem management has gained increased acceptance from both managers and the public as a way to both protect sensitive natural habitats and ensure the long-term viability of NIPF lands for both commodity and non-commodity objectives.

This study reports research on one of the newest approaches to ecosystem management and its application to a rural area of Southwestern Virginia - The Forest Bank. The study investigated the level of and basis for interest among landowners (Chapter 2), as well as the relationships among values and attitudes that are likely to influence views on The Forest Bank (Chapter 3). These studies help further the knowledge base in the field of

NIPF research while also providing managers with valuable information about NIPF owners and their attitudes.

Forest Fragmentation and Parcelization - A Growing Concern

In 1977, NIPFs constituted 47% of America's forests. By 1994, this figure had risen to 58% (Birch, 1996). It is both the sheer acreage of land owned by private individuals and the number of individual landowners that makes NIPFs an important focus of study. Because over 50% of all NIPF owners have less than ten acres, this large land base is divided up among millions of Americans (Bliss, Nepal, Brooks, and Larsen, 1997). From 1978 to 1995, the number of NIPF tracts ten acres or less increased by 52% (Moulton and Birch, 1995). This highlights one of the most alarming trends related to NIPFs: forest parcelization, or the process of dividing larger parcels of land into smaller parcels through subdivision. The concern with parcelization is that it may eventually lead to forest fragmentation, or "the disruption of continuity in forest cover by water and non-forested land" (Rudis, 1993, p. 35). With more and more lands being sold and divided into smaller tracts, the potential for this type of disruption is more likely, while the management of these lands on a sustainable or ecosystem level becomes increasingly difficult. While this is clearly a national trend, it is very pronounced in Virginia as well.

First noted in the 1980s on forestlands across the north (Harper et al., 1990), parcelization is an issue of increasing concern in Virginia, a state with over 13 million acres of forestland and nearly 470,000 forest landowners. In 1992, NIPF lands accounted for 75% of the forest base in the state (Hodge and Southard, 1992). In five years that figure has increased slightly, to just over 77% (Shaffer and Meade, 1997). Fifty-one percent of all Virginia NIPFs are less than 100 acres in size, a number that has been slowly increasing this decade (Thompson and Johnson, 1996). These factors seem to indicate the forested land base of Virginia is subject to increasing parcelization.

Ecosystem Management

One possible solution to the issues of forest parcelization and fragmentation is ecosystem management. Ecosystem management was first introduced to federal lands in the west

during the 1960s, and gained favor as a response to growing concerns over endangered species and the protection of wildlife habitat. Although early land management legislation alluded to ecosystem- level principles, very little specific legal precedent has been made until quite recently (Salwasser, 1994). At the present time, much more ecosystem-level management is occurring on the public lands of the West, but the public and resource managers are still struggling to determine what "ecosystem management" really means. Today there is no widely accepted definition of the term; instead it comprises a collection of evolving ideas (Brunson et al., 1997; Grumbine, 1994). A recent study identified more than 90 wide ranging items suggested by landowners as elements of a formal definition (Bengston, 1993). One possible description was provided by Brunson et al. (1997):

> Ecosystem management is a shift in the philosophy of managing America's forests and undeveloped lands. It blends social, economic, and scientific principles to achieve healthy ecosystems and maintain biological diversity over long periods of time, while at the same time allowing production of the many valued resources our society needs from its forests. (p. 16)

There seems to be a growing consensus that ecosystem management is a viable approach for public lands, particularly in the West. Several national surveys have concluded that there is strong support for applying a holistic ecosystem approach to management on federal lands (Bliss et al., 1994). For example, a recent study from the Pacific Northwest measured public attitudes for many different federal forest management policies (Shindler, List, and Steel, 1993). This study found that 75% of those surveyed nationally agreed or strongly agreed that federal forest management should focus on the forest as a whole and not on its individual parts. Similarly, 79% agreed that federal forest management should emphasize a wide range of benefits, rather than focus on one commodity alone. These results seem to indicate the high levels of support for the general idea of ecosystem management. This is echoed in other nations, with studies showing the same level of broad support in countries such as New Zealand (Cocklin and Doorman, 1994).

While ecosystem management is beginning to be accepted on public lands, owners of private lands are much more skeptical about this new management tool. Many are concerned that embracing ecosystem management would mean the loss of control over their land, a finding which has been established in several studies (Bliss et al., 1994; Brunson et al., 1997; Campbell and Kittredge, 1996; Cocklin and Doorman, 1994; Peterson and Horton, 1995). While these studies have identified limited support for ecosystem management among NIPF landowners in the abstract sense, there have been few actual land management programs which have attempted to adopt the principles of ecosystem management.

Frequently, programs directed toward NIPF lands that are similar to ecosystem management are referred to as cross-boundary management or collaborative management programs. These ideas begin with good neighbor relations among adjoining landowners, which may eventually lead to shared management objectives. While these types of agreements between landowners have had limited success, there have not yet been any collaborative management programs which have been successful on a scale large enough to be comparable to a true ecosystem management effort. One reason is the extreme difficulty of coordinating diverse landowner interests and objectives on a large scale, such as across an entire watershed. However, several recent programs have begun to approach this level of collaboration.

In South Carolina's ACE Basin (Ashepoo, Combahee, and Edisto Rivers), Westvaco and NIPF owners have collaborated to protect 55,000 acres of sensitive wetland habitat while preserving the traditional uses of the area such as timber harvesting and agriculture. This was one of the earliest programs to demonstrate that timber harvest and habitat protection could occur simultaneously (Muckenfuss, 1994). In the Tidelands of Connecticut, The Nature Conservancy has initiated an effort to encourage landowners to develop stewardship plans that meet the needs of their land, while addressing important watershed concerns as well (Tyson, Broderick, and Snyder, 1998). Other programs in the Chattooga River watershed in Georgia and in Plainfield, Massachusetts have established community-led efforts to protect important ecological values while retaining important

economic values such as timber harvest (Campbell and Kittredge, 1996; Sample, 1994). All of these programs demonstrate that ecosystem management concepts are beginning to gain acceptance on private lands, but that no large-scale efforts which truly represent ecosystem management have been established.

Non-Industrial Private Forest Landowner Characteristics

Non-industrial private forest landowners have been, and will continue to be an important component of the nation's landowners. In 1996, the USDA Forest Service released results from the most comprehensive nationwide analysis of NIPFs and their owners to date (Birch, 1996). Results from this study provide some insight into the characteristics of individuals who own private forestland. Private forest landowners tend to be relatively old, with 45% being 55 years of age or older, while 33% are retired. A majority (64%) of the landowners in Birch's study have owned their land for more than 15 years, and 67% live either on their land or within one mile of it. This national study did not obtain information concerning the education or income of landowners, however a recent study from Virginia can provide some insight (Hodge, 1993). In Virginia, 45% of NIPF landowners have a college degree, while 55% have annual incomes of more than $40,000.

Although private forest landowners control a majority of the nation's forestland, many do not own their land for timber production. Only 3% of the landowners in Birch's study hold their land primarily for timber production, while 40% say that they own forestland simply because it is part of their residence. Thirty-four percent say that they will never harvest timber off their lands, although 32% say that they intend to harvest some timber within the next 10 years. Those who do have harvesting experience (46%) own 78% of the private forest land base, suggesting that many of those who do not actively harvest are likely to be among the owners who have less than 10 acres of forest. Only 5% of private forest landowners have a written management plan.

Past research dealing with NIPF lands and owners has been plentiful, however the direction of this research has not always been clearly defined. Many of the early NIPF

studies in the 1970s focused on the timber supply in America, and how the under-represented masses of private owners could be motivated to produce more timber (Egan, 1997; Hodge, 1993). Such research was driven by continuing predictions of a timber shortage in America which has not yet occurred (Egan, 1997). Landowner attitudes seemed to be of little importance to researchers and managers, with emphasis being on the product (timber) rather than the people. It was also a time when very little was known about the effectiveness and efficiency of incentive programs to affect harvest intentions (Skok and Gregerson, 1975). One of the problems with this approach was that efforts to increase harvesting were being directed toward an NIPF owner group whose non-timber reasons for ownership made it impossible to motivate them to cut trees (Hodge, 1993; Worrell and Irland, 1975). However, by the late 1970s, social science research had begun to explore the variety and complexity of NIPF owner attitudes. As a result, new and varied incentive programs, such as the Forest Stewardship Program, have been developed.

Although researchers have begun to take a more in-depth look at NIPF landowners, the scope and approach of this research is still somewhat narrow, and many gaps remain. For example, questions dealing with why individuals own forestland have more often ascertained how the land was acquired, rather than actual motivations for acquisition (Kingsley, Brock, and DeBald, 1988; Moulton and Birch, 1995). Similarly, these studies rarely address when and why owners are interested in their forests as a commodity. For the most part, then, existing research has gained little insight into determining landowner attitudes (Kingsley et al., 1988), leaving managers with an incomplete understanding of the NIPF owner. While past research has explored factors such as age, land holding size, and duration of ownership, these studies have not addressed complex attitudinal issues.

An analysis of this past research indicates several important components of NIPF characteristics that have been neglected or given only a cursory examination. Very little is known about the reasons these individuals own forestland and how these reasons may influence their desire to actively manage their land. These are important research considerations if complex ideas such as ecosystem management are introduced on a

widespread basis. However, perhaps one of the most important needs in the area of NIPF research is a systematic and comprehensive analysis of landowner attitudes toward important concepts such as the environment and their land. Without this type of knowledge, researchers and managers will continue to struggle with how to understand and communicate effectively with NIPF landowners.

The Forest Bank - A Proposed Ecosystem Management Program

As a response to the issues of parcelization and fragmentation, The Nature Conservancy (TNC) has created The Forest Bank, a large-scale ecosystem management program. It is specifically designed for NIPF owners in the Clinch River Valley of Southwest Virginia, but should be of interest to the broader professional forestry community because it represents a novel approach to the increasingly recognized problem of forest fragmentation. Located in the far Southwestern corner of Virginia, the Clinch River Valley represents a unique laboratory for ecosystem management. Seventy-five percent of the valley is forested, with ownership dominated by NIPF landowners who control 83% of the valley's timberland. Intermixed with these lands are National Forest lands, corporate holdings (private timber companies, coal companies) and a scattering of small towns. Located in a predominantly rural area, the Clinch River is one of the last remaining free-flowing tributaries of the Tennessee River and provides habitat for over 40 species of freshwater mussels, one of the highest levels of species diversity in the world. The upper reaches of the river provide habitat for 50 rare aquatic species, more than any other river system in the United States. The forests of the area are predominantly oak-hickory, and dominated by steep slopes and deeply cut stream channels.

The Clinch River and surrounding areas are affected by the land use patterns and economy of this portion of Virginia. Coal mining and farming are the major industries in the valley, with roughly 35% of the land in agricultural production, dominated by beef cattle and burley tobacco. The economy of the area lags behind other areas in the state and nation, with an average per capita income that is about one-third less than the national average. The last wave of widespread timber harvest occurred nearly sixty years ago; thus the resulting second-growth forests are nearing maturity. In this difficult

economic climate, many landowners are turning to their timber resource as a quick cash option. Recent years have also seen increasing amounts of timber harvested to clear land for other uses such as grazing and tobacco production. These increases in harvesting have accelerated fragmentation and threatened the integrity of the watershed.

The Nature Conservancy established the Clinch Valley Bioreserve in 1989, and since that time has been working with local officials on ways to develop the region in an economically and environmentally sustainable fashion. One program that has emerged from this effort is The Forest Bank. The bank is set up as a quasi-financial institution where landowners will permanently "deposit" their right to grow and manage timber. In return, the landowner will receive a guaranteed annual payment based on the appraised value of his or her initial deposit, (i.e., the timber). In order to fund these payments, TNC will harvest and sell timber from these lands on a sustainable basis, based on a management plan designed to manage the entire watershed at an ecosystem level. Each participating property will receive a detailed management plan to be worked out with the landowner in advance. In order to function, the program requires that "deposits" be made on a permanent basis, and that parcels not be subdivided. Land can be sold, however, and enrollment in the program would transfer to the new owner. Efforts will be made to process harvested timber locally.

Currently, The Forest Bank is in its formative stages. The necessary start-up capital has been obtained and management staff have been put in to place. The Forest Bank is an ideal program and situation to study ecosystem management and NIPFs for several reasons. Because The Forest Bank integrates financial and non-financial benefits, it provides a good opportunity to determine which types of incentives are most important to landowners. Other components of the program allow us to address important research questions raised by existing literature dealing with private property rights and reasons for owning land as they relate to support for new land management programs.

This study is comprised of two parts, both of which deal with Southwestern Virginia landowners' attitudes toward The Forest Bank, and various other attitudes and

characteristics. Each of these parts is represented by a chapter that approaches the data somewhat differently. However, both chapters provide important insights into NIPF landowners and their responses to The Forest Bank.

Chapter 2 Overview

A major gap in the literature dealing with NIPF owners is the lack of information concerning landowner preferences for ecosystem and collaborative management programs. Very little research has been devoted to specific programs and how landowners view the components of an effort such as The Forest Bank. This information could contribute both to better design of these programs and to more effective marketing of them to landowners. By better understanding landowners, interested parties could be contacted more efficiently and with the appropriate information.

In response to this need, Chapter 2 presents the results of an analysis of landowner enrollment intentions based on their knowledge of The Forest Bank as presented to them in a survey instrument. Level of enrollment interest is then related to other landowner characteristics such as socio-demographic information and attitudes toward specific components of the program. This analysis clarifies how different groups view the program, describes perceived benefits and problems, and identifies the types of landowners who would be most likely to express interest in such a program. The results can then be used to make recommendations about the specific marketing techniques that could be used to target landowners who are more likely to be interested in The Forest Bank or other ecosystem management programs.

Chapter 3 Overview

Many studies have looked at sets of variables and how they relate to landowner attitudes toward ecosystem management and other land management approaches. However, few have looked at the complex interplay between attitudinal dimensions in a comprehensive manner. Thus, one goal of this study was to provide an analysis that would model landowners' attitudes toward The Forest Bank to help determine what other attitudes and motivations impact attitudes toward The Forest Bank, or any ecosystem management

program. Building on previous research, survey items were developed to measure attitudes about property rights, environmental issues, community attachment, perceptions of local environmental conditions, sources of natural resource information, the level of trust in those sources, and reasons for owning land. The intent was to be able to provide researchers with a starting point from which to further analyze the ways in which the components impact not just decisions to enroll in ecosystem management programs, but also how they impact other major management and harvesting decisions.

Chapter 3 presents this analysis in the form of a structural equation model, designed to identify the significant linkages between several important variables and attitudes toward The Forest Bank. The LISREL program provided information on the direction and strength of the linkages among these variables and their influences on attitudes toward The Forest Bank. These results provided the opportunity to determine what variables were instrumental in shaping attitudes toward The Forest Bank and which were not. This research has also produced several reliable variables important to NIPF research that can form the basis for future research of this type.

Chapter 4 Overview

This section synthesizes results and conclusions from each of these two studies and draws some general conclusions. Similarities and differences in findings between the two studies will also be discussed. Finally, this section discusses how the larger study has contributed to the research in this field and provides considerations for future research.

CHAPTER TWO

CHARACTERISTICS OF LANDOWNERS AS INDICATORS OF ENROLLMENT INTEREST IN THE FOREST BANK

Introduction

Even though the South has over 188 million acres of forested land, there are concerns over its increasingly fragmented nature and the complex social and economic processes that are driving this trend (Birch, 1996). The division of larger tracts of land into smaller tracts with more owners (parcelization) is changing the way forests are managed and products are produced, as well as ecological systems and processes (DeCoster, 1998). This increased parcelization may eventually lead to fragmentation of forests. Defined as "the disruption of continuity in forest cover by water and non-forested land" (Rudis 1993, p. 35), fragmentation frequently occurs when multiple landowners have multiple and/or different objectives. Concerns about these changes have led to attempts to slow parcelization and fragmentation, including the growth of land trusts, collaborative agreements between landowners across common boundaries, and ecosystem management on federal lands. This ecosystem management has been identified by many as the key to preserving large-scale ecosystem processes in a landscape dominated by multiple landowners with small tracts of forestland (Sample et al.,1994).

One response to forest fragmentation in southwestern Virginia has been a program proposed by The Nature Conservancy (TNC) called The Forest Bank. It entails organizing landowners from across the region in an attempt to promote coordinated management of forests across boundaries on an ecosystem level. This type of "ecosystem management" has no single accepted definition, but instead is a collection of evolving ideas (Brunson et al., 1997; Grumbine, 1994). Like other ecosystem management programs, The Forest Bank is new and innovative in its approach, thus it is not known how it will be received by landowners. Effective implementation requires a better understanding of the forest landowners of the area and their attitudes toward such a program. This study first examines the problem of fragmentation, various ecosystem-

level responses, and The Forest Bank as a potential solution to the problem of forest fragmentation. It then explores the attitudes of landowners toward components of The Forest Bank and examines their enrollment intentions. Understanding the various characteristics of landowners who say they would or would not enroll in the program provides information that could be used by organizations and agencies to target landowners who may be willing to participate in an ecosystem management program, and to develop information and marketing efforts.

Fragmentation as a "Problem"

The forested landscape of the United States is undergoing a pronounced shift. This is especially evident in the South, where 89% of the forested land is in private ownership. In this region, the acreage in forested tracts less than 10 acres increased by 52% between 1978 and 1994 (Moulton and Birch, 1995). The acreage in tracts between 10 and 49 acres increased by 87%, while acreage in tracts of 100 to 1,000 acres declined by 14%. This pattern arises from the subdivision and sale of small tracts to new owners, who often desire land for non-timber related land uses (Alig and Wear, 1992; Harper et al., 1990; Healy, 1984). Some projections predict that 95% of private forest ownership could ultimately be in parcels of less than 100 acres (DeCoster, 1998). This increased parcelization could have a significant effect on large portions of the forest ecosystems in the South.

Parcelization is an issue of increasing concern in Virginia, a state with over 13 million acres of forestland and nearly 470,000 forest landowners. In 1997, nonindustrial private forest (NIPF) lands accounted for just over 77% of the forest base in the state (Shaffer and Meade, 1997). Fifty-one percent of Virginia NIPFs are less than 100 acres in size, a number that has been slowly increasing this decade (Thompson and Johnson, 1996). A recent study has shown that the parcelization of forestland in Virginia due to population increases may have reduced the viable timber base (measured by growing stock volumes) by up to 40% from values reported before this dramatic increase in population (Wear et al., 1999).

De Coster (1998) outlines three major reasons for increasing rates of parcelization: death, taxes, and lifestyle shifts. Half of Virginia's forest landowners are over 60 years of age (Hodge and Southard, 1992), whereas in the south as a whole, only 23% are over 65. Thus, the potential transfer and division of large parcels due to the death of an owner is of greater concern in Virginia than elsewhere. In circumstances where there are several heirs, forested parcels are often divided, producing more landowners and smaller parcel sizes. A second cause of parcelization is the federal and state tax structure. Rapidly escalating property taxes push many off their land who simply cannot afford the taxes associated with a rapidly maturing forest resource. In addition, many states have capital gains legislation which makes owning forest difficult (Hubbard 1989). The third factor driving parcelization is the changing lifestyle of Americans in general. As more people seek the “country life”, landowners are encouraged by real estate prices to sell or subdivide their land to these “country bounders” (DeCoster, 1998). This increased population base could have a significant effect on the amount of forestland in an area. A study of forestland in Virginia concluded that for every 20% increase in population in an area, the amount of timberland decreases by 4% (Wear et al., 1999).

While the causes of parcelization appear fairly straightforward, its consequences, and the appropriate response, are not so apparent. One of the most immediate outcomes of this trend is forest fragmentation. With the conversion of forest for such uses as agriculture, residential and commercial development, or recreation, a once continuously forested area becomes a patchwork of landscapes. While beneficial to some species such as deer, fragmentation can have detrimental results on other species of plants and animals (Wilcove, 1990), ecological processes (Harper et al., 1990; Zipperer, 1993), and the economic viability of timber management in forests divided among smaller and smaller tracts (Bates and Cooksey, 1998).

Aside from biological and ecological concerns, there are other important consequences of fragmentation and parcelization. One concern of particular interest to readers of this journal is that owners of smaller forests may not feel a need to actively manage their lands (De Coster, 1998). This disinterest in management could have important

implications for the timber supply in many areas, particularly as the supply from federal lands decreases at a steady rate and manufacturers turn to NIPF lands as a source of timber (Bourke and Luloff, 1994; Fleury and Blinn, 1996). Even if parcelization does not result in fragmentation, there are concerns over whether enough timber will be produced on NIPF lands to meet regional and national demand. In addition to concerns over timber supply, because landowners who harvest timber are more likely to pursue technical information and assistance, those who do not may be less informed as to the important ecosystem functions of their land within a regional context.

Responses to Fragmentation

Various responses have been proposed to address the problems perceived to arise from parcelization and fragmentation. Some states are turning to tax incentives to discourage the subdivision of forested parcels (DeCoster, 1998). Other direct measures such as zoning for larger parcels have been proposed or enacted by regional or county planning districts. Still other responses include third-party efforts to reduce fragmentation through conservation easements and agreements to keep land in open space (Bates and Cooksey, 1998). While these efforts have focused on stopping parcelization before it occurs, another type of program has been devoted to coordinating the efforts of adjacent landowners, to mitigate the outcomes of parcelization. The Forest Bank is one example of this type of ecosystem management program. This type of voluntary (rather than mandatory) program has been identified as appropriate in a mixed-ownership setting such as the typical landscape dominated by NIPF owners (Sample, 1994). It is hoped that these voluntary, bottom-up approaches could be more successful than more traditional, top-down approaches.

Examples of Ecosystem Management Efforts Involving NIPFs

Although the ecosystem approach is almost non-existent in areas dominated by small NIPFs (Jones, 1994), there have been several fairly well-known examples. Often, these programs are created as a response to concerns over water, wetlands, or endangered species (Williams and Ellefson, 1997). These provide insights to managers and planners

about technologies and tactics that work, as well as serving as tangible examples to landowners.

Several of these larger initiatives are worth considering for their merits and individual findings. One of these is the ecosystem management project in the ACE (Ashepoo, Combahee, and Edisto Rivers) Basin in South Carolina. The goal was to protect and enhance the traditional uses of the basin, while protecting sensitive wetland areas. Currently, the project protects over 55,000 acres (more than 17,000 by Westvaco, with the remainder consisting of private lands), although many of the private landowners either do not own forest land or do not manage their forests for timber production. This program demonstrated that it was possible to sustain traditional uses (timber production on Westvaco lands), while still protecting important ecosystem habitats and functions. This was an important lesson and an early indicator that a program such as The Forest Bank could be a success (Muckenfuss, 1994).

Another ecosystem partnership program is taking shape in the Tidelands region of south central Connecticut. The Nature Conservancy initiated an effort in 1994 to develop ecosystem management plans for a 40,000-acre sub-watershed on the Eight Mile River. Approximately 90% of the watershed is owned by NIPF owners. The program encourages landowners to develop stewardship plans that meet their needs, while addressing important watershed concerns. This study provides valuable insights into the types of landowner marketing analysis and techniques that are needed to make ecosystem management a success, as well as informing managers about how best to design a program to maximize landowner interest (Tyson, Broderick, and Snyder, 1998). By identifying varying levels of enrollment intention, managers were able to market to these groups differently. For example, non-intenders were targeted with information showing that the benefit/cost ratio was greater than they thought and with information that emphasized the issues that were driving new management efforts. The realization that family, friends, and other local sources are important information sources for landowners led to new strategies for presenting information.

Other examples of community-initiated ecosystem/cooperative management also merit attention. The Stekoa Creek Water Quality Committee is a citizen-formed group that emphasizes cooperative efforts to help maintain the water quality of the creek, which eventually flows into the federally protected Chattooga River in Georgia. An important lesson from this example was that solutions must be driven by the community and based in good science, with leadership coming from the private sector as opposed to federal or state governments. Other important lessons for future efforts were that many landowners are looking for more information in the form of technical assistance, and that they are interested not only in the financial incentives of collaborative management, but also in non-financial incentives (Sample, 1994).

Similar in scope to the Chattooga project is the Plainfield, Massachusetts ecosystem-based management program. Driven by the Massachusetts Forest Stewardship Program, this effort has included over 860 properties consisting of 78,770 acres into an ecosystem level program to protect important ecological and social values of the native forests since 1992. Again, this effort showed that leadership by landowners was critical to the program's success, as was a combination of information, education, and incentives. However, it also suggests that for an ecosystem management program such as The Forest Bank to be successful, it is important for landowners to realize how their land fits into and contributes to the region as a whole (Campbell and Kittredge, 1996).

Other programs in Missouri and Texas highlight the importance of cooperation and collaboration among stakeholders (Larsen et al., 1997; Sample, 1994). Together, such efforts show that voluntary programs, initiated by the private sector and focused on a common issue can provide an effective response to forest fragmentation. However, none of the programs established to date represents a successful large-scale, ecosystem management effort, solely on traditionally timber-producing NIPF lands (Washburn, 1996).

Ecosystem Management: Obstacles and Incentives for Landowner Participation

Obstacles to Participation

The examples presented above detail the successes of various programs but few discuss those landowners who were not interested in participating. One of these studies did identify obstacles to participation, such as the financial losses a landowner may incur under a collaborative management scheme (Campbell and Kittredge, 1996). Another study indicated that these costs may include time and money of implementation, as well as the complication of estate plans and tax structures (Peters, Haney, and Greene, 1996).

A recent survey of landowners concluded that negative attitudes regarding ecosystem management program goals could outweigh benefits such as financial incentives (English, Bell, Wells, and Roberts, 1997). This finding is confirmed by a study in the Pacific Northwest which found that some NIPF owners were not willing to forfeit harvest rights, regardless of the incentive offered (Johnson, Alig, Moore, and Moulton, 1997). Evidently, some NIPF owners will oppose a program regardless of these incentives, perhaps on the basis of other deep-seated values.

Incentives to Participate

Little is known about the components and incentives of programs that motivate landowners to practice ecosystem management (Irland, 1994). Some landowners may already have management objectives aligned with ecosystem management (Brunson et al,. 1997; Roberts and Parker, 1998) and thus may perceive fewer obstacles or be unconcerned with program incentives. In fact, one reason that voluntary ecosystem management looks so attractive to some NIPF owners is that it is consistent with their current ownership objectives (Hodge, 1996). For other landowners, incentives may play a key role in participation.

Financial incentives such as conservation easements and tax incentives have been successfully employed to encourage participation in these programs. For example, some local governments allow landowners to deduct property taxes if they participate in ecosystem management programs. Alternatively, existing programs such as the USDA

Stewardship Incentive Program are being considered as opportunities to encourage cooperative efforts that transcend ownership boundaries.

The study by English et al. (1997) suggested that activities aimed at creating a more favorable attitude toward program goals have a much stronger influence than financial incentives. Other research has found that the most effective means for encouraging timber management is through identifying and removing constraints, rather than focusing on incentives (Kurtz and Lewis, 1981). However, perhaps simply making information available regarding the benefits of ecosystem management and providing the technical assistance needed to do it, may provide the biggest incentive for landowners to participate (Sample, 1994).

Understanding obstacles to programs and the effectiveness of incentives is one way to help ecosystem management management efforts succeed. An alternative is to use market research techniques to identify receptive audiences and target these individuals. Such efforts rely on identifying observable or attitudinal characteristics of the targeted landowners, as well as their different levels of interest in the program. Appropriate marketing techniques are then developed for each group. In addition, by understanding the motivations of the targeted landowners, managers can better understand what types of incentives, financial or otherwise, would be important to them (Campbell and Kittredge, 1996; Ellefson et al., 1997; Tyson et al., 1997).

The Forest Bank - An Ecosystem Management Program

The Forest Bank, sponsored by TNC, is specifically designed for NIPF owners in the Clinch River Valley of Southwest Virginia, but should be of interest to the broader professional forestry community because it represents a novel approach to the increasingly recognized problem of forest fragmentation. Located in the far Southwestern corner of Virginia, the Clinch River Valley represents a unique laboratory for ecosystem management. Seventy-five percent of the valley is forested, with ownership dominated by NIPF landowners who control 83% of the valley's timberland. Intermixed with these lands are National Forest lands, corporate holdings (private timber and coal companies),

and a scattering of small towns. Located in a predominantly rural area, the Clinch River is one of the last remaining free-flowing tributaries of the Tennessee River and provides habitat for more than 40 species of freshwater mussels, one of the highest levels of species diversity in the world. The upper reaches of the river provide habitat for 50 rare aquatic species, more than any other river system in the United States. The forests of the area are predominantly oak-hickory, and dominated by steep slopes and deeply cut stream channels.

The Clinch River and surrounding areas are affected by the local land use patterns and economy. Coal mining and farming are the major industries in the valley, with roughly 35% of the land in agricultural production, dominated by beef cattle and burley tobacco. The economy of the area lags behind other areas in the state and nation, with an average per capita income that is about one-third less than the national average. The last wave of widespread timber harvest occurred nearly sixty years ago, thus the resulting second-growth forests are nearing maturity. In this difficult economic climate, landowners are turning to their timber resource as a quick cash option. Recent years have seen increasing amounts of timber harvested to clear land for other uses such as grazing and tobacco production. These increases in harvesting have accelerated fragmentation and threatened the integrity of the watershed.

The Nature Conservancy established the Clinch Valley Bioreserve in 1989, and since that time has been working with local officials on ways to develop the region in an economically and environmentally sustainable fashion. One program that has emerged from this effort is The Forest Bank. The bank is set up as a quasi-financial institution where landowners will permanently “deposit” their right to grow and manage timber. In return, the landowner will receive a guaranteed annual payment based on the appraised value of his or her initial deposit, (i.e., the timber). In order to fund these payments, TNC will harvest and sell timber from these lands on a sustainable basis, based on an ecosystem-level management plan. Each participating property will receive a detailed management plan to be worked out with the landowner in advance. In order to function, the program requires that “deposits” be made on a permanent basis, and that parcels not

be subdivided. Land can be sold, however, and enrollment in the program would transfer to the new owner. Efforts will be made to process harvested timber locally in order to benefit the local economy.

Responding to concerns over sensitive and endangered aquatic species, the mission of The Forest Bank is to "work in partnership with private landowners to promote the economic productivity of working forests while protecting the ecological health and natural diversity of the landscapes in which they occur" (TNC, 2000). Given the focus on aquatic species, one of the primary goals of the program is to improve water quality in the area by reducing sedimentation. By managing surrounding forests in an ecologically sustainable manner, combined with the expertise of professional foresters, TNC hopes to utilize harvesting techniques that will reduce sedimentation. These concerns are balanced by economic goals that include enhancing the local economy through local processing of timber, and giving landowners increased financial liquidity through steady annual payments.

It was anticipated that landowners might enter into a program for a variety of reasons, including being motivated by environmental concerns, desiring a steady rather than periodic cash flow, not wanting to assume the risk and costs of forest management, not having the expertise or knowledge to manage their forest, and/or liking the idea of local processing of timber.

Study Objectives

Currently, The Forest Bank is in its formative stages. The necessary start-up capital has been obtained and management staff have been hired. By learning more about the characteristics of landowners and their attitudes toward specific components of the program, professional foresters can learn how programs like The Forest Bank might be received in other areas and situations. This information could also be used for marketing purposes to identify landowners who might be interested in The Forest Bank and to target information and marketing efforts toward those individuals. One of our primary areas of interest is to determine the differences in the characteristics and attitudes of landowners

based on their level of enrollment interest. The specific objectives of this research include:

- Understanding the nature and extent of positive and negative attitudes toward features of The Forest Bank.

- Determining the constraints to enrollment and the characteristics that differ between those who are likely to enroll and those who are not likely to enroll.

- Determining the various landowner characteristics that influence attitudes toward components of The Forest Bank

Methods

Instrument

Semi-structured interviews were conducted with landowners from the target area to identify issues that were important to their consideration of new forest management programs. This information was combined with a review of previous NIPF studies and literature on landowners' motivations and environmental attitudes to generate a list of potential reasons that a landowner would or would not be interested in a program such as The Forest Bank. A mail survey was then developed that addressed the following topics: Land ownership characteristics, community attachment, and basic socio-demographic items (Appendix A). An additional section described The Forest Bank program (giving information about requirements and conditions) and asked about attitudes toward the program and likelihood of enrollment. This was done by listing several components of the program and having respondents evaluate these on a 5-point scale ranging from "reason not to enroll" (-2) to "reason to enroll" (+2). Likelihood of enrollment was assessed by having landowners indicate whether they would be willing to enroll some or all of their land now, in the future, or never. A final question was stated as: "There are many reasons why a landowner might or might not want to enroll lands in The Forest Bank program. How would each of the following reasons influence your decision to join?" Respondents marked all of the reasons that applied, from a list of 9 items.

In March of 1999, a pretest was performed with 64 undergraduate students (who were asked to imagine owning land, and filled out the survey as part of a take-home assignment) and 200 randomly selected landowners in Washington County, Virginia with tracts of 10 acres or more (single mailing with no follow-ups). Washington County was selected because it is directly adjacent to the study area and is geographically and ecologically similar to the study area. Fifty-nine surveys were returned from the landowners for a response rate of 29.5%. All 64 students filled out the survey. Summary statistics were compiled and questions were modified in response to the pretest to ensure that the constructs tested were reliable, that question meanings were clear, and that response options were comprehensive.

Sample

In April of 1999, the revised mail survey was sent to 2,000 randomly selected landowners from the counties of Lee, Russell, Wise, Scott, and Tazewell, all within the Clinch River watershed. Names were obtained from landowner lists provide by the Department of Revenue in each county. Lists contained every landowner in each county regardless of acreage or type of land owned (e.g., agricultural or forest). The sample was stratified so that equal percentages of landowners would be sampled from acreage classes of 10-49 acres, 50-99 acres and greater than 100 acres. This was done to represent owners of both large and small holdings, since the debate is still ongoing as to whether these groups differ in characteristics and attitudes (Bliss et al., 1997; Cleaves and Bennett, 1994; Jones et al., 1995; Rosen and Kaiser, 1988). Sampling without these strata would have resulted in a sample almost entirely made up of small landowners, due to the distribution of land in Southwestern Virginia.

Four hundred tracts were selected from each of the five counties (2,000 landowners), with a target distribution of one-third of each county's tracts from each of the three size classes. In several of the counties, not enough tracts existed in one or both of the larger categories. When this occurred, a census was taken of these larger land holdings and the remaining unused cases were divided between the other two size classes. Respondent selection was done by counting the available tracts in a size class and then dividing by the

appropriate number needed to arrive at 133 names. For example if 399 tracts in the 10-49 acre size class were eligible to be sampled, every third tract would be selected, ensuring that tracts would be selected from across the list, whether it be sorted by city or alphabetically.

Mailings were conducted generally according to the Dillman (1978) Total Design Method. One week after the initial mailing, a postcard reminder was sent to everyone who had not returned a survey. Three weeks after the date of the first mailing, a second packet was sent out with another copy of the survey, a stamped return envelope, and an appropriate cover letter, to all individuals who had not responded by that time. Finally, a third mailing was sent out 4 weeks after the initial mailing with a third copy of the survey and a stamped return envelope. The cover letters detailed the objectives of the study, and ensured landowners of the confidentiality of the results provided. They also stressed that indicating an interest in The Forest Bank did not constitute any form of commitment to the program, and explained the need for the identifying numbers on the printed survey.

Of the 2,000 surveys mailed, 187 were undeliverable due to various reasons. These included because the address was incorrect or the forwarding address expired (n = 54), or because the addressee was deceased (n = 52), no longer owned property (n = 55), or was physically incapable of filling out the survey (n = 26). Thus, the total effective sample size was 1,813. In total, 816 surveys were received for a response rate of 45.0%.

Analysis

Frequencies and means are reported for the entire sample. Results are presented both in the aggregate and using ANOVA to identify differences in mean responses among the three levels of enrollment interest. Stepwise logistic regression was also used to identify those variables (attitudinal or socio-demographic) most able to discriminate between landowners who would and would not enroll in such a program.

Results

Landowner Characteristics

Before presenting results specific to The Forest Bank, it is useful to compare the socio-economic characteristics of the landowners in our study to other landowners in Virginia (Table 1). Respondents from Southwest Virginia are older and less educated than landowners across the whole state; however, they have nearly identical incomes. More of our respondents grew up on a farm, but they have owned their land for less time and live further from it than the average Virginia landowner.

Table 1. Comparison Between Respondents in SW Virginia and State Averages.

Variable	**SW Virginia (percent)**	**All of Virginia (percent)[1]**
Older than 55 years of age	64.3	35.5
Earned a college degree	28.5	45.7
Household income <$40,000	53.5	55.2
Grew up on a farm	61.8	38.9
Owned land >13 years	37.1	63.0
Live <5 miles from their land	66.2	76.7

[1] Source: Birch, 1993; Hodge, 1993

Attitudes to The Forest Bank

Landowners were asked if they had heard of The Forest Bank prior to filling out the questionnaire, and if so, from what source(s). Very few landowners (12.6%) had heard of The Forest Bank, which is not surprising given that very little public contact or marketing concerning this program had been done at the time this survey was mailed out. Of the few landowners who had heard of the program previously (n = 99), most gained information either from the newspaper (43.4%), friends (27.2%), a university extension service (24.2%), or television (15.1%). Since landowners could indicate more than one source, these totals do not add up to 100%, but provide an idea of the most important sources of information about The Forest Bank.

Three-quarters (77.0%) of landowners were not interested in enrolling in the program, while 15.3% expressed willingness to enroll sometime in the future. Only 7.7% of landowners would be willing to immediately enroll in The Forest Bank based on the information provided in the survey. Among those who would not enroll, the two most common reasons were concern over losing control of their land and the related concern of wanting their children to decide how to manage the land on their own, rather than making that decision for them (Table 2). Other important concerns included reducing the resale value of the property and wanting to wait to see how the program works before making a decision.

Table 2. Landowner Reasons For Not Enrolling in The Forest Bank[1]

Reason for Not Enrolling	**% Yes**
Don't want to give up control	55.9%
Want children to decide	42.4
Will reduce resale value of property	28.2
Would like to see how it works first	19.6
Landowners already protect the environment enough	17.3
The program sounds too confusing	16.8
My trees are not valuable enough to cut	16.8
The program will prevent me from subdividing my land	16.5
My trees are too small in size	13.2
I won't make as much money from my trees under this program	7.7

[1] More than one reason could be indicated. N = 586

All landowners (not just those who said they would not enroll) were asked to evaluate characteristics of The Forest Bank. We were hoping to learn what characteristics were most salient (both positive and negative) in shaping landowner reactions to such a program. Consistent with the results presented above, landowners suggested that the most important reason not to enroll was that land would be enrolled permanently (mean = -1.1), and that the resale value of the land might decline (mean = -1.1) (Table 3).

Table 3. Landowner Attitudes to Components of The Forest Bank as a Reason To Enroll

Program Component	Overall Mean[1]	Enroll Now	Enroll in Future	Never Enroll	*p*-value[2]
Land will be permanently enrolled	-1.1	-0.7[a]	-0.7[a]	-1.3[b]	.000
The resale value of my land may decline	-1.1	-0.9[ab]	-0.8[a]	-1.2[b]	.001
Land enrolled will not be able to be subdivided	-0.6	0.2[ab]	0.2[a]	-0.8[b]	.000
Timber would be harvested off your land	-0.6	0.6[a]	-0.1[b]	-0.8[c]	.000
The Nature Conservancy is sponsoring it	-0.2	0.5[a]	0.3[a]	-0.4[b]	.000
The Nature Conservancy is responsible for keeping up on regulations	0.0	0.9[a]	0.7[a]	-0.3[b]	.000
Will receive a steady, reliable income	0.1	1.1[a]	0.7[b]	-0.2[c]	.000
The Nature Conservancy assumes all risk (ice, fire, insect damage)	0.2	1.2[a]	0.7[b]	-0.0[c]	.000
Timber harvested will be processed locally	0.3	1.2[a]	1.0[a]	-0.1[b]	.000

[1] Mean score on a scale of "reason to enroll" (+2) to "reason not to enroll" (-2).
[2] Analysis of Variance (F test). Values with different superscripts differ at the .05 level.

There were significant differences among at least two of the groups for all of the components of the program. On average, those who would enroll in the program now view timber harvest, income, and TNC assuming the risks as benefits to the program, while those who will never enroll see these as reasons not to enroll. Those who might enroll in the future fall between these two groups. Although several items are perceived as deterrents, even for those who would enroll, overall, those who are interested in enrolling to some degree are less likely to see the components as reasons not to enroll in The Forest Bank.

Socio-demographic Differences Among Enrollees and Non-Enrollees

Results of ANOVAs (continuous variables) or χ^2 (categorical variables) analysis show that the three groups of landowners differ significantly on several socio-demographic variables (Tables 4 to 12).

Table 4. Socio-Demographic Characteristics of Landowners by Level of Enrollment Interest[1]

Variable	Overall Mean	Enroll Now	Enroll in Future	Never Enroll	*p*-value (F test)
Years lived in Southwest Virginia	50	42[a]	43[a]	52[b]	.000
Age of landowners	59	57[ab]	56[a]	60[b]	.003
Acres owned	133	202	145	124	.014
Years owned land	23	20	21	24	.157
Number of community groups belong to	2	2	2	2	.072

[1]Continuous variables only. Analysis using one-way ANOVAs.
[ab] Values with different superscripts differ at the .05 level.

Table 5. Distance of Landowner Residence From Property

Distance (miles)	% Enroll Now (n=55)	% Enroll in Future (n=107)	% Never Enroll (n=543)
0 (live on property)	49	49	65
1-30	16	21	19
30-100	4	8	6
>100	31	23	11

$p = .000$, χ^2

Table 6. Landowner Income

Income level ($)	% Enroll Now (n=56)	% Enroll in Future (n=107)	% Never Enroll (n=468)
0 - 29,999	32	27	43
29,999 - 59,999	21	39	30
60,000 - 89,999	14	14	15
> 90,000	29	20	12

$p = .001$, χ^2

Table 7. Landowner Employment

Employment Type	% Enroll Now (n=56)	% Enroll in Future (n=112)	% Never Enroll (n=556)
Full time	57	58	37
Part time	4	5	4
Unemployed	0	5	5
Retired	40	32	54

$p = .000$, χ^2

Table 8. Primary Source of Income

Source	% Enroll Now (n=51)	% Enroll in Future (n=106)	% Never Enroll (n=495)
Timber	2	1	0
Farming	6	3	4
Livestock	2	4	4
Non-land related	51	47	31
Other	20	21	21
Retired	20	25	40

$p = .009$, χ^2

Table 9. Political Orientation[1]

Category	% Enroll Now (n=56)	% Enroll in Future (n=110)	% Never Enroll (n=515)
Liberal	13	10	5
Moderate	48	60	52
Conservative	39	30	42

$p = .026$, χ^2

[1] Landowners were asked to self-categorized themselves based on these groups.

Table 10. Area Grew Up In

Type of Area	% Enroll Now (n=53)	% Enroll in Future (n=106)	% Never Enroll (n=549)
Farm	53	48	65
Rural	26	26	18
Town	13	15	12
City	8	11	5

$p = .022$, χ^2

Table 11. Number of Children

Number	% Enroll Now (n=54)	% Enroll in Future (n=113)	% Never Enroll (n=555)
0	11	12	12
1	15	21	14
2	26	35	36
3	26	22	22
4	22	11	16

$p = .34$, χ^2

Table 12. Education

Level of Education	% Enroll Now (n=56)	% Enroll in Future (n=111)	% Never Enroll (n=541)
No HS Diploma	13	10	25
At least HS Diploma	39	50	51
Bachelors Degree	27	27	15
Advanced Degree	21	13	9

$p = .000$, χ^2

Many of the variables in Tables 4-12 significantly differ across the levels of enrollment interest. In general, those interested in enrollment either now or in the future are slightly younger (Table 4), more affluent (Table 6), and have more education (Table 12) than those who are not interested in enrolling. Those not interested are much more likely to be retired (Tables 7 and 8). In addition, those who are interested in enrolling are more likely to be absentee owners who do not live on their property (Table 5); if they do currently live in Southwestern Virginia, they have done so for a shorter period of time (Table 4). Potential enrollees grew up in more urbanized areas (Table 10), and correspondingly, live further from their land than those who are not interested in enrolling The Forest Bank. Variables which were not significantly different among the three levels include how long the land has been owned, the number of local community organizations one belongs to, and gender. Although the results for number of acres owned indicate a large difference between the mean enrollment levels, this result was not statistically significant due to large standard deviations within each group for this variable. Thus, although the individual post-hoc comparisons showed no differences, overall there was a difference in the number of acres owned.

While binary analyses show how individual variables relate to the enrollment decision, one might also be interested in the combination of variables that best predicts enrollment. A logistic regression was thus performed to determine which socio-demographic variables contribute most to the decision to enroll in the program. Variables used in this analysis were chosen because they might be identified quickly in a marketing effort. A chi-square test was done to determine if those who would “enroll now” differ from those who would “enroll in the future” based on the variables in Tables 4-12. Only one variable

was significantly different between these two levels (distance of landowner residence from property; $p = .044$ (Table 5)). Because the overall differences between these two levels were minor, they were collapsed into a single group. This combined group was compared to the second category consisting of those who were opposed to joining The Forest Bank outright. A backward stepwise procedure began with all of the significant variables from Table 4-12, with the *p*-value for removal of a variable set at .05. Because only 23% of landowners indicated some level of enrollment interest, a cut value of .23 was used. Table 13 presents the variables retained in the model at the .05 level, as well as the predictive power of these variables. The regression equation formed by these variables ($p = .000$), correctly classified 64.9% of those who would not enroll in The Forest Bank and 62.4% of those who would enroll.

Table 13. Results of Logistic Regression of Variables
Which Predict Enrollment (N = 465)

Variable	**β**[1]	**Sig.**
Miles to property	.11	.016
Education	.20	.011
Type of Job	-.16	.044
Political orientation	-.18	.032

[1] Standardized
Percent of cases classified correctly = 64%

An analysis of these results shows that the farther a landowner lives from his or her property, the greater the likelihood of enrollment. Likewise, likelihood of enrollment increases with increasing landowner education. Landowners who are employed in land-based careers are less likely to enroll, and the more conservative a landowner is, the less likely he or she is to enroll in the program. Of these variables, the level of education a landowner has attained has the largest effect on predicting enrollment.

Discussion

These results shed light on the types of landowners most likely to enroll in voluntary ecosystem management programs such as The Forest Bank. While only about a quarter of landowners were interested in enrolling at any time (8% now and 15% in the future), this level of interest could amount to a large number of individuals when projected across a large watershed such as the Clinch River or others areas where such a program might be

implemented. It also important to note that there is a normal resistance to any type of innovation among individuals, and that this aversion may subside over time and result in increasing interest in the program. Some insight can be gained as to why other individuals were not interested in the program when we examine their reasons for not enrolling.

Reasons Not To Enroll

The primary reason landowners would not enroll in the program was the fear of giving up control of their land. This confirms what others have found in previous studies of landowner attitudes toward ecosystem management (Bliss et al., 1994; Brunson et al., 1997; Campbell and Kittredge, 1996; Cocklin and Doorman, 1994; Peterson and Horton, 1995), and was expected, as it came up frequently in our preliminary interviews with landowners. Perhaps related to this finding was the second most important reason for not enrolling: landowners wanting their children to be able to decide what to do with the land. Many of our landowners (41%) inherited the land they now own, and may want to pass on to their children the rights and privileges they received from their parents. This issue has rarely been addressed in the NIPF literature, but perhaps merits more attention. Nonetheless, these reasons, both related to concerns over control, constitute the main deterrents to participation in the program.

Several other important reasons for not joining reflect the cautious nature of NIPF owners. Landowners suggested they might prefer to wait and see how the program works, and some thought the program was complex and confusing. Perhaps, some of these landowners could be enticed to enroll at a later date, particularly if these concerns could be alleviated over time with a successful pilot program or comprehensive marketing efforts. A few landowners felt that their trees were too small or that their timber was not valuable enough to warrant enrollment. Because The Forest Bank is a long-term program, these types of issues might be resolved, especially since the proponents of the program are likely to be interested in acquiring many different cover types and forests in different stages of maturity.

Some researchers have speculated that perceptions of constraints (e.g, believing trees are too small or potential financial loss) cause landowners to reject ecosystem management (Campbell and Kittredge, 1996; Peters et al., 1996). Our results did not confirm this finding, as only a small percentage of landowners felt that these were deterrents to enrollment, and reinforce the conclusion that loss of control is a much more important concern. Control concerns may not be easy or possible to overcome. However, the feared loss of resale value if lands were permanently enrolled was also a significant concern. This particular concern might be alleviated by marketing efforts that describe actual effects. Thus, together these findings suggest that although the initial enrollment percentages are low, there is potential for modestly more interest given time and information.

Even those who will enroll view the permanency of enrollment and the possible loss of resale value as components weighing against the positive benefits of enrollment. Even this group does not view The Forest Bank in an entirely positive light, and their enrollment only comes at the expense of a few components of which they do not fully support. Thus, even among the enrollees there are complex tradeoffs going on between the different components of the program and their underlying attitudes and beliefs. It is with these individuals that the benefits (in this case peace of mind regarding risk, reliable economic income, and local economic impact) outweigh the constraints mentioned above. It may also be the case that they perceive environmental benefits that outweigh costs.

Attitudes to Components: Incentives versus Deterrents

While the anticipated benefits of enrolling clearly appealed to some landowners, these perceptions were not shared by all. Landowners who were willing to enroll saw benefits in that The Nature Conservancy would keep up with regulations and assume all the risk and also in the steady, reliable income and local processing of timber the program would provide. This is consistent with previous research which suggests the importance of both financial and non-financial incentives and available technical assistance to landowner participation (Sample, 1994). Many of these landowners may be less knowledgeable

about land management, and would prefer to have someone else assume the associated risks and responsibilities. This is consistent with our finding that potential enrollees are more likely to be absentee landowners.

Those who said they would never enroll rated all of these "benefits" negatively, suggesting that they possess the knowledge to manage their own land and may actually value the feelings of responsibility and involvement they get from this management. Some research has shown that the removal of these types of landowner responsibilities may take away the feeling of autonomy and independence so cherished by the landowner in America (Bliss and Martin, 1989; Fink, 1986). Perhaps programs such as The Forest Bank should find ways to still allow landowner involvement and include them in the important management decisions that provide a sense of responsibility and stewardship.

Complexity of Landowner Attitudes

While appealing to some landowners, many of the components of The Forest Bank are seen as negative attributes by others. However, this merely highlights the compromise involved and needed by landowners to make voluntary collaborative management efforts successful on any level. This finding has important implications for managers who design these types of programs, because it suggests that a more thorough understanding and better targeting of landowner attitudes is needed. In part, our findings indicate that much more attention must be given to issues of property rights and control, such as the permanence of enrollment and the inability to subdivide lands. A large body of research has confirmed that these are important issues to NIPF owners (Bliss et al., 1994; Brunson et al., 1997; Campbell and Kittredge, 1996; Cocklin and Doorman, 1994; Larson, 1993; Peterson, 1991; Peterson and Horton, 1995; Sample, 1994). The Forest Bank is one of the first ecosystem management programs to require permanent enrollment. It is not known if permanent enrollment is necessary from a financial or environmental standpoint; however, it is clear that this issue, as it relates to property rights, is important to landowners.

Of particular interest are the components where landowners in each of the three enrollment levels differed significantly from each other: that timber would be harvested off their land, they would receive a steady income, and TNC would assume many risks. In all three of these cases, those who indicated they would enroll now saw these as positive components, while those who had no enrollment interest saw these as negative components, or reasons not to enroll. This has important management implications for marketing efforts because it shows that how a landowner views the components of the program may influence his or her level of interest in the program. In this case, components which we assumed would be seen as reasons to enroll in The Forest Bank by all groups were only seen as such by those interested in enrolling.

One area of particular interest to us was how landowners would react to the timber harvest component of The Forest Bank. Interestingly, those who would enroll now perceive this as a positive feature (they also value the associated steady income), whereas those who would not enroll view timber harvest as a reason not to enroll and may even perceive income as a reason not to enroll. This suggests that reactions may be based in part in some deeper, more over-riding environmental values (see Chapter 3).

Marketing Programs Similar to The Forest Bank

Landowner attitudes toward an ecosystem management program are not black and white, and different marketing strategies are needed depending on the landowner. There are complex trade-offs occurring which appear to be based in the value orientations of each individual. Our findings indicate that the "benefits" of local processing of timber and a steady income are enough to outweigh the "costs" of the permanency of the program for those who are willing to enroll now. The biggest difference between those who would enroll now and those who might enroll in the future seems to be a negative view of timber being harvested off of their land (Table 3). Thus, marketing efforts to this group might be directed not only toward the incentives (steady income), which they already support, but also toward ensuring these landowners that harvesting will be done in an environmentally sensitive and sustainable fashion. This approach has been suggested by previous research as well (Kurtz and Lewis, 1981).

Landowners who expressed no interested in the program were only slightly more concerned about control issues (permanency, ability to subdivide) than those interested in enrolling. However, they were significantly less motivated by the possible utilitarian benefits of income or reduced risk. Perhaps marketing efforts directed toward this group could make other reasons to participate more visible by providing more information to landowners about the incentives of the program, or by simply making the incentives more attractive.

Aside from providing insights into the different attitudes of landowners, our findings also seem to indicate that landowners with certain socio-demographic characteristics are more willing to enroll in The Forest Bank. Those who indicated that they would enroll now are younger, more affluent, more educated, somewhat more liberal and tend to live further from their land than those who are not interested in enrolling, based on the description of The Forest Bank provided in the survey instrument. There is also suggestive evidence that this group holds larger tracts of land. These findings support previous findings by English et al. (1997), Johnson et al. (1997), and Tyson et al. (1998) suggesting that market segmentation of landowners might be more effective than treating landowners as one homogenous group. Knowing the attitudes and motivations of this group is important because they are an increasingly dominant force in land ownership trends both in Virginia and across the East. Information on several of these variables could be obtained from public records, and The Nature Conservancy or others might selectively approach groups (e.g., approach absentee owners with larger acreages, don't approach retired landowners with small holdings).

Conclusion & Future Research

Forest fragmentation is a problem receiving increasing attention by professional foresters. Several mechanisms to address this problem exist. Some programs, such as zoning, attempt to address issues of fragmentation before they arise. Other methods, such as those examined here, attempt to work with landowners who are already dealing with issues of fragmentation. In this study, our primary focus was on a voluntary program directed

toward NIPFs that attempts to encourage collaborative and ecosystem-sensitive land management practices. These types of programs are believed to be most likely to succeed in the forests of the southern United States (Sample, 1994).

Although only a modest proportion of landowners surveyed were interested in enrolling in The Forest Bank, other data suggest that there are some limitations for non-enrollees that might be overcome given more time and information, as well as evidence of a successful, real-world program that can be seen in practice. However, the major deterrents to enrollment - control and permanency - are probably less amenable to persuasive marketing efforts. Creative solutions to these impediments will be necessary if ecosystem management is to attract the majority of landowners.

This study has sketched a rough image of what a landowner interested in an ecosystem management program may look like in terms of socio-demographic and land ownership characteristics. This is an important step in being able to readily identify these individuals when targeting informational and marketing materials and efforts. Programs such as The Forest Bank have significant potential as a response to the issue of forest parcelization and fragmentation. This potential could be realized if market segmentation efforts are employed to target both those who are ready to enroll now, and more importantly, those who may be ready in the future if provided with more time and information.

Although The Forest Bank is just now being implemented, our findings suggest that there are already important clues as to how these types of programs can succeed. Consistent with Sample's (1994) findings in Georgia, we found that landowners will support a program that involves non-financial benefits, particularly technical assistance of some sort. This is contrary to the notion that NIPF owners are solely economically-oriented and more concerned with financial gains than other benefits from new land management programs. Our findings are also consistent with the lessons learned from a similar program in the Tidelands of Connecticut (Tyson et al., 1998), which focused on the importance of identifying different groups of landowners based on their level of interest in a program. The results presented here show that landowners with varying levels of

interest in The Forest Bank have distinctly different characteristics and attitudes toward specific components of the program.

Other interesting conclusions and lessons arise from this study. For example, although the factors which lead to enrollment can be difficult to ascertain, our research suggests that managers might begin with a list of basic socio-demographic variables to begin the process of targeting their efforts. Even for those landowners who would not be interested in an ecosystem management program, our research suggests that the barriers to enrollment for some landowners might be overcome with the provision of more information, or a little more time to see how the program works in practice. This supports the notion that landowners prefer to see demonstration projects before trying a particular type of management on their own land (Haymond, 1988; Lankford, 1994; Tyson et al., 1998). In short, our research indicates that by learning more about the attitudes and characteristics of landowners, we can begin to design increasingly successful programs as well as be able to efficiently market and disseminate this information to the landowners who are most likely to benefit from them.

Certain limitations in this study suggest directions for further research. One such limitation is that this study was geared toward a specific program, The Forest Bank, and does not necessarily gauge the response to any and all ecosystem management programs that may be proposed. While this allowed us to analyze attitudes toward individual components of a very specific program, a useful divergence from the more common global types of studies, it may be risky attempting to generalize these results to other programs in different areas. This, coupled with the fact that this area of the Appalachians has a very specific cultural and geographical character, also limits generalization to other areas. Given the pressing concerns about parcelization and fragmentation, we would welcome additional research that helps generate publicly acceptable, economically viable, and environmentally sound solutions to ecosystem management.

CHAPTER THREE
MODELING COMPONENTS CONTRIBUTING TO LANDOWNERS' ATTITUDES TOWARD THE FOREST BANK

Introduction

Although there is a relative wealth of literature dealing with the socio-demographic characteristics of Non-Industrial Private Forest (NIPF) landowners, several researchers have pointed out that there is a lack of information on the attitudes and deeply-held beliefs of the average landowner (Egan, 1997; Rickenbach et al., 1998). There is also a lack of information on how attitudes and general characteristics relate to land management decisions. In particular, there exist few efforts to develop a multivariate model explaining the interrelationships among these types of variables. Of particular interest is how such variables factor into a decision to join a cross-boundary ecosystem management effort. This exploratory study is an attempt to test a model incorporating several of the important variables identified in other research and use them to explain people's attitudes toward a proposed ecosystem management program.

The specific program examined in this study is The Forest Bank, sponsored by The Nature Conservancy (TNC), and being tested in Southwestern Virginia. The bank is set up as a quasi-financial institution where landowners will “deposit” their right to grow and manage timber. In return, the landowner will receive a guaranteed annual payment based on the appraised value of his or her initial deposit (i.e., the timber). In order to fund these payments, TNC will harvest and sell timber from these lands on a sustainable basis, based on a management plan designed to manage the entire watershed on an ecosystem level. Each property will receive a detailed management plan to be worked out with the landowner in advance. In order to work at the ecosystem level for an extended period of time, the program requires that “deposits” be permanent, and that parcels not be subdivided. Land can be sold, however, and enrollment in the program would transfer to the new owner. Efforts will be made to process harvested timber locally to help stimulate

the local economy. Though similar to an ecosystem management program, it is not identified as such by TNC.

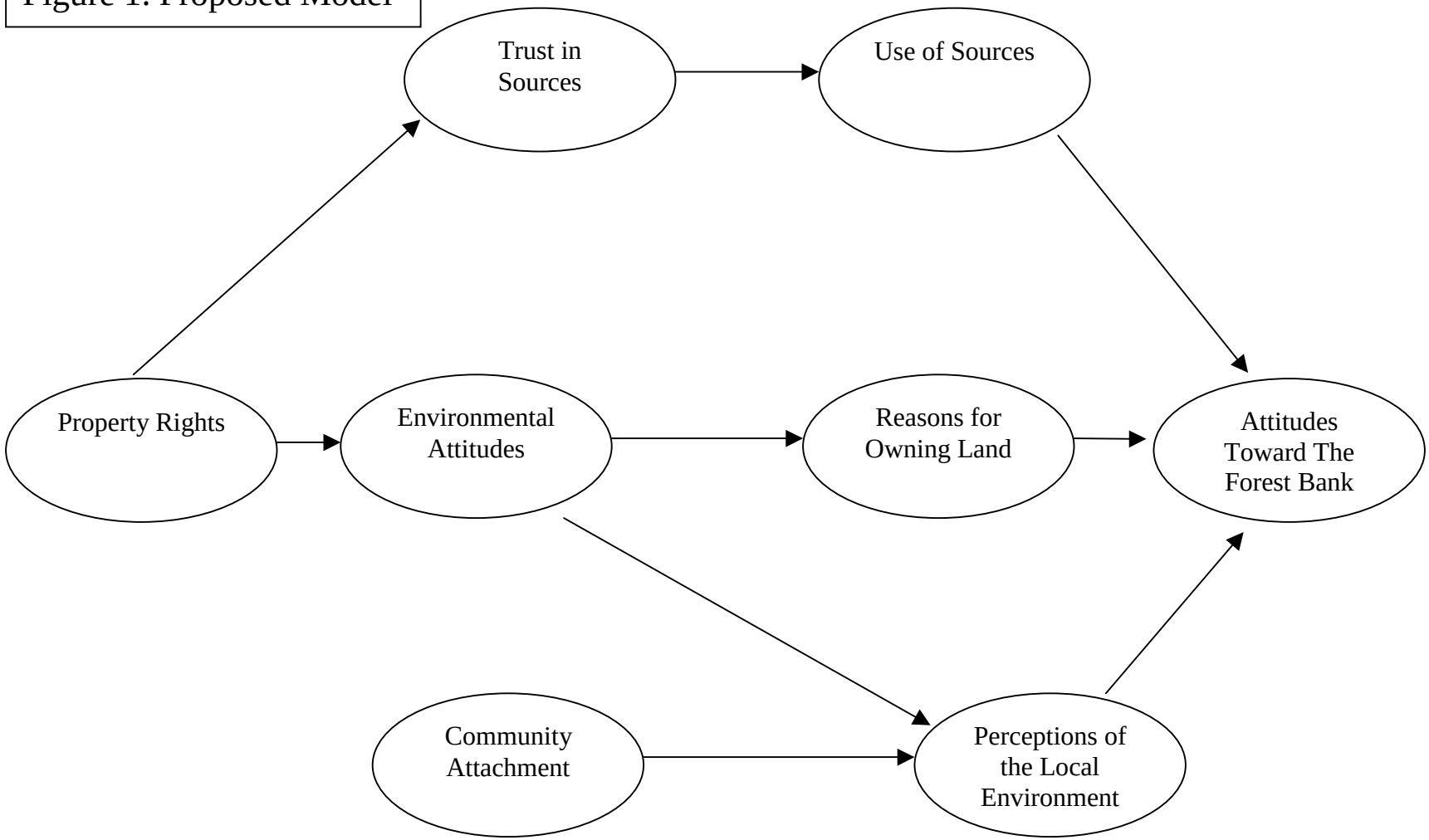
This study presents a proposed model of variables that may influence attitudes toward The Forest Bank. The variables, and the model of their multivariate relationships, is based on previous research related to NIPF landowners. Each variable is presented in such a way as to reflect its hypothesized level of influence on landowners' attitudes toward The Forest Bank. After a brief section detailing the methods used to obtain the data in this study, results from the model are presented, followed by a discussion of these findings with recommendations for future research.

Proposed Model

The proposed model tested by this research is presented in Figure 1. Several variables were hypothesized to have a direct or indirect relationship with attitudes toward The Forest Bank. This model attempts to incorporate a wide range of explanatory variables (NIPF owners' beliefs and attitudes) into a holistic model to predict attitudes to a specific program. Based on interviews with landowners and review of relevant research on NIPF landowners, the following seven major variables were identified as potentially important determinants of attitudes toward The Forest Bank: community attachment, property rights attitudes, environmental attitudes, perceptions of local environmental conditions, trust in sources of natural resource information, sources used for natural resource information, and reasons for owning land.

This study relies on the assessment of landowner attitudes, both for the dependent variable (attitudes toward The Forest Bank) and several other variables in the model. In general, an attitude has been described as a “psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor” (Eagly and Chaiken, 1998, p. 269). Strongly-held attitudes are often predictive of behavior, thus, the inclusion and analysis of landowner attitudes is important because better understanding of these attitudes may help predict or understand future enrollment behavior related to programs similar to The Forest Bank.

Figure 1. Proposed Model



Because this study and the resulting model rely heavily on measuring attitudes, it is important to make a distinction between the two primary types of attitudes that will be measured in the empirical study that follows: symbolic and instrumental attitudes. Symbolic attitudes reflect concerns about one's identity, while instrumental attitudes tend to account for more tangible items such as personal or economic gain (Cary, 1993). Because instrumental attitudes are more powerful than symbolic ones in influencing environmental behavior (Cary, 1993), symbolic attitudes (e.g., protecting the environment for future generations) may not be as strongly related to adoption behavior as instrumental ones (such as a free management plan or direct economic benefits). In this study, symbolic attitudes include concerns about general environmental issues, political orientation, as well as community attachment. Instrumental attitudes, which should have a stronger direct influence on landowner behavior, include concerns about local environmental quality and reasons for owning forestland. Although the relationship between these two types of attitudes and actual enrollment behavior is not analyzed here, it remains an area of important future research related to landowner interest and eventual enrollment in ecosystem management programs.

Previous Research

Over the past several years, research on NIPF landowners has begun to discuss ecosystem management as a response to issues of rapid parcelization and resultant fragmentation of the forested land base of the east. While collaborative agreements between adjacent landowners have been occurring for years, the idea of researching relevant attitudes has only begun to reach fruition in the last five years. Several recent studies deal with landowner attitudes toward and perceptions of the general idea of ecosystem management (Campbell and Kittredge, 1996; Hodge, 1996; Rickenbach et al., 1998; Sample, 1994; Williams and Ellefson, 1997), while a few examine landowner attitudes to specific management objectives (Brunson et al., 1997; Jacobson et al., 1996; Yarrow and Guynn, 1994). However, even as late as 1997, Bliss et al. (1997) point out the relative lack of research on the attitudes of NIPF owners toward proposed ecosystem management.

The purpose of this study was to model the variables that would influence attitudes toward The Forest Bank. The dependent variable in the model is a construct that measures landowner attitudes toward The Forest Bank and represents what we are attempting to understand in this study. This variable was measured by asking landowners to evaluate individual components of the program. The sections that follow summarize research that has been done with respect to each of the independent variables included in the proposed model. Relevant literature pertaining to each is discussed, and the relationships and links that are expected between these variables and the dependent variable are proposed. In the type of model used here, variables must be identified as dependent (attitudes toward The Forest Bank), intermediate (reasons for owning land; sources of information used and trusted for natural resource information; attitudes concerning the environment; perceptions of the local environment), or initial (property rights; community attachment). Intermediate variables can freely correlate with any other intermediate variables in the model and the dependent variable, but not the initial variables because the initial variables are theorized to be "prior" to the intermediate variables, and can only influence intermediate variables and the dependent variable (not each other). Thus, intermediate variables cannot have an effect on the initial variables in the type of model used in this analysis. A major assumption of this model is that one's attitudes concerning property rights and community attachment are formed prior to, and influence the intermediate variables.

Intermediate Variables

Reasons for Owning Land

Past research has identified many of the factors important to landowners as reasons for owning land. However, little has been done to connect these reasons with management decisions and other important attitudes. Failure to understand non-timber reasons for ownership and attitudes toward management practices led many efforts to stimulate harvesting to fail (Egan, 1997; Hodge, 1993; Worrell and Irland, 1975). Over one-quarter of all landowners own forestland simply because it is part of their primary residence, while only 3% consider timber harvest as their major reason for owning forestland

(Birch, 1996). In Virginia, the top three reasons for owning land among NIPF owners are preserving nature, maintaining scenic beauty, and viewing wildlife. These may or may not be compatible with the goals of ecosystem management programs such as the one proposed here (Hodge, 1996).

Other related research suggests a relationship between motivation and preservation. For example, Axelrod (1994) found that the three motivational domains in most value structures are economic, social, and universal. Individuals who are dominated by economic domains are the least likely to pursue environmental preservation. It may follow, therefore, that individuals who own land for economic gain may be less apt to endorse preservation.

This is reinforced in a study undertaken in South Africa which found that the more dependent one was on the land for income, the less likely he or she was to engage in any number of conservation behaviors (McDowell and Sparks, 1989). Similarly, Palmer et al. (1985) found that landowner objectives influenced management and adoption behavior. Thus, further understanding ownership motives appears to be very important to understanding attitudes toward ecosystem management.

It is expected that the reasons landowners identify for owning land will have a direct and significant effect on attitudes toward The Forest Bank. Presumably, if the reasons one has for owning land do not align with the practices of a new management regime, attitudes toward that proposed management will not be favorable. For example, a landowner who indicates owning land primarily to preserve scenic beauty is not likely to have a favorable attitude toward a program that involves clearcutting of forests. These reasons are important to a landowner's identity, and are likely to be a central concern when developing attitudes toward The Forest Bank.

Perceptions of the Local Environment

Apart from specific reasons for owning land, more general environmental attitudes may affect attitudes toward The Forest Bank. One dimension of environmental attitudes is one's perceptions of local environmental conditions. Although general constructs have been developed and tested for abstract environmental attitudes (e.g., the New Environmental Paradigm), specific environmental attitudes are also likely to influence one's views on land management. Thus, a model should include a general environmental variable and a more specific variable reflecting the manifestation of these general attitudes on a specific concern, i.e., the local environment. In this case, perceptions of the local environment are thought to be more direct and immediate, while general environmental attitudes are indirect and function at a more distant and base level. Other researchers have suggested that few individuals develop personal philosophies of environmental concern in the abstract, and therefore surveys of environmental attitudes should focus more on specific issues with which the respondents interact on a day-to-day basis (Solecki, 1998).

In general, higher levels of dissatisfaction with environmental conditions result in higher levels of action to protect the environment. For example, one study found that an individual's evaluation of environmental quality significantly predicted attitudes toward, and practices involved with, various forms of activism (Pelletier et al., 1996). Seguin et al. (1998) also found that an important mediating variable of environmental activism was the perception of an important local environmental problem, and another study found perception of personal harm to be one of three predictors most frequently associated with environmental activism (McKenzie-Mohr et al., 1995). Baldassare and Katz (1992) found that personal environmental threat is a better predictor of overall environmental practices than are demographic variables or political factors. Such findings seem to indicate that the more one is concerned with local environmental problems, the more likely he or she would be to favor an activist response. In the context of this study, we would expect this to be manifest as more favorable attitudes toward an ecosystem management program such as The Forest Bank.

Environmental Attitudes

The general attitudes an individual has toward the environment can have a strong and important impact on acceptance of environmentally-based programs which are currently being proposed across the country. Several studies based on landowners from across many different areas have determined that landowner attitudes toward the environment and the level to which they engage in "pro-environmental" behaviors (e.g., recycling, purchasing "green" products) are very similar to those of the general public (Bliss, Brooks, and Larsen, 1993; Bliss et al., 1994; Bourke and Luloff, 1994; Jacobson et al., 1996; Jones, Luloff, and Finley, 1995; Williams, Voth, and Hitt, 1996). The common conclusion from this body of research is that NIPF landowners generally exhibit fairly high levels of support for environmental protection.

The environmental attitudes held by an individual could also be important contributors to the way they view their local environment. Since environmental attitudes are in part a function of other elements such as age (Buttell, 1992; Mohai and Twight, 1987), education (Baldassare and Katz, 1992), and political orientation (Buttell, 1992; VanLiere and Dunlap, 1981), we can assume that those attitudes will be formed well before local environmental concerns arise and perhaps influence attitudes toward those concerns.

This literature suggests that general environmental attitudes have a fundamental influence on many other variables. Such attitudes are deeply held, and usually formed ealier in life, and therefore will influence items such as perceptions of the local environment and reasons for owning land. For this reason, environmental attitudes are likely to have a strong, but indirect influence on attitudes toward The Forest Bank.

Trust in Sources of Information

While factors such as perceptions of the local environment and reasons for owning land are important in landowners' management decisions, so too are other factors such as the level of trust given to the organization sponsoring new programs. Sources that individuals trust are more likely to be the ones they use to inform decisions in the future. Several

studies have begun to examine source credibility, but much remains to be done. Among NIPF owners, the highest credibility ratings have been given to extension agents, state foresters, and The Nature Conservancy, while the lowest ratings have been given to private foresters (consultants) and town conservation officials (Soden, 1995; Tyson et al., 1998). Among farmers, many of whom are NIPF owners, the two most trusted sources for information regarding conservation issues and new management practices are farm magazines and the Natural Resources Conservation Service (Korsching and Hoban, 1990). In the arena of water resource policy, developers are the least trusted, while other farmers are the most trusted for information and advice (Lovrich and Pierce, 1986). In general, non-governmental sources are awarded more trust from the public and landowners than the government (Soden, 1995).

When dealing specifically with ecosystem management and other collective measures, there have been relatively few studies regarding trust, although this is an emerging field of study. Proponents of ecosystem management have struggled with residents' fears of outside intervention into the management of their lands (Jacobson et al., 1996). Any group or agency that tells a landowner what to do with their land is implying that the landowner is wrong, which can result in defiance, possibly resulting in lower levels of trust in these sources in the future (Carneige, 1953). In general, when contributions are sought from a collective, and the government (or any group) is involved, trust in that source can be expected to play a major role in influencing an individual's decision (Blamey, 1998).

The level of trust an individual has in a group or organization can influence how they respond to information and marketing efforts from these groups. In the past, new environmental regulations and programs have often come from state and federal agencies who are traditionally trusted less (Soden, 1995; Tyson et al., 1998). However, as private environmental organizations such as The Nature Conservancy and regional land trusts have emerged with privately sponsored programs, assessing trust has become more important. Not only is trust in the technical information groups provide important, but also the perceived alignment between the program's source or sponsor and the

individual's environmental attitudes. This is a particularly important consideration in this study, since a private environmental organization, The Nature Conservancy, is sponsoring the program. While research presented above indicates that some landowners hold environmental attitudes and engage in environmental behaviors, it will be important to assess how they perceive The Nature Conservancy and whether this perception affects adoption. This is difficult to predict; although The Nature Conservancy is an environmental organization, it is more mainstream than others and often employs conservative market-based strategies to protect the environment.

Past research indicates that landowners have a tendency to trust some sources of technical information more than others, and that this level of trust will influence adoption of new management techniques or land management programs. In our study, levels of trust in The Nature Conservancy are expected to directly influence landowners' attitudes toward The Forest Bank, and consequently their enrollment decision, with more trust relating to more favorable attitudes toward the program.

Sources of Information Used

Beyond issues of trust, whether or not a particular source is actually used for information could be an important determinant of attitudes toward land management programs. Often, accessibility and the ease of getting information have been found to have a greater influence on an individual's choice of sources than the amount or quality of information available from them (Korsching and Hoban, 1990). A recent study of Virginia forest landowners found that the sources most frequently used for technical information were farm magazines and The Nature Conservancy magazine, while no forestry-related magazines were cited (Hodge and Southard, 1992). Virginia NIPF owners belong to many organizations, the most popular being any number of state forestry associations (19%), The Nature Conservancy (16%), and the National Wildlife Foundation (16%) (Hodge and Southard, 1992). This body of literature suggests that landowners receive information from a wide variety of sources including The Nature Conservancy itself. This

means that many landowners are likely to be exposed to The Nature Conservancy and The Forest Bank at some point.

Studies of farmers have confirmed work that has been done on forest landowners' sources of information regarding ecosystem management. Leading sources of information regarding conservation techniques for farmers are other farmers with successful experience with the product or technique, local agricultural dealers, and local government agencies (Korsching and Hoban, 1990). In Southern Ontario, landowners also rely on other landowners for assistance and information, while any governmental authority is generally not preferred, regardless of whether it is local or federal government (Kreutzwiser and Pietroszko, 1986). By preferring sources with the fewest ties to government, landowners feel they are left with more options. Various studies suggest that personal contacts may be more important than any form of mass media, highlighting the importance of one's social group and the networks of acquaintances one has in a community or region, especially fellow farmers of foresters (Chubb, 1994; West et al., 1988). However, in general, adopters of conservation technology or management practices rely on more sources of information than do those who do not adopt new technologies or programs (Rodgers, 1983).

The implication of this research for our model is that landowners may vary in their use of different sources of information, and that the utilization of particular sources may increase the likelihood that the landowner will enroll in The Forest Bank. With respect to the proposed model, this indicates that the sources used for natural resource information could have a direct effect on attitudes toward The Forest Bank.

Initial Variables

Community Attachment

Community attachment has a long tradition in other disciplines (e.g., rural sociology, tourism), but has yet to be explored in NIPF research. Ecosystem management efforts entail a large commitment from the members of a community. They may also

significantly impact the way that area looks or is managed. Therefore, it seems logical to examine the effects of attachment to a place or community on important decisions such as ecosystem management projects, particularly because highly attached individuals may react differently than those with less attachment.

Community attachment can be thought of as analogous to "sense of community" which is "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (McMillan and Chavis, 1986, p. 9). Place attachment is important "because it generates identification with a place and fosters social and political involvement in the preservation of the physical and social features that characterize a neighborhood" (Mesch and Manor, 1998, p. 505). This suggests that landowners who are attached to their community would care more about the environmental problems or issues which threaten the physical features of the community.

In addition to social factors, satisfaction with the physical dimensions of the environment surrounding the community are strongly related to overall satisfaction with the area (Fried, 1982). This is supported by findings from recent studies of rural Southeastern residents that these individuals have strong emotional and symbolic attachment to the region's forest and wild areas, rooted in the cultural and environmental landscape (Cordell et al., 1996; Williams et al., 1992). Again, this suggests that level of attachment would directly affect an individuals' perception of local environmental issues. Also, significant town to town differences in attitudes and support of proposed land use controls have been found, furthering the idea of regional differences based in attachment and place (Bobrow, 1984).

There is the general belief that people in small communities in rural areas have higher levels of attachment based on the notion that they have more close friends and nearby family as well as deeper roots in the area (Stinner et al., 1990). One predictor for attachment is the number of family neighbors present (Logan and Spitze, 1994). Because attachment to a community and the resultant social networks are so important to sources

of information and important decisions, these variables are likely to be important to adoption decisions.

Community attachment could also have an important influence on nearly every element within our proposed model because it fosters social and political involvement in the community and beyond. It is an important component of personal identity, reshaping how an individual perceives the world, region, and local community. This could affect everything from the way one views the local environment, to their sources of all types of information and even their fundamental attitudes. For this reason, community attachment is theorized to have both direct and indirect effects on attitudes toward The Forest Bank and is included in the model as an initial variable.

Private Property Rights

Studies have shown that one of the biggest fears of ecosystem management is the loss of property rights (Bliss et al., 1994; Brunson et al., 1997; Campbell and Kittredge, 1996; Cocklin and Doorman, 1994; Peterson and Horton, 1995). There is little doubt that the tradition of private property rights is firmly entrenched in America. John Locke felt that society's primary responsibility was to protect private property rights (Cocklin and Doorman, 1994). This philosophical and social tradition has been passed down, particularly in rural regions, translating into the strong feelings of many farmers and other landowners. The perceived chipping away at private property rights by various forms of government through environmental regulation seems to have created strong anti-government feelings (Karp, 1993). There is a long tradition, bolstered by the Jeffersonian agrarian ideal, of the farmer as the noble “victim” of society, laboring for the good of all citizens. Farmers' greatest fear is that “somewhere down the road they might not have any choice in what they do on their land” (Peterson, 1991, p. 302).

These deeply rooted ideas concerning property rights are essential when considering cross-boundary management efforts such as ecosystem management. While ecosystem management has proceeded relatively quietly on the west coast, until recently it was seen

as a concept without much relevance to the NIPF lands of the east. This changed in 1993 when the Society of American Foresters (SAF) released the results of its Task Force Report on Long-Term Health and Productivity. It acknowledged that public values were changing and that the time may have arrived for NIPF owners to consider ecosystem management on private lands. The ensuing firestorm of controversy is highlighted by the belief by some (Jones et al., 1995) that any central management of NIPF lands "violates the tradition of private property ownership in this country" (Heissenbuttel, 1996; Larson, 1993, p. 16). Others have echoed this idea, claiming that the notion of private property ensures that large numbers of people will act independently, resulting in a "whole" that is diverse and strong, rather than requiring all landowners to act together (Sampson, 1992).

There are many different facets of protest to ecosystem management stemming from concerns about property rights, however most focus on the issues of bearing the public burden and the potential loss of autonomy. One of the most fundamental issues to many landowners is that of bearing the public burden. Some current backlash is based on the fact that NIPF owners do not feel that they should have to bear the public burden of protecting resources for the public good (Sample, 1994). Many feel that public, not private lands should be used to achieve public goals. However, a much more fundamental argument has emerged concerning the simple loss of the right to private property in America.

In terms of ecosystem management, there seem to be similar concerns and responses to the idea of landowners losing their autonomy over their land (Roberts and Parker, 1998). Some believe that where public ecosystem values are high, it would simply be more effective to reconfigure the mosaic of public and private land (through purchase and exchange) rather than imposing more regulations and costs on NIPF owners (Wear, Turner, and Flamm, 1996). A recent study determined that a majority of Arkansas NIPF owners believe they have the right to use their land in any fashion they wish, without regulation (Williams et al., 1996). Many simply believe that ecosystem management, when implemented through enforceable regulations, increases the prospect of a conflict over its constitutionality, and the potential of a Fifth Amendment controversy (Flick,

Barnes, and Tufts, 1995). This only seems to heighten the need for research and study of voluntary, collaborative attempts as opposed to regulatory systems.

A component of the potential loss of autonomy is the loss of flexibility in the way lands can be managed. Studies have shown that this is the largest barrier to cross-boundary coordination from NIPF owners (Sample, 1994). They fear that entering into a cooperative planning effort will limit their flexibility for future decision making regarding their property (Sample, 1994). A similar concern comes from small NIPF owners who worry that the agenda of larger owners will dominate the efforts of a collaborative management plan (Williams and Ellefson, 1997). Bliss and Martin (1989) found that long-time landowners perceive the forest as an extension of his or her identity, enhanced by personal management. Some of these landowners fear that outside control of their lands will threaten this sense of identity and autonomy.

Many of these concerns over property rights have been echoed in studies of Appalachian residents, including those in Southwestern Virginia. Many of the NIPF owners in SW Virginia are or have been tobacco farmers. Farmers have been characterized as liking land better than money, and one reason community land trusts aren't successful is that they would keep farmers from working their land (Fink, 1986). In the Southern Appalachians, four in ten rural landowners view land as something that should not be bought or sold, but rather something to be revered and shared (Cordell et al., 1996). A study on rural communities in Appalachia found that “land held a special meaning that combined the diverse concepts of utility and stewardship. While land was something to be used and developed to meet one's needs, it was also the foundation of daily existence giving form to personal identity, material culture, and economic life. As such, it defined the ‘place’ in which one found security and self-worth” (Beaver, 1976, p. 57). Appalachian residents have been characterized as having fierce pride and a do-it-yourself attitude, which is reflected in their independent, self-reliant attitude, that precludes asking for any outside help or intervention (Jones, 1976). In a recent study of forestry-related individuals in the southern U.S., among the 41% of NIPF owners who felt they had lost

some of their property rights, the primary perceived cause was laws protecting endangered species (Yarrow and Guynn, 1994).

Despite the strong property-rights sentiment, there is far from a consensus on how property rights concerns fit into the attitudinal hierarchy of landowners when considering cross-boundary management efforts. For example, in contrast to most of the studies cited above, a recent study found that 69% of landowners in the Tennessee Valley approve of limiting their rights in order to protect the environment (Bliss et al., 1997). However, loss of control and property rights were one of the major concerns raised by landowners during preliminary interviews about The Forest Bank. This, and the large body of research demonstrating such concerns among farmers and other landowners, makes it a key variable to the hypothesized model, and one which could have important direct and indirect effects on several others. This would include attitudes toward new programs, such as The Forest Bank, which clearly entail the loss of at least some property rights. Due to its importance in the literature and to many landowners in SW Virginia, the tradition of private property rights is established in such a way as to perhaps be the most influential variable in our model.

Methods

Instrument

In order to test the proposed model, data were obtained from a survey of landowners in Southwestern Virginia. This survey was designed based on previous studies in NIPF research as well as other literature on landowners' motivations and environmental attitudes. In addition, semi-structured interviews were conducted with landowners to identify issues which were important to their consideration of new ecosystem management programs. Interviews were arranged with a number of landowners in the region, based on recommendations from TNC of interested individuals, through informal contact at a local farm co-op store, and from referrals from any of the individuals contacted through one of the other methods. Interviews were also conducted with one consulting forest manager for a local timber company, a regional Natural Resources Conservation Service worker who works with farmers in the area, and an employee of the

Virginia Department of Recreation and Conservation who also works with landowners in the area. Discussions covered NIPF attitudes and land use, as well as The Forest Bank. Interviews and literature led to a list of potential reasons that a landowner may or may not be interested in a program such as The Forest Bank. The following general topics were represented in the survey:

- Dependent variable: Attitudes toward The Forest Bank
- Intermediate variables: Reasons for owning land, sources of information used and trusted for natural resource information; attitudes concerning the environment; perceptions of the local environment;
- Initial variables: Community attachment; private property rights

The section dealing with the dependent variable described The Forest Bank program and asked questions about respondents' attitudes toward the program and their desire to enroll. It is important to note that this program was never explicitly identified as an ecosystem management program.

The following sections detail how each variable was measured in terms of the indicators included as well as how these were measured. The complete survey instrument is included in Appendix A, and the full results are presented in Appendix B.

Dependent Variable

Attitudes toward The Forest Bank

This variable was measured using nine statements regarding features of the proposed program. Respondents rated each component on a five-point Likert-type scale with values ranging from -2 (component is a reason not to enroll in the program) to +2 (component is a reason to enroll). The nine statements were as follows:

- The Nature Conservancy is sponsoring the program
- Getting a steady, reliable income
- Timber would be harvested off your land
- The Nature Conservancy assumes the risk of timber value lost due to natural disaster

- Land enrolled in this program will be permanently enrolled
- Timber harvested will be processed locally to promote the local economy
- Land enrolled will not be able to be subdivided
- The Nature Conservancy, not the landowner, will be responsible for keeping up with new regulations
- The resale value of my land may decline

Intermediate Variables

Reasons for Owning Land

The items used to measure this variable were developed in two ways. First, reasons identified from prior research were included (Birch, 1996; Bliss and Martin, 1989; Hodge, 1996). Added to this list were reasons identified in the landowner interviews conducted prior to the creation of the instrument. These reasons for owning land were measured using a five-point Likert-type scale with values ranging from "extremely important" (1) at one end to "not at all important" (5) at the other, as potential responses to the question "How important to you personally is each of the following reasons to continue owning land in Southwest Virginia?"

Perception of the Local Environment

Landowner perceptions of local environmental conditions were measured using a list of issues or problems in the area and asking that respondents rate how much of a problem the issues were in the area. The list was developed from a previous study done in the area by The Nature Conservancy and through information obtained in the interviews. A four-point Likert-type scale was used with categories ranging from "a big problem" (1), to "not a problem" (4).

Environmental Attitudes

While environmental attitudes have been measured in many studies, recent research has suggested growing concern over how environmental attitudes and actions are defined in rural regions. Some studies have found that rural residents are less supportive of

environmental behaviors or attitudes that entail more land and resource use regulation (Van Liere and Dunlap, 1981), or ones that threaten their sense of identity, or sense of place (Carrol and Lee, 1990). Nevertheless, landowners often self-identify themselves as more environmentally-oriented because they have a more regular interaction with the environment and see themselves as the "stewards of the environment" (Constance and Rikoon, 1998). Thus, the nature of the question appears to influence the findings. Realizing the importance of these concerns, we felt it was best to employ a very general and well-tested measure of environmental attitudes, and we used a series of statements adopted from the General Social Survey (GSS, 1999). Each item was ranked in terms of agreement based on a five-point Likert-type scale ranging from "strongly agree" at one end to "strongly disagree" at the other.

Trust in Information Sources

How much respondents trust natural resource information sources was measured using existing measures from previous research (Soden, 1995; Tyson, 1998). Several other sources were added to reflect the specific nature of the study region. Respondents were asked to rate how much they would trust information provided by each of the sources. A four-point Likert-type scale was used in the response frame with categories indicating they would trust the source "very much", "some", "not much", or "not at all."

Sources of Information

The sources of natural resource information used by landowners were measured by asking respondents to indicate how frequently they had obtained information from the list of sources provided in the "trust in sources" item. A five-point response frame was used with categories ranging from whether they had used a source "many times" to "never."

Community Attachment

A respondent's attachment to his or her community was measured through two items, both of which are supported in the literature as two of the strongest and most reliable predictors of community attachment (Logan and Spitze, 1994; Stinner et al., 1990). The first asked respondents to indicate their level of agreement with the statement "I feel a

sense of belonging to my community." A five-point Likert-type response frame was used with categories ranging from "strongly agree" at one end to "strongly disagree" at the other. The second item asked respondents to indicate how many members of their family live within thirty miles of their home. The five response categories available included "all", "most", "some", "a few", and "none."

Property Rights

Respondents' views on property rights issues were measured using a series of statements dealing with their view of government regulations used to manage private lands. One of these indicators was obtained from Bliss et al. (1997), while others were modified versions of items in the same study. Respondents were asked to indicate their level of agreement with these statements based on a five-point Likert-type scale that ranged from "strongly agree" to "strongly disagree".

An initial instrument was pre-tested in March of 1999, with 64 undergraduate students (who were asked to imagine owning land) and 200 randomly selected landowners in Washington County, Virginia with tracts of 10 acres or more of forested land. This county is directly adjacent to the study area and has geographic and ecological conditions similar to the study area. This was done through a single mailing with no follow-ups, and as an in-class assignment for the undergraduates. Fifty-nine surveys were returned from the landowners, for a response rate of 29.5%. Summary statistics were compiled and factor analysis of multi-item scales was done to ensure that the variables tested were valid and reliable, that question wording was comprehensible, and that question categories were comprehensive. Changes suggested by the pretest were incorporated in the final version.

Sample

In April of 1999, the revised mail survey was sent to 2,000 randomly selected landowners from the counties of Lee, Russell, Wise, Scott, and Tazewell in Southwest Virginia, all within the Clinch River Watershed. Names were obtained from landowner lists provided by the Department of Revenue in each county. Lists contained every landowner in each

county regardless of ownership size or type of land owned (e.g., agricultural or forest). Since this study focused on private landowners (all business and limited liability corporations were excluded), the sample was stratified so that from each county, equal numbers of landowners would be sampled from acreage classes of 10-49 acres, 50-99 acres and greater than 100 acres. This was done to ensure adequate samples of large and small landowners, since the debate is still ongoing as to whether these groups differ in characteristics and attitudes (Bliss et al., 1997; Cleaves and Bennett, 1994; Jones et al., 1995; Rosen and Kaiser, 1988).

Because equal numbers of landowners from each of the three ownership categories were desired for each of the five counties, and because the target sample size was 2,000, four hundred tracts were selected from each of the five counties with an ideal representation of one-third of each county's tracts from each of the three size classes. In several of the counties, not enough tracts were available in one or both of the larger acreage categories. In this case, all of the tracts in those classes were selected, and the remaining tracts needed to reach 400 were divided between the other two size classes. Respondent selection was done by counting the available tracts in a size class and then dividing by the appropriate number needed to arrive at 133 names. For example if 399 tracts in the 10-49 acre size class were eligible to be sampled, every third tract would be selected, ensuring that tracts would be selected from across the list, whether it be sorted by city or alphabetically.

Mailings were conducted according to a modified Dillman (1978) Total Design Method. One week after the initial mailing, a postcard reminder was sent to everyone who had not returned a survey. Three weeks after the date of the first mailing, a second packet was sent with another copy of the survey, a stamped return envelope, and an appropriate cover letter, to all individuals who had not responded by that time. Finally, a third mailing was sent out 4 weeks after the initial mailing with a third copy of the survey and a stamped return envelope. The enclosed cover letter in this final mailing provided an opportunity for individuals to indicate why they had not returned a completed survey, and if refusing for any of those reasons, to send this cover letter back. The cover letters sent in all three

waves of the mailing detailed the objectives of the study, and ensured landowners of the confidentiality of the results provided. They also stressed that indicating an interest in The Forest Bank did not constitute any form of commitment to the program, and explained the need for placing identifying numbers on the survey itself.

Of the 2,000 surveys mailed, 187 were undeliverable due to various reasons. These included because the address was incorrect or the forwarding address had expired (n = 54), or because the addressee was deceased (n = 52), no longer owned property (n = 55), or was physically incapable of filling out the survey (n = 26). Thus, the total effective sample size was 1,813. In total, 816 surveys were received, for a response rate of 45.0%.

Analysis Procedures

In order to test the relationships between the variables presented above, we used the LISREL 8 structural equation analysis package (Joreskog and Sorbom, 1993), employing the maximum likelihood (ML) method of estimation, as well as the two-stage process recommended by Anderson and Gerbing (1988). This analysis tool was chosen because of its ability to test relationships among the variables simultaneously. These relationships were tested through analysis of the strength and direction of the resulting path coefficients. The path coefficients produced using LISREL are appropriate for this type of analysis because they take into account both direct and indirect effects related to all of the variables in the model.

Several measures were used to evaluate the fit of the final LISREL model. These included the goodness-of-fit index and the adjusted goodness-of-fit index (GFI and AGFI; Joreskog and Sorbom, 1989), the parsimonious normed-fit index (PNFI; Mulaik et al., 1989), the non-normed-fit index (NNFI; Hu and Bentler, 1995), the comparative fit index (CFI; Bentler, 1990), and the critical N statistic (Hoelter, 1983). The values for these fit indices range from 0 to 1, with values closer to 1 indicating a good model fit (Byrne, 1989; Mulaik et al., 1989). Several fit indices were used because the properties of these indices vary along several dimensions.

Due to the fact that many of the variables in the model contained several factors, it was decided not to exclude surveys with missing data listwise, so as not to decrease the sample size beyond reliable levels. Instead, missing data points were replaced by the series average to retain large samples.

Measurement Model

A confirmatory measurement model was tested as recommended by Sethi and King (1994), Anderson and Gerbing (1988), and Joreskog (1993). This model specifies the hypothesized relationships of the indicators measured to the underlying variables, with each of the variables allowed to intercorrelate freely among each other. Before this measurement model was tested, the unidimensionality of each variable was assessed through factor analysis. This assures that each set of indicators has only one underlying trait or variable in common (Hattie, 1985; McDonald, 1981; Sethi and King, 1994). Variables found to have unacceptable fit indices were re-defined by dropping the indicators that failed to preserve the unidimensionality of the variable (Anderson and Gerbing, 1988). Due to the exploratory nature of this research and the fact that many of these items had not been tested previously, several indicators failed to preserve unidimensionality and thus were dropped from each variable, with the final results indicated in Table 14. This step also resulted in the emergence of more than one factor for several variables, including the ultimate dependent variable.

After determining the unidimensionality of each variable individually through factor analysis, a measurement model for each pair of variables was estimated, combining them two by two (Joreskog, 1993). Thus, after making sure the fit of each variable was acceptable, the fit of two variables was measured. In this fashion all variables were paired with each other (AB, AC, BC, etc.) to ensure that the indicators of each variable did not load on other variables. After these variables had been tested two by two, the overall measurement model fit was tested (Anderson and Gerbing, 1988; Joreskog, 1993; Sethi and King, 1994).

Results

Results of Factor Analysis

Factor analysis of multi-item questions led us to drop several indicators, and resulted in more than one factor for several variables, as detailed below. The final indicators for each variable are presented in Table 14. The composite reliability for each indicator and variable is shown which in LISREL is analogous to Cronbach's Alpha (α). In general, reliability of the variables is quite good. Although several of the variables had reliability scores of below the accepted minimum of .7, it is generally accepted that exploratory research such as this need not meet this standard (Bollen, 1989; Nunnally, 1978).

Table 14. Results of Factor Analysis on Constructs in Final Model (N = 816)

Constructs and Indicators	**Completely standardized loadings**	**Indicator Reliability**	**Error Variance**
Dependent Variable			
Attitudes Toward The Forest Bank			
Attitudes Toward The Forest Bank - Benefits		**0.88***	
Getting a steady reliable income	0.84	0.70	0.30
TNC assumes risk of timber value lost due to natural disaster	0.90	0.81	0.19
Timber harvested will be processed locally	0.78	0.61	0.39
Attitudes Toward The Forest Bank – Constraints		**0.69***	
Land enrolled in this program will be permanently enrolled	0.51	0.26	0.74
Land enrolled will not be able to be subdivided	0.91	0.83	0.17
Intermediate Variables			
Reasons for Owning Land			
Reasons for Owning Land - Economy		**0.85***	
Income from agriculture	0.84	0.70	0.30
Income from grazing	0.88	0.77	0.23
Reasons for Owning Land - Environment		**0.68***	
To protect land from development	0.72	0.52	0.48
To protect the environment	0.71	0.51	0.49
Reasons for Owning Land - Amenities		**0.76***	
To enjoy scenery	0.77	0.59	0.41
To pass on to my children	0.56	0.32	0.68
To have privacy	0.80	0.64	0.36
Perception of Local Environment		**0.72***	
Poor water quality in the Clinch River	0.66	0.44	0.56
Abandoned mine lands	0.65	0.42	0.58
Overcutting of forests	0.73	0.53	0.47

Table 14. Results of Factor Analysis on Constructs in Final Model (N = 816) (cont.)

Constructs and Indicators	**Completely standardized loadings**	**Indicator Reliability**	**Error Variance**
Trust in Information Sources			
Trust in Information Sources - Agency		**0.90***	
Natural Resources Conservation Service (SCS)	0.81	0.66	0.34
University extension service	0.85	0.73	0.27
State Department of Forestry	0.85	0.73	0.27
Technological/scientific experts	0.79	0.63	0.37
Trust in Information Sources – Business		**0.77***	
Business or private industry	0.81	0.66	0.34
Timber companies	0.77	0.59	0.41
Trust in Information Sources - Local		**0.76***	
Farmers	0.70	0.49	0.51
Neighbors/other landowners	0.75	0.57	0.43
Local farm co-op store	0.70	0.49	0.51
Use of Information Sources – Agency		**0.61***	
Natural Resources Conservation Service (SCS)	0.51	0.27	0.73
Environmental Protection Agency	0.58	0.34	0.66
State Department of Fish and Game	0.66	0.44	0.56
Use of Information Sources			
Use of Information Sources – Business		**0.78***	
Private foresters	0.74	0.55	0.45
Business or private industry	0.72	0.52	0.48
Timber companies	0.74	0.55	0.45
Utilization of Information Sources – Local		**0.86***	
Farmers	0.87	0.75	0.25
Neighbors/other landowners	0.87	0.75	0.25
Environmental Attitudes			
Environmental Attitudes – Pro - Nature		**0.47***	
Any change humans cause in nature..will make things worse	0.60	0.36	0.64
Human beings should respect the nature…created by God	0.22	0.05	0.95
Nature would be at peace and in harmony if left alone	0.59	0.35	0.65
Environmental Attitudes – Pro - Technology		**0.42***	
To protect the environment, America need economic growth	0.42	0.18	0.82
Science and technology usually find ways to solve problems	0.61	0.37	0.63
Initial Variables			
Community Attachment		**0.39***	
Sense of belonging to the community	0.51	0.26	0.74
Members of family living within 30 miles	0.47	0.22	0.78

Table 14. Results of Factor Analysis on Constructs in Final Model (N = 816) (cont.)

Constructs and Indicators	**Completely standardized loadings**	**Indicator Reliability**	**Error Variance**
Property Rights		**0.72***	
Private forest owners have the right to do as they please	0.44	0.19	0.81
Gov't should regulate to protect water quality	-0.81	0.65	0.35
Gov't should regulate to preserve the beauty of the forest	-0.76	0.58	0.42

* Composite reliability of each construct

Dependent Variable

Results from factor analysis generated two factors for attitudes to The Forest Bank (Table 14). An "enrollment constraints" factor was measured by two items, "land will be permanently enrolled" and "land will not be able to be subdivided." Three items were used to measure "enrollment benefits." These were "getting a steady income", "TNC assumes all risks due to natural causes", and "timber harvested will be processed locally."

Intermediate Variables

Environmental Attitudes

Two factors were identified for use in measuring this variable, one we called "pro-nature" and the other "pro-technology/economy." The "pro-nature" factor was measured using three items, while the "pro-technology/economy" factor was measured using two items (Table 14). These items were as follows and asked landowners to indicate their level of agreement with each:

- Pro-Nature
  - Any change humans cause in nature, no matter how scientific, is likely to make things worse.
  - Human beings should respect nature because it was created by God.
  - Nature would be at peace and in harmony if only human beings would leave it alone

- Pro-Technology
  - Science and technology usually find ways to solve environmental problems.
  - In order to protect the environment, America needs economic growth.

Trust in Sources

Three factors emerged for this variable: trust in agency sources, in private sources, and in local sources. Trust in agency sources was measured by four items including the Natural Resources Conservation Service, University extension, the State Department of Forestry, and technological/scientific experts. Trust in private sources was measured with two items, business or private industry and timber companies. Trust in local sources was measured by three items including farmers, neighbors/other landowners, and the local farm co-op store (Table 14).

Sources of Information

The same three factors were used to measure this variable as were used for trust in sources, including agency sources, business/private sources, and local sources. Agency sources used were measured by three items including the Natural Resource Conservation Service, the Environmental Protection Agency, and the State Department of Fish and Game. Private industry sources were measured by three items including private foresters, business or private industry, and timber companies. Local sources were measured by two items, other farmers, and neighbors/other landowners (Table 14).

Reasons for Owning Land

Three factors emerged to measure this variable: economic reasons, environmental reasons, and amenity reasons for owning land. The economic reasons were measured using two items “income from grazing” and “income from agriculture.” Environmental reasons were measured by two items: “to protect land from development” and “to protect the environment”. Finally, amenity reasons were measured by three items: “to enjoy the scenery”, “to pass on to my children,” and “to have privacy” (Table 14).

Perception of the Local Environment

One factor emerged to measure this variable and included three items: “Poor water quality in the Clinch River”, “abandoned mine lands”, and “overcutting of forests” (Table

14), each assessed by asking landowners how much of a problem they feel each of these issues is in Southwest Virginia.

Initial Variables

Community Attachment

As outlined above, the two items used to measure this variable were an item determining how strongly landowners feel a sense of belonging to their community, and the number of family members living within thirty miles of their home (Table 14).

Property Rights

Three items were retained to measure this variable, with landowners asked to indicate their level of agreement with each:

- Private forest owners should have the right to do as they please with their forests, regardless of what it does to the environment.

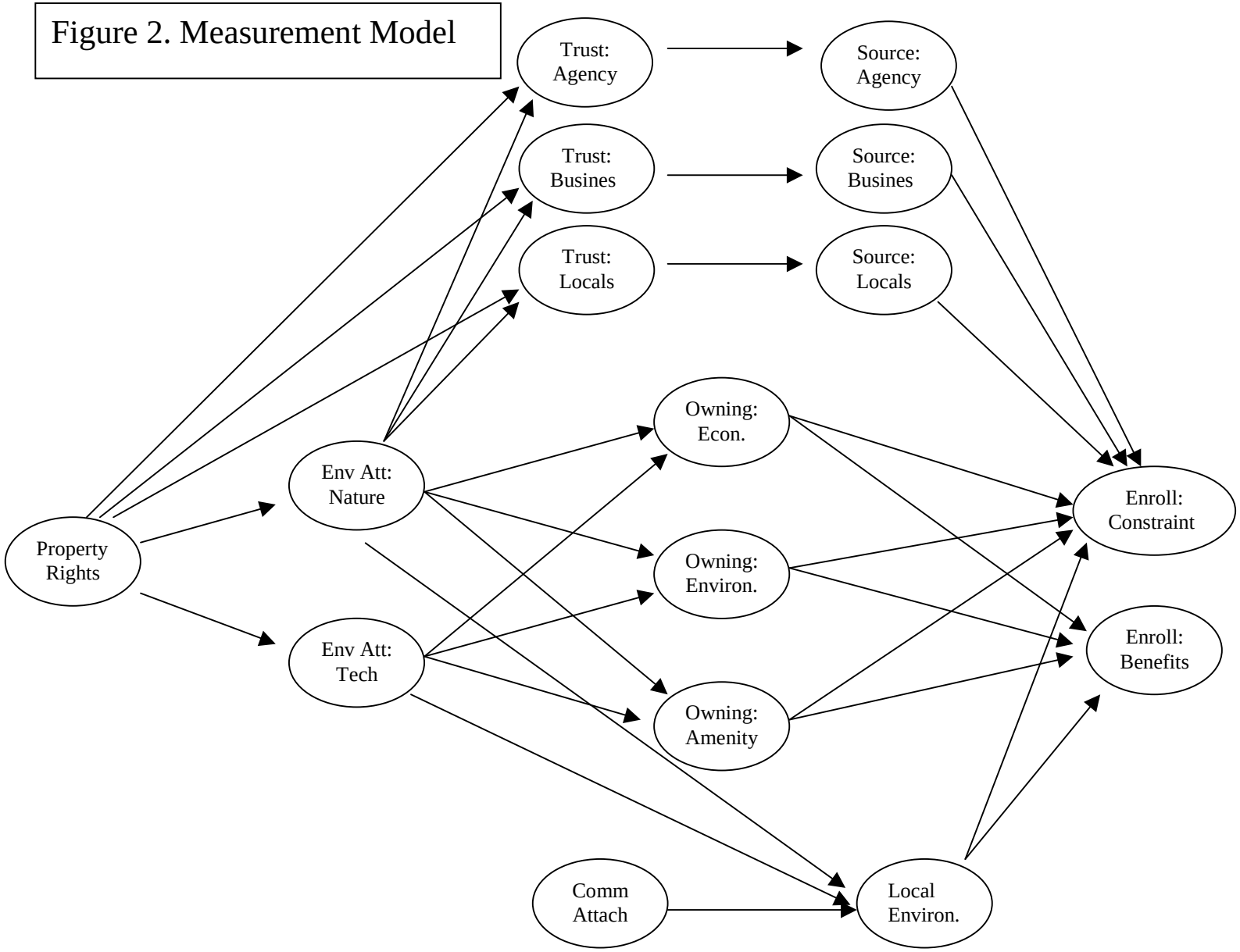
- The government should have the right to regulate how people use their land and forest to (2 separate items):
  - Protect water quality
  - Preserve the beauty of the forest

Results from factor analysis produced the measurement model presented in Figure 2. This model depicts all paths between the variables and was used to test the data and produce the final results.

Model Results

The overall fit statistics of the final model indicate that the model fits the data within established guidelines. Standard fit index values were as follows: GFI = .92; AGFI = .90;

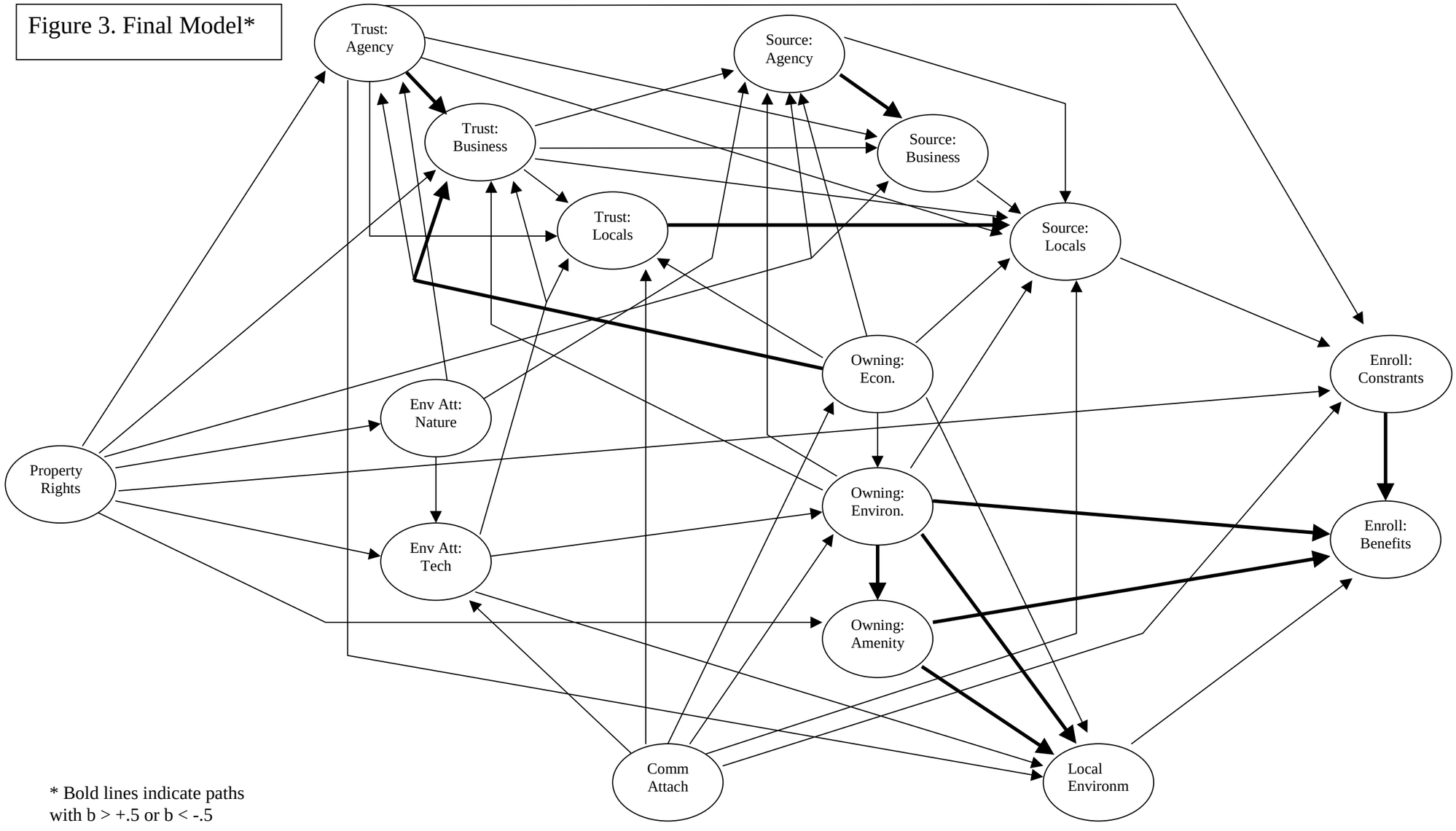
Figure 2. Measurement Model



CFI = .94; NNFI = .93; PNFI = .77. The closer these values are to 1, the better the overall fit of the model, with values over .9 considered adequate for using the model to make conclusions. Thus, the fit of the model based on these values is good. Also the critical N value was 458, well above the recommended cut value of 200. In exploratory research such as this, the fit indices need only demonstrate a sufficient level of reliability to be able to accept the model (Bollen, 1989; Nunnally, 1978). Thus, the model generated was sufficient enough to permit reasonable conclusions to be drawn from the results. The final model is shown in Figure 3 with all significant paths (.05 level) shown. The nine strongest paths are depicted as bold arrows.

Table 15 presents the statistically significant standardized path coefficients for the relationships between the variables. Table 16 decomposes these effects into the direct, indirect, and total effects of each variable on the dependent variable in the final model. For example, in Table 15 the path between property rights (row) and the "nature" factor in environmental attitudes (column) has a standardized beta coefficient of .18. The direct, indirect, and total effects in Table 16 can be interpreted by reading the columns and rows in the same fashion. Direct effects are only from one variable straight to another, while indirect effects operate from one variable, through many others, to eventually influence the target variable. For example, the community attachment variable does not have a direct effect on attitudes toward the benefits of The Forest Bank; however, it does have an indirect effect. Thus, the effect of community attachment on the dependent variable is only realized through its influence on other intermediate variables, which in turn have an effect on the dependent variable.

Figure 3. Final Model*



* Bold lines indicate paths with b > +.5 or b < -.5

Table 15. Estimated Standardized Path Coefficients for Relationships in Final Model (N = 816)[1]

Variable		Env. Attitudes		Reasons for Owning Land			Trust in Sources			Use of Sources			Loc.Env.	Dep Var	
	Indicator	Nature	Tech	Econ	Env	Amen	Agen1	Bus1	Local1	Agen2	Bus2	Local2	Loc. Env	Const	Benf
Property Rights		0.18*	0.28*	0.07	-0.23*	0.13*	-0.35*	0.15*		-0.28*	0.12*		-0.06	0.10*	-0.04
Community Attach			-0.31*	0.27*	0.29*	0.07			0.19*			-0.12*		0.25*	
Env. Att.	Nature		-0.26*			0.04	0.30*			0.14*			-0.04		
	Tech				0.25*			-0.24*	0.14*				0.18*	0.09	-0.07
Reasons for Owning	Econ				0.22*		0.14*	0.13*	0.09*	0.23*		0.19*	-0.13*		
	Env					0.93*		-0.51*		0.17*		-0.10*	1.20*		-1.62*
	Amen							0.30	0.14				-0.79*		1.39*
Trust in Sources	Agen1							0.48*	0.37*		-0.10*	-0.25*	0.16*	-0.19*	
	Bus1								0.37*	0.17*	0.31*	-0.30*			
	Local1											0.68*			
Use of Sources	Agen2										0.54*	0.40*			
	Buss2											0.30*			
	Local2													-0.16*	
Perc. of Local Env.															0.27*
Dep Var	Const														0.48*

*: Significant at <=.05

[1] Prop = Property Rights; Attach = Community Attachment; Nature = Environmental Attitudes (pro -nature); Tech = Environmental Attitudes (pro - technology)
Econ = Economic Reasons for Owning Land; Env = Environmental Reasons for Owning Land; Amen = Amenity Reasons for Owning Land
Agen1= Trust in Agency Sources; Bus1 = Trust in Business Sources; Local1 = Trust in Local Sources
Agen2 = Use of Agency Sources; Bus2 = Use of Business Sources; Local2 = Use of Local Sources
Locen = Perceptions of the Local Environment;
Dep Var - Const = Attitudes Toward the Forest Bank (constraints); Benf = Attitudes Toward the Forest Bank (benefits)

Table 16. Decomposition of Causal Effects in Final Model (N = 816)[1]

Variables	Nature			Technology			Economic			Env			Amen			Agen 1		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
Prop	0.18		0.18	0.28	-0.05	0.23	0.07		0.07	-0.23	0.07	-0.16	0.13	-0.14	-0.01	-0.35	0.06	-0.29
Attach				-0.31		-0.31	0.27		0.27	0.29	-0.02	0.27	0.07	0.26	0.32		0.04	0.04
Nature				-0.26		-0.26					-0.07	-0.07	0.04	-0.06	-0.02	0.30		0.30
Tech										0.25		0.25		0.24	0.24			
Econ										0.22		0.22		0.21	0.21	0.14		0.14
Env													0.93		0.93			
Amen																		
Agen1																		
Bus1																		
Local1																		
Agen2																		
Buss2																		
Local2																		
Locen																		
Const																		

[1] DE = Direct effect; IE = Indirect effect; TE = Total effect

Prop = Property Rights; Attach = Community Attachment; Nature = Environmental Attitudes (pro -nature); Tech = Environmental Attitudes (pro - technology)
Econ = Economic Reasons for Owning Land; Env = Environmental Reasons for Owning Land; Amen = Amenity Reasons for Owning Land
Agen1= Trust in Agency Sources; Bus1 = Trust in Business Sources; Local1 = Trust in Local Sources
Agen2 = Use of Agency Sources; Bus2 = Use of Business Sources; Local2 = Use of Local Sources
Locen = Perceptions of the Local Environment; Const = Attitudes Toward the Forest Bank (constraints); Benf = Attitudes Toward the Forest Bank (benefits)

Table 16. (cont.) Decomposition of Causal Effects in Final Model (N = 816)

Variables	Bus 1			Local 1			Agen 2			Bu s2			Local 2			Localenv		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
Prop	0.15	-0.11	0.04		-0.05	-0.05	-0.28	0.02	-0.26	0.12	-0.10	0.02		-0.04	-0.04	-0.06	-0.21	-0.27
Attach		0.08	0.08	0.19	0.07	0.26		0.12	0.12		0.09	0.09	-0.12	0.25	0.13		-0.01	-0.01
Nature		0.24	0.24		0.16	0.16	0.14	0.03	0.17		0.13	0.13		0.08	0.08	-0.04	-0.07	-0.11
Tech	-0.24	-0.06	-0.30	0.14	-0.08	0.06		-0.01	-0.01		-0.09	-0.09		0.07	0.07	0.18	0.12	0.30
Econ	0.13	0.01	0.14	0.09	0.14	0.23	0.23	0.06	0.29		0.19	0.19	0.19	0.23	0.42	-0.13	0.12	-0.01
Env	-0.51	0.28	-0.23		0.04	0.04	0.17	-0.04	0.13		0.00	0.00	-0.10	0.15	0.05	1.20	-0.74	0.46
Amen	0.30		0.30	0.14	0.11	0.25		0.05	0.05		0.12	0.12		0.13	0.13	-0.79		-0.79
Agen 1	0.48		0.48	0.37	0.18	0.55		0.08	0.08	-0.10	0.19	0.09	-0.25	0.29	0.04	0.16		0.16
Bus1				0.37		0.37	0.17		0.17	0.31	0.09	0.40	-0.30	0.44	0.14			
Local 1													0.68		0.68			
Agen 2										0.54		0.54	0.40	0.16	0.56			
Buss 2													0.30		0.30			
Local 2																		
Locen																		
Const																		

[1] DE = Direct effect; IE = Indirect effect; TE = Total effect

Prop = Property Rights; Attach = Community Attachment; Nature = Environmental Attitudes (pro -nature); Tech = Environmental Attitudes (pro - technology)
Econ = Economic Reasons for Owning Land; Env = Environmental Reasons for Owning Land; Amen = Amenity Reasons for Owning Land
Agen1= Trust in Agency Sources; Bus1 = Trust in Business Sources; Local1 = Trust in Local Sources
Agen2 = Use of Agency Sources; Bus2 = Use of Business Sources; Local2 = Use of Local Sources
Locen = Perceptions of the Local Environment; Const = Attitudes Toward the Forest Bank (constraints); Benf = Attitudes Toward the Forest Bank (benefits)

Table 16. (cont.) Decomposition of Causal Effects in Final Model (N = 816)

Variables	Const			Benefits		
	DE	IE	TE	DE	IE	TE
Prop	0.10	0.09	0.19	-0.04	0.24	0.20
Attach	0.25	-0.06	0.19		0.12	0.12
Nature		-0.09	-0.09		0.02	0.02
Tech	0.09	-0.01	0.08	-0.07	0.04	-0.03
Econ		-0.09	-0.09		-0.12	-0.12
Env		-0.01	-0.01	-1.62	1.42	-0.20
Amen		-0.02	-0.02	1.39	-0.22	1.17
Agen1	-0.19	-0.01	-0.20		-0.05	-0.05
Bus1		-0.02	-0.02		-0.01	-0.01
Local1		-0.11	-0.11		-0.05	-0.05
Agen2		-0.09	-0.09		-0.04	-0.04
Buss2		-0.05	-0.05		-0.02	-0.02
Local2	-0.16		-0.16		-0.08	-0.08
Locen				0.27		0.27
Const				0.48		0.48

[1] DE = Direct effect; IE = Indirect effect; TE = total effect
Prop = Property Rights; Attach = Community Attachment; Nature = Environmental Attitudes (pro -nature)
Tech = Environmental Attitudes (pro - technology); Econ = Economic Reasons for Owning Land
Env = Environmental Reasons for Owning Land; Amen = Amenity Reasons for Owning Land
Agen1= Trust in Agency Sources; Bus1 = Trust in Business Sources; Local1 = Trust in Local Sources
Agen2 = Use of Agency Sources; Bus2 = Use of Business Sources; Local2 = Use of Local Sources
Locen = Perceptions of the Local Environment; Const = Attitudes Toward the Forest Bank (constraints)
Benf = Attitudes Toward the Forest Bank (benefits)

The strongest total effect in the model was the effect of amenity reasons for owning land on attitudes toward the benefits of The Forest Bank (standardized b = 1.17) (Table 16). Other highly significant direct effects were between environmental reasons for owning land and amenity reasons (b = .93) and between amenity reasons for owning land and perceptions of the local environment (b = -.79) (Table 16). Five of the eleven strongest total effects involved reasons for owning land, while the remaining six involved the effects of the two sources of information variables (trust in and use of) on other variables in the model.

The R^2 value, the best indicator of the amount of variance explained in the dependent variable (attitudes toward The Forest Bank), was .49 for the benefits factor, and .15 for the constraints factor. This suggests that 49% of the variability in landowner's attitudes toward the benefits of The Forest Bank is explained by the variables included in the model. However, only 15% of the variance in the constraints factor was explained by this model.

Discussion

There are many intriguing relationships between these variables when examining the model as a whole, some of which were unexpected, yet highly significant. Surprisingly, there was little support for the role of property rights as a strong direct or indirect contributor to attitudes toward The Forest Bank. The variable representing property rights was found to have only a handful of significant paths, and of these, only a few were important enough to make a large contribution. In fact, property rights had only a small effect (b = .10) (Table 15) on the perceived constraints of The Forest Bank, and no direct effect on the perceived benefits. This was contrary to what was expected given the literature in this area and interviews conducted with landowners prior to this study (Bliss et al., 1994; Brunson et al., 1997; Cocklin and Doorman, 1994; Campbell and Kittredge, 1996; Peterson and Horton, 1995). Furthermore, an unexpected positive, indirect effect of property rights on attitudes toward the benefits of The Forest Bank (b = .24) emerged in the model (Table 16). This path turned out to be the second strongest indirect effect on either factor in the dependent variable, weaker than only the indirect effect of

environmental reasons for owning land. Thus, the theorized direct effects of property rights did not emerge. This unusual finding deserves further study.

Environmental attitudes was another variable which seemed to have support in the literature as an influential item, but that did not produce many significant effects in the model. Only a handful of significant paths emerged, and of these many were quite small in terms of their beta weights. Environmental attitudes (as measured here) seem to not be important determinants of the reasons one chooses to own land, or one's use of or trust in sources of natural resource information. This suggests that other variables either present in this model or not included here, play a more instrumental role in determining these items. It may also suggest that the measurement of environmental attitudes in the model was not appropriate or complete; a different measure of environmental attitudes might produce the results suggested by the literature.

Not surprisingly, there was an important relationship between landowner trust in sources and the sources of information used by landowners for natural resource issues. Two of the three factors within the trust in sources variable had strong direct effects upon their associated factors in the sources of information variable, and six of the eleven strongest total effects in the model involved the linkage between trust in sources and sources used (Table 15). However, what is surprising is that the sources of information a landowner uses have very little impact upon attitudes toward the specific proposed program. Only one factor in this variable (local sources of information) had a direct path to the dependent variable and this was a fairly weak effect (b = -.16) (Table 15). In general, the sources of information used by landowners had very little impact in the model as a whole, as was reflected in the fact that only one path from any of the three factors in this variable was directed outside of the variable. Most of the significant effects involving this variable were related to trust in sources. For example, one of the strongest paths in the model (b = .68) (Table 15) was between trust in local sources and the use of local sources. This finding supports a large body of research which has focused on the importance of both the trust in and use of local sources of information such as other farmers, friends, and neighbors for natural resource information (Chubb, 1994; Korsching and Hoban, 1990;

Kreutzwiser and Pietroszko, 1986; Lovrich and Pierce, 1986; West et al., 1988). Again, this highlights the importance of trust in sources as a predictor of what sources landowners will use for natural resource information.

A surprising result was the lack of a relationship between community attachment and other variables in the model. It was theorized that different levels of community attachment would result in different levels of perception or concern for local environmental problems. This hypothesis was not supported by the model, as there was no path between the two variables. It was also expected that there would be more interaction between perceptions of the local environment and the other variables in the model; however, this was not the case. The only significant path to emerge from this variable was directly to the dependent variable.

By far the more significant findings in terms of contribution to NIPF research dealt with landowner reasons for owning land. While this was expected to be an important variable with respect to attitudes toward The Forest Bank, our results reveal the influential effect of this variable on other components of the model as well. As a whole, landowner reasons for owning land were found to be the strongest predictors of attitudes toward The Forest Bank, and had the most heavily weighted direct effects on the dependent variables. The strongest direct, indirect, and total effects in the model all involved reasons for owning land and attitudes toward The Forest Bank.

Most importantly, the four strongest direct effects in the model involved reasons for owning land. One intriguing result was the path representing the direct effect between environmental reasons for owning land and attitudes toward the benefits of The Forest Bank (b = -1.62) (Table 16). This path completely negated the indirect path between these two factors (b= 1.42) (Table 16). Because the indicators in the “benefits” of The Forest Bank factor were all economically oriented (receiving a steady income, TNC assumes all risks, timber will be processed locally), it appears that individuals who own their land for environmental protection reasons do not perceive these items as benefits, resulting in the strong, negative direct effect. However, this is counteracted by the strong

influence of environmental reasons for owning land as realized indirectly through other variables. This is a compelling and complex finding that could be explored further by future research. Those individuals who own their land for "amenity" reasons (enjoy scenery, pass on to children, privacy) seem to have a positive attitude toward the "benefits" of The Forest Bank (b = 1.39) (Table 15). Though not examined extensively in previous studies, our findings about the importance of determining landowner reasons for owning land are supported by some earlier research (McDowell and Sparks, 1989; Palmer et al., 1985). The variable representing reasons for owning land also had several significant paths to perceptions of the local environment, suggesting that the reasons one owns land are an important predictor for their attitudes toward the perceived health of the local landscape.

Only four significant paths from the variables in the model to attitudes toward the constraints of The Forest Bank resulted from the model, with all four being relatively weak effects. The strongest of these effects implies that the more attached one is to the community, the more likely they are to perceive the constraints of The Forest Bank. Similar to the "benefits" variable, future research may make it possible to identify and operationalize this variable using different indicators.

These findings indicate that past research has not done enough to explore the importance of landowner reasons for owning land and the relationship between these and other attitudes. As was found in early NIPF research (Egan, 1997; Hodge, 1993; Worrell and Irland, 1995), early efforts directed at motivating landowners to harvest timber were hindered because many landowners did not own land for the purposes of harvesting timber for income. This important lesson is essential today, because it supports the findings of our model in that by identifying landowner reasons for owning land ahead of time, managers can predict interest in various programs and management objectives. While this seems somewhat intuitive, very little research has been done on this premise, and our research points out the need to move in this direction if researchers and managers are to understand the motivations and attitudes of NIPF owners.

Conclusion and Future Research

While this study is both complex and compelling, it is merely an exploratory look at some of the important variables and linkages involved in the process of determining landowner attitudes. The importance of this model to the current body of research is that it can form the building block for future efforts. Variables can be redefined, and tested again to develop reliable indicators of landowner attitudes. One variable in particular, the perceived benefits of The Forest Bank, would benefit from further definition. In this study, these "benefits" were primarily economic in nature; future research could explore attitudes toward the perceived environmental benefits of such a program as well.

Perhaps the most important and intriguing finding of this research was the influence of landowner reasons for owning forestland on attitudes toward The Forest Bank. The number and significance of the effects related to this variable suggest that reasons for owning land are key to future ecosystem management efforts such as The Forest Bank. While somewhat intuitive, it seems logical that landowners will base their attitudes toward the components of a program based on whether or not their reasons for owning land (and associated management objectives) align with the components of the program. Very little research has been dedicated to landowner reasons for owning land, and our findings suggest some interesting avenues for future research.

While reasons for owning land were found to have a large influence in our model, several of the variables did not have the level of effect that was suggested by the literature. Specifically, these included environmental attitudes, perceptions of the local environment, and property rights. However, in all three of these cases, important indirect effects, or effects that were significant but weak were found, indicating that these important variables should be further examined in future research. Thus, while the results of this research provide some interesting conclusions, they also suggest many avenues for future research. As was expected, this effort has provided a model that can function as a building block for future research of this nature, and can be moved forward considerably with further testing and confirmation of the variables, factors, and indicators in this study.

CHAPTER FOUR

CONCLUSION

Conclusion

Many interesting conclusions can be drawn from this research, most of which stem from comparing findings from these two similar studies. Although each was concerned with furthering our understanding of NIPF landowners, Chapter Two focused on how observable characteristics of landowners related to attitudes toward The Forest Bank, while Chapter Three dealt more with the interrelationship between attitudes toward The Forest Bank and other attitudes. Findings from both studies provide valuable information as to what types of landowners would be interested in enrolling in ecosystem management programs such as The Forest Bank, and what factors contribute to their decisions. These findings represent an important shift in NIPF research by trying to understand landowners on a fundamental level, yet provide ample impetus for future research which can help to refine and reinforce the findings reported here.

Major Findings

Existing literature suggested that property rights/loss of control issues would be an important component of landowner interest in The Forest Bank. In Chapter Two, results indeed showed that giving up control of their land was the biggest deterrent to enrollment for those who indicated they would not enroll in The Forest Bank. Even among those landowners who would enroll, results showed that the permanency of enrollment of land was a concern. It was therefore surprising that results from Chapter Three indicated that property rights as whole did not have a significant effect upon attitudes toward the positive and negative aspects of The Forest Bank. While there were indirect effects, these were minor and do not represent the strong direct effect that was expected. It is possible that these results did not corroborate findings from the previous chapter as a result of a poorly defined construct, which may not have measured the full breadth of the property

rights issue. In particular, the indicators in the property rights variable dealt primarily with regulations on private land, while the indicators in the constraints (of The Forest Bank) variable dealt with the permanency of the decision and the ability to subdivide enrolled lands. Nonetheless, largely on the basis of Chapter Two there appears to be sufficient evidence pointing toward continued analysis of property rights issues and potential loss of control as limitations to enrollment in other ecosystem management programs.

Next we turn to the results pertaining to what factors may contribute to enrollment in or favorable attitudes toward The Forest Bank, specifically financial incentives. Results from Chapter 2 indicated that financially rewarding components of the program (steady income, TNC assumes all risk), on average were not seen as appealing by those who were not interested. In addition, results indicated that a mix of incentives would be a more effective tool for encouraging enrollment. The study in Chapter Three produced the previously undocumented result that reasons for owning land were a key component in attitudes toward The Forest Bank. Thus, no amount of financial incentive would be likely to overcome objections among those for whom the program goals for The Forest Bank were not consistent with their own reasons for owning land. Overall, these two studies suggest that non-commodity considerations are more important factors to landowners when evaluating a new management program such as this than commodity or financial benefits.

Combining the most significant findings from each study produces an important indication of how to gauge the success of future ecosystem management programs. Chapter Two indicated that a mix of incentives and marketing efforts might produce the most efficient formula for program success, as measured by the number of landowners willing to enroll. The findings indicated that there may potentially be a distinct set of characteristics that could function as indicators of landowners who would be likely to enroll in a program. When coupled with findings from Chapter Three, indicating that landowner reasons for owning land are also important predictors of attitudes toward The Forest Bank, we can conclude that landowners may be segmented by either observable,

traditional marketing criteria (income), or by the reasons they own land. Both sets of factors appear to inform their management decisions and attitudes toward The Forest Bank. Our results suggest that if landowners with different reasons for owning land could be approached with a program including benefits and incentives which aligned with these reasons, the likelihood of landowner enrollment would increase.

Future Reserarch

Although this research provided insight into various issues, it also raised several possibilities and considerations for future research. The analysis in Chapter Two, while interesting, applies only to landowners in Southwest Virginia. It will be important for future research to build upon these efforts, and attempt similar studies in other areas. By testing the characteristics identified in this study, researchers can begin to refine those indicators that are essential to predicting enrollment. These efforts could produce a set of variables that could be used in any area, regardless of its geographical or social characteristics. Future research could also focus on assessing the characteristics of potential enrollees across a wide variety of programs with different components.

Chapter Three represents a more preliminary approach to determining interest in an ecosystem management program, and there are many facets of this study that can be built upon in future research. Many of the variables and constructs in the model used have not been tested in this format prior to our research. Future efforts could attempt to further refine these constructs and increase the reliability and predictive power of the overall model. Finally, future research could examine in more detail the reasons individuals own land and the role of these reasons in their attitudes toward new management programs such as The Forest Bank.

In the end, this research suggests that as the number of private forest landowners in America continues to increase, it will be important for researchers and managers to better understand the characteristics and attitudes of these individuals. The research presented here is an attempt to further this knowledge and develop tools and indicators that can be

used to better understand landowners in the future, especially as ecosystem management programs become more numerous and more viable as a solution to the issues of forest fragmentation and parcelization.

CHAPTER FIVE

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APPENDIX A

1999 SOUTHWEST VIRGINIA LANDOWNER SURVEY

Section 1. Your land in Southwest Virginia

1. How many acres of land do you own in Southwest Virginia? _____

2. Do you own more than one parcel of land in Southwest Virginia?
   - ❑ No (*go to question 4*)
   - ❑ Yes

3. How many parcels of land do you own in Southwest Virginia?_____

4. Is any of your land in Southwest Virginia currently in forest?
   - ❑ No (*go to question 7*)
   - ❑ Yes

5. About what percentage of your land is in forest? _____%

6. About how old are **most** of your trees? Most are around _____ years old.

7. How long have you personally owned your largest parcel(s) of land? _____ years

8. How did you acquire the land you currently own? (Check all that apply.)
   - ❑ Inherited
   - ❑ Purchased
   - ❑ Other _____

9. Are there any permanent streams (those that flow year-round) on your property?
   - ❑ No
   - ❑ Yes

10. How important *to you personally* is each of the following reasons to continue owning land in Southwest Virginia?

	Extremely Important	Very Important	Somewhat Important	Not Very Important	Not at all Important
Income from timber	❑	❑	❑	❑	❑
Income from agriculture	❑	❑	❑	❑	❑
Income from grazing	❑	❑	❑	❑	❑
Personal recreation	❑	❑	❑	❑	❑
As a place to live	❑	❑	❑	❑	❑
To enjoy the scenery	❑	❑	❑	❑	❑
To pass on to my children	❑	❑	❑	❑	❑
To preserve family and tradition	❑	❑	❑	❑	❑
To protect land from development	❑	❑	❑	❑	❑
To provide wildlife habitat	❑	❑	❑	❑	❑
To have privacy	❑	❑	❑	❑	❑
Financial investment	❑	❑	❑	❑	❑
To protect the environment	❑	❑	❑	❑	❑

Section 2. These questions ask about how you use and manage your land in Southwest Virginia.

11. Which of the following actions do you plan to do or have you done on your land? (If your land isn't suitable for one or more, mark "doesn't apply.")

	Doesn't apply	Have done	Plan to do	Will not do	Unsure
Placed water bars in roads or trails	❑	❑	❑	❑	❑
Fenced cattle out of streams	❑	❑	❑	❑	❑
Kept vegetation near streams as buffers	❑	❑	❑	❑	❑
Managed vegetation to help wildlife	❑	❑	❑	❑	❑
Thinned-out some of my trees	❑	❑	❑	❑	❑
Planted vegetation to help control erosion	❑	❑	❑	❑	❑
Burned or sprayed to control vegetation	❑	❑	❑	❑	❑
Cut trees for firewood	❑	❑	❑	❑	❑
Cut trees to clear land for different uses	❑	❑	❑	❑	❑
Prepared a written management plan for my property	❑	❑	❑	❑	❑
Consulted with land managment professionals about my land	❑	❑	❑	❑	❑

12. Have you ever cut trees for timber (to sell)?
    - ❑ Yes (*go to question 14*)
    - ❑ No, but I probably will some time
    - ❑ No, I don't think I ever will

13. If you haven't cut trees on your land, please indicate why. (Check all that apply.)
    - ❑ I don't have enough information about how to do it
    - ❑ I haven't needed the income
    - ❑ I don't like clearcutting
    - ❑ I don't think trees should be cut for income
    - ❑ To protect the scenery
    - ❑ My trees aren't worth enough to harvest
    - ❑ I don't like the way the land looks after trees have been cut
    - ❑ I don't have the time
    - ❑ I don't have the money or the equipment

Section 3. These questions ask about sources of information you may rely on to find out about natural resource and forest management issues.

14. Many groups supply technical information about forestry and natural resources. Please mark the box that best indicates ***how much you would trust*** information provided by each of the following groups.

	How would you trust this source?			
	Very much	Some	Not Much	Not at all
Natural Resources Conservation Service (SCS)	❑	❑	❑	❑
The Nature Conservancy	❑	❑	❑	❑
University extension service	❑	❑	❑	❑
State Department of Forestry	❑	❑	❑	❑
Technological/scientific experts	❑	❑	❑	❑
Private foresters	❑	❑	❑	❑
Business or private industry	❑	❑	❑	❑
Town/county officials	❑	❑	❑	❑
Environmental Protection Agency	❑	❑	❑	❑
Timber companies	❑	❑	❑	❑
Farmers	❑	❑	❑	❑
Sources you find on the internet	❑	❑	❑	❑
State Department of Fish and Game	❑	❑	❑	❑
Neighbors/other landowners	❑	❑	❑	❑
Local farm co-op store	❑	❑	❑	❑

15. How frequently have you ***obtained information*** from each of the following sources?

	Many times	Several times	A Few times	Once or twice	Never
Natural Resources Conservation Service (SCS)	❑	❑	❑	❑	❑
The Nature Conservancy	❑	❑	❑	❑	❑
University extension service	❑	❑	❑	❑	❑
State Department of Forestry	❑	❑	❑	❑	❑
Technological/scientific experts	❑	❑	❑	❑	❑
Private foresters	❑	❑	❑	❑	❑
Business or private industry	❑	❑	❑	❑	❑
Town/county officials	❑	❑	❑	❑	❑
Environmental Protection Agency	❑	❑	❑	❑	❑
Timber companies	❑	❑	❑	❑	❑
Farmers	❑	❑	❑	❑	❑
Sources you find on the internet	❑	❑	❑	❑	❑
State Department of Fish and Game	❑	❑	❑	❑	❑
Neighbors/other landowners	❑	❑	❑	❑	❑
Local farm co-op store	❑	❑	❑	❑	❑

Section 4. We are interested in landowners' views about several important social issues, including environmental issues and private property rights. The following questions ask your personal opinion about a some of these concerns.

16. In your personal opinion, are the following issues in Southwest Virginia a:

	Big problem	Moderate problem	Slight problem	Not a problem
Poor water quality in the Clinch River	❑	❑	❑	❑
Soil erosion	❑	❑	❑	❑
Threats to rare plant or animal species	❑	❑	❑	❑
Subdividing rural land	❑	❑	❑	❑
Abandoned mine lands	❑	❑	❑	❑
Local economic stability	❑	❑	❑	❑
Overcutting of forests	❑	❑	❑	❑
Loss of local sense of community	❑	❑	❑	❑

17. Please indicate your level of agreement or disagreement with the following statements:

	Strongly Agree	Agree	No opinion	Disagree	Strongly Disagree
Almost everything we do in modern life harms the environment	+2	+1	0	-1	-2
In order to protect the environment, America needs economic growth	+2	+1	0	-1	-2
Any change humans cause in nature, no matter how scientific, is likely to make things worse	+2	+1	0	-1	-2
We worry to much about the future of the environment and not enough about prices and jobs	+2	+1	0	-1	-2
Human beings should respect nature because it was created by God	+2	+1	0	-1	-2
People worry too much about human progress harming the environment	+2	+1	0	-1	-2
Nature would be at peace and in harmony if only human beings would leave it alone	+2	+1	0	-1	-2
It is just too difficult for someone like me to do much about the environment	+2	+1	0	-1	-2
Science and technology usually find ways to solve environmental problems	+2	+1	0	-1	-2

18. Please indicate your level of agreement or disagreement with each of the following statements:

	Strongly Agree	Agree	No opinion	Disagree	Strongly Disagree
Private forest owners should have the right to do as they please with their forests, regardless of what it does to the environment	+2	+1	0	-1	-2
The government should have the right to regulate how people use their land and forests to:					
…protect water quality	+2	+1	0	-1	-2
…protect threatened or endangered spec.	+2	+1	0	-1	-2
…preserve the beauty of the forest	+2	+1	0	-1	-2
…maintain healthy forests	+2	+1	0	-1	-2

Section 5. Living in Southwest Virginia

19. Do you live in Southwest Virginia?
    - ❑ Yes (How long have you lived there? _____ years)
    - ❑ No

20. How many miles do you live from your property in Southwest Virginia?

❑ 0 (Live on my property)	❑ 10-30 miles	❑ 100-500 miles
❑ 1-5 miles	❑ 30-50 miles	❑ More than 500 miles
❑ 5-10 miles	❑ 50-100 miles	

21. Please indicate your level of agreement or disagreement with the following statement: I feel a sense of belonging to my community.
    - ❑ Strongly Agree
    - ❑ Agree
    - ❑ Neutral
    - ❑ Disagree
    - ❑ Strongly Disagree

22. How many members of your family live within a about thirty miles of your home?

❑	All	❑ A few
❑	Most	❑ None
❑	Some	

23. Which of the following organizations do you or someone in your immediate family currently contribute time or money? (Check all that apply.)

❑ Local PTA	❑ Local Farm Board
❑ Local FFA or 4H	❑ Local church leadership
❑ Volunteer Firefighter	❑ Local Service Group (Rotary, Elks, VFW etc.)

24. In your opinion, what do the following things suggest to you about a forest's health in Southwest Virginia?

	It is very healthy	It may be healthy	No impact on health	It may be unhealthy	It is very unhealthy
Many large trees	❑	❑	❑	❑	❑
Trees of many different sizes and ages	❑	❑	❑	❑	❑
Tree leaves that are yellowish	❑	❑	❑	❑	❑
You see many deer	❑	❑	❑	❑	❑
Many different species of trees and animals	❑	❑	❑	❑	❑
Large areas with no visible human management	❑	❑	❑	❑	❑
Cows drinking water from a stream	❑	❑	❑	❑	❑
Clear streams	❑	❑	❑	❑	❑
All pine (evergreen) trees	❑	❑	❑	❑	❑
Lots of insects in the streams	❑	❑	❑	❑	❑
Lots of vines growing in the trees	❑	❑	❑	❑	❑
Evidence that trees have been harvested with a clear-cut	❑	❑	❑	❑	❑
An area of large trees along the road with evidence of a clear-cut timber harvest visible behind the large trees	❑	❑	❑	❑	❑
A small house in the forest	❑	❑	❑	❑	❑
Tire tracks from off-road vehicles in the forest	❑	❑	❑	❑	❑
A small paved road through the forest	❑	❑	❑	❑	❑
A small hiking trail through the forest	❑	❑	❑	❑	❑
An agricultural field planted in the forest	❑	❑	❑	❑	❑
Signs describing who is responsible for the forest	❑	❑	❑	❑	❑
Signs describing when the forest was planted	❑	❑	❑	❑	❑
Bales of hay keeping exposed soil from eroding during a timber harvest	❑	❑	❑	❑	❑
Grass planted after a timber harvest	❑	❑	❑	❑	❑
New, young trees planted after a timber harvest	❑	❑	❑	❑	❑

Section 7. The Nature Conservancy (TNC), a non-profit, non-governmental organization, is creating a program called the Forest Bank in your area. The questions in the following section ask for your reaction to the program. We are interested only in your opinions; you are not being asked to join the program in any way.

The purpose of the Forest Bank is to protect the environment while still allowing landowners to earn income from cutting timber and contributing to the local economy. Here is how the program works:

- The landowner will retain ownership of the land but gives up the following rights:
  - The landowner will give TNC the right to grow, manage, and cut trees on these lands.
  - Landowners will not be able to subdivide any lands enrolled in the program.
- The landowner chooses how much land to enroll, and which parcels.
- The landowner will receive a guaranteed annual payment of 3%-6% of the value of their timber.
- To fund these payments, TNC will harvest some timber off these lands in an environmentally appropriate manner.
- TNC professionals will work with each landowner to establish a management plan for their land.
- Land "deposited" in the Forest Bank will be permanently enrolled (like an easement).
- Landowners will continue to receive payments even if damage occurs (for example, fire, wind-damage, or ice storm).
- This non-governmental program is being established now, and will be operational by the end of the year.
- Timber harvested will be processed locally, to promote the local economy.

25. Had you heard of the Forest Bank prior to filling out this questionnaire?
    - ❑ No (*go to question 27*)
    - ❑ Yes

26. If yes, from what source(s) have you heard about the Forest Bank? (Check all that apply.)

❑ Newspaper	❑ Extension office	❑ Club or association meeting
❑ Television	❑ Friend or neighbor	❑ The Nature Conservancy magazine

27. There are many reasons why a landowner might or might not want to enroll lands in the Forest Bank program. How would each of the following reasons influence your decision to join?

	Reason to Enroll		Neutral		Reason not to Enroll
TNC is sponsoring the program	+2	+1	0	-1	-2
Getting a steady, reliable income	+2	+1	0	-1	-2
Timber would be harvested off your land	+2	+1	0	-1	-2
TNC assumes the risk of timber value lost due to natural disaster (ice, fire, insects)	+2	+1	0	-1	-2
Land enrolled in this program will be permanently enrolled	+2	+1	0	-1	-2
Timber harvested will be processed locally to promote the local economy	+2	+1	0	-1	-2
Land enrolled will not be able to be subdivided	+2	+1	0	-1	-2
TNC, not the landowner, will be responsible for keeping up with new regulations	+2	+1	0	-1	-2
The resale value of my land may decline	+2	+1	0	-1	-2
Other_____	+2	+1	0	-1	-2
Other_____	+2	+1	0	-1	-2

28. Based on the description provided above, would you be willing to enroll some of your lands in the Forest Bank? (We are interested in your opinion only; no one will contact you unless you specifically request.)
    - ❑ Yes, now (*go to question 30*)
    - ❑ Yes, in the future (*go to question 30*)
    - ❑ No, never

29. If you said "no" which of the following were your reasons? (Check all that apply.)
    - ❑ My trees are too small in size.
    - ❑ My trees are not valuable enough to cut.
    - ❑ The program sounds too confusing.
    - ❑ It will reduce the resale value of my property.
    - ❑ Private landowners do a good enough job of protecting the environment.
    - ❑ It will prevent me from subdividing my land.
    - ❑ I want my children to be able to decide on their own what to do with the land.
    - ❑ The program is still new; I'd like to see how it works before I make up my mind.
    - ❑ I don't want to give up control of my land.
    - ❑ I might not make as much money from my trees under this program.
    - ❑ Other _____

Section 8. We would like some general information about you, which will help us understand how Southwest Virginia landowners differ from landowners in other places. Again, this information is strictly confidential and will not be connected with you.

30. What is your age? ____ years.

31. Are you ❑ Male or ❑ Female?

32. Which of the following categories includes your total household income before taxes last year?

- ❑ $0 to $9,999
- ❑ $10,000 to 19,999
- ❑ $20,000 to 29,999
- ❑ $30,000 to 39,000
- ❑ $40,000 to 49,999
- ❑ $50,000 to 59,999
- ❑ $60,000 to 69,999
- ❑ $70,000 to 79,999
- ❑ $80,000 to 89,999
- ❑ $90,000 to 99,999
- ❑ $100,000 +

33. What is the highest level of education you have completed?

- ❑ Grammar school
- ❑ Some high school
- ❑ High school diploma
- ❑ Some college
- ❑ Bachelor's degree or equivalent
- ❑ Master's degree
- ❑ Ph.D., M.D., J.D.

34. Are you presently:

- ❑ Employed (full time)
- ❑ Employed (part time)
- ❑ Unemployed
- ❑ Retired

35. How many children do you have? _____children

36. What is your primary source of income? (Check one.)

- ❑ Timber harvest
- ❑ Farming
- ❑ Livestock
- ❑ Non-land related employment
- ❑ Not applicable (retired)
- ❑ Other

37. In what type of area did you grow up? (Check one.)

- ❑ Farm
- ❑ Rural, non-farm
- ❑ Town (under 5,000 people)
- ❑ Town (5,000-10,000 people)
- ❑ City (10,000-50,000 people)
- ❑ City (more than 50,000 people)

38. Would you consider yourself: (Check one.)

- ❑ Extremely Liberal
- ❑ Liberal
- ❑ Slightly Liberal
- ❑ Moderate
- ❑ Slightly Conservative
- ❑ Conservative
- ❑ Extremely Conservative

39. Do you fish?

- ❑ No
- ❑ Yes, in the Clinch River
- ❑ Yes, in other streams or rivers
- ❑ Yes, in both the Clinch and other rivers

If you have any comments about the Forest Bank, or any other land use and forestry issues in Southwest Virginia, please use the space provided below, or attach a separate sheet

To mail, fold in half and use the return envelope provided.
Thank you for your help!

Troy E. Hall, Professor
Jason Dedrick, Graduate Research Assistant
Virginia Tech Department of Forestry, Blacksburg VA

APPENDIX B

1999 SOUTHWEST VIRGINIA LANDOWNER SURVEY RESULTS

Question 1. Number of Acres Owned (n = 795)

Acres	Percent
0-10[1]	0.6
11-50	34.0
51-100	28.6
101-150	13.3
151-200	7.6
201-250	3.6
250+	12.1

[1] Only landowners with more than 10 acres were sampled

Question 2. Own more than one parcel (n = 801)

Response	Percent
Yes	43
No	57

Question 3. Number of parcels owned (n = 344)

Number of Parcels	Percent
2	54
3-5	38
More than 5	8

Question 4. Any land currently in forest (n = 802)

Response	Percent
Yes	86
No	14

Question 5. Percentage of land in forest (n = 682)

Percent of land	Percent
Less than 25%	24.3
25%-50%	26.7
50%-75%	20.7
More than 75%	28.2

Question 6. Age of trees owned (n = 586)

Tree Age (years)	Percent
20 or less	22.4
21-40	35.3
41-60	29.0
61-80	9.2
81 or more	4.1

Question 7. Number of years largest parcel has been owned (n = 790)

Years	Percent
20 or less	54.3
21-40	32.2
41-60	10.0
61 or more	3.5

Question 8. How land was acquired (n =812)

Response	Percent[1]
Inherited	40.9
Purchased	71.6
Gift	1.2

[1] More than one response could be indicated

Question 9. Are there streams on your property (n = 802)

Response	Percent
Yes	70.1
No	29.9

Question 10. Reasons for Owning Land in SW Virginia (n = 648)

Reason	Extremely Important	Very Important	Somewhat Important	Not Very Important	Not at All Important
Income from timber	5.3	7.7	22.4	24.8	39.8
Income from agriculture	11.6	13.9	2.0	20.2	32.3
Income from grazing	13.7	16.8	17.8	17.4	34.2
Personal recreation	29.0	24.8	22.8	9.7	13.6
As a place to live	52.4	19.1	10.3	6.4	11.8
To enjoy the scenery	42.7	31.6	16.4	3.7	5.6
To pass on to my children	46.7	23.9	14.3	6.0	9.0
To preserve family and tradition	39.1	26.9	14.9	8.5	10.5
To protect land from development	37.1	22.1	19.2	9.5	12.0
To provide wildlife habitat	40.8	26.7	19.9	6.1	6.5
To have privacy	53.9	27.1	8.7	4.6	5.7
Financial investment	20.9	20.6	29.8	13.8	14.8
To protect the environment	34.9	29.5	24.4	5.4	5.7

Question 11. Actions Landowners Have Taken or Will Not Take on their Land (n = 691)

Action	Have Done	Plan to Do	Will Not Do	Unsure	Doesn't Apply
Cut trees for firewood	49.4	5.1	18.4	7.8	19.3
Planted vegetation to help control erosion	43.0	8.2	8.0	11.2	29.7
Burned or sprayed to control vegetation	38.5	6.7	21.1	9.5	24.2
Thinned-out some of my trees	38.1	14.2	14.3	12.2	21.1
Managed vegetation to help wildlife	34.7	11.6	11.3	14.8	27.6
Cut trees to clear land for different uses	33.1	7.8	26.2	11.3	21.6
Kept vegetation near streams as buffers	30.9	5.7	8.6	12.7	42.1
Placed water bars in roads or trails	19.2	3.8	10.1	10.8	56.2
Consulted with land management professionals about my land	19.1	6.5	26.2	21.4	26.7
Fenced cattle out of streams	10.8	5.9	19.0	11.9	52.4
Prepared a written management plan for my property	7.3	7.6	29.7	26.8	28.7

Question 12. Ever cut trees for timber (to sell) (n = 791)

Response	Percent
Yes	30.8
No, but I will	28.8
No, I never will	40.3

Question 13. Reasons for not cutting trees on land (n = 550)

Reason	Percent Indicated[1]
I don't like clearcutting	50.0
I don't like the way the land looks after trees have been cut	43.5
I haven't needed the income	37.6
My trees aren't worth enough to harvest	36.7
To protect the scenery	31.6
I don't have the money or the equipment	14.7
I don't have enough information about how to do it	9.8
I don't think trees should be cut for income	8.9
I don't have the time	7.3

[1] More than one reason could be indicated

Question 14. Trust in sources of natural resource information (n = 632)

Source	Very Much	Some	Not Much	Not At All
State Department of Forestry	38.9	44.9	9.0	7.1
University extension service	37.3	46.0	9.8	6.9
Natural Resources Conservation Service (SCS)	25.3	51.5	14.1	9.0
State Department of Fish and Game	22.5	50.4	15.8	11.3
Farmers	20.8	54.1	16.3	8.7
The Nature Conservancy	19.7	47.8	20.6	11.9
Technological/scientific experts	19.3	52.1	16.7	11.8
Neighbors/other landowners	18.0	54.0	17.7	10.2
Environmental Protection Agency	12.6	40.9	24.6	21.8
Local farm co-op store	11.0	54.5	21.9	12.5
Private foresters	8.8	41.3	30.8	19.1
Business or private industry	2.8	28.7	41.1	27.4
Town/county officials	2.8	28.6	37.4	31.3
Timber companies	2.0	25.7	36.6	35.6
Sources found on the internet	1.6	29.9	32.6	35.9

Question 15. Use of Sources of Natural Resource Information (n = 709)

Source	Many Times	Several Times	A Few Times	Once or Twice	Never
Farmers	7.7	11.2	16.8	14.5	49.8
Neighbors/other landowners	6.5	10.3	22.5	16.8	43.9
Local farm co-op store	5.2	8.1	14.2	10.2	62.2
University extension service	4.6	6.8	13.8	10.9	63.9
National Resource Conservation Service (SCS)	3.3	6.2	8.5	9.2	72.7
State Department of Forestry	2.8	6.4	11.4	14.0	65.4
State Department of Fish and Game	1.4	3.1	8.6	9.7	77.2
Timber companies	1.2	2.8	8.4	18.3	69.3
The Nature Conservancy	0.8	1.4	4.6	5.3	87.8
Private foresters	0.6	3.2	7.0	12.8	76.4
Business or private industry	0.6	2.2	5.7	10.7	80.8
Technological/scientific experts	0.4	1.5	4.9	5.0	88.1
Sources found on the internet	0.4	0.8	5.1	4.9	88.7
Town/county officials	0.3	1.9	7.5	9.6	80.7
Environmental Protection Agency	0.3	0.7	4.6	5.7	88.7

Question 16. Perception of Issues in Southwest Virginia (n = 685)

Issue	Big Problem	Moderate Problem	Slight Problem	Not a Problem
Local economic stability	42.9	30.4	13.7	13.0
Overcutting of forests	40.1	59.7	16.0	14.1
Abandoned mine lands	36.3	29.0	16.3	18.4
Poor water quality in the Clinch River	33.8	35.9	17.6	12.7
Loss of local sense of community	31.8	31.5	20.5	16.3
Subdividing rural lands	31.6	28.7	17.3	22.4
Soil erosion	27.6	38.0	22.4	11.9
Threats to rare plant or animal species	16.0	26.6	30.8	26.6

Question 17. Environmental Attitudes (n = 732)

Statement	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
Human beings should respect nature because it was created by God	51.6	32.9	11.6	2.2	1.7
Almost everything we do in modern life harms the environment	17.7	36.0	13.1	25.7	7.5
Nature would be at peace and in harmony if humans would leave it alone	17.4	30.9	18.4	27.8	5.5
In order to protect the environment, America needs economic growth	11.5	31.2	23.5	24.8	9.0
People worry too much about human progress harming the environment	10.9	27.2	13.4	33.0	15.5
We worry too much about the future of the env. and not enough about jobs	10.2	23.7	13.8	36.7	15.6
Any change humans cause in nature is likely to make things worse	10.1	27.2	18.9	35.4	8.5
It is too difficult for someone like me to do much about the environment	8.9	21.4	15.8	41.2	12.7
Science and technology usually find ways to solve environmental problems	4.8	35.5	18.8	31.0	9.9

Question 18. Private Property Rights (n = 745)

Statement	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
The gov't should have the right to regulate how people use their forests to:					
Maintain healthy forests	14.8	40.2	10.3	18.4	16.4
Protect water quality	13.9	42.3	7.7	18.0	18.2
Preserve the beauty of the forest	11.1	34.9	12.8	23.6	17.6
Protect endangered species	10.0	35.2	12.3	25.1	17.4
Owners should have the right to do as they please with their forests, regardless of what it does to the env.	13.5	15.4	8.9	43.6	18.5

Question 19. Live in Southwest Virginia (n = 802)

Response	Percent
Yes	78.2[1]
No	21.8

[1]Mean number of years = 49.9

Question 20. Distance Landowners Live From Their Property in SW Virginia (n = 767)

Distance	Percent
0 miles (live on property)	60.6
1-5 miles	5.6
5-10 miles	4.7
10-30 miles	8.6
30-50 miles	3.9
50-100 miles	2.5
100-500 miles	9.5
More than 500 miles	4.6

Question 21. "Community Attachment" (n = 792)
"I feel a sense of belonging to my community"

Response	Percent
Strongly Agree	42.6
Agree	34.8
Neutral	18.9
Disagree	2.5
Strongly Disagree	1.1

Question 22. Members of Family Who Live Within Thirty Miles (n = 803)

Response	Percent
All	25.2
Most	29.4
Some	16.3
A few	15.1
None	14.1

Question 23. Organizations Involved With (n = 810)

Organization	Percent[1]
Local church leadership	63.2
Volunteer firefighters	33.1
Local PTA	25.6
Local service group (Ellks, Rotary, VFW)	24.2
Local FFA or 4H	13.5
Local farm board	10.7

[1] More than one organization could be indicated

Question 24. Perceptions of Forest Health (n = 665)

Items	Very Healthy	May be Healthy	No Impact on Health	May be Unhealthy	Very Unhealthy
Many large trees	31.3	48.6	7.9	12.0	0.3
Trees of many different sizes and ages	39.3	48.3	8.4	3.9	0.1
Tree leaves that are yellowish	2.2	9.2	12.8	66.5	9.3
You see many deer	26.5	39.8	17.6	14.0	2.1
Many different species of trees and animals	41.7	44.7	10.3	3.0	0.3
Large areas with no visible human management	17.7	42.0	19.9	18.2	2.2
Cows drinking water from a stream	12.5	25.3	23.3	33.3	5.6
Clear streams	43.6	45.9	6.9	3.3	0.3
All pine (evergreen) trees	5.6	31.8	29.3	27.7	5.6
Lots of insects in the streams	9.7	28.3	12.8	40.7	8.5
Lots of vines growing in the trees	3.4	19.2	17.7	51.0	8.8
Evidence that trees have been harvested with a clear-cut	4.0	16.7	17.7	36.7	24.8
An area of large trees along the road with evidence of a clear-cut timber harvest visible behind the large trees	5.4	19.0	22.9	35.6	17.1
A small house in the forest	8.5	28.6	52.5	9.4	1.0
Tire tracks from off-road vehicles in the forest	1.8	7.9	30.3	45.9	14.2
A small paved road through the forest	4.4	18.5	49.7	23.8	3.6
A small hiking trail through the forest	10.9	31.2	52.1	5.3	0.4
An agricultural field planted in the forest	11.9	34.4	39.0	13.1	1.6
Signs describing who is responsible for the forest	16.0	34.9	46.2	2.1	0.9
Signs describing when the forest was planted	14.3	33.7	49.2	2.0	0.9
Bales of hay keeping exposed soil from eroding during a timber harvest	28.2	51.2	12.9	6.4	1.3
Grass planted after a timber harvest	36.9	48.3	10.4	3.6	0.9
New, young trees planted after a timber harvest	51.1	40.1	6.5	1.7	0.6

Question 25. Heard of Forest Bank Prior to Survey (n = 785)

Response	Percent
Yes	12.6
No	87.4

Question 26. Where Heard of Forest Bank (n = 101)

Source	Percent[1]
Newspaper	42.6
Friend or neighbor	26.7
Extension office	23.8
Television	14.9
Club/association meeting	11.9
The Nature Conservancy	11.9

[1] More than one source could be indicated

Question 27. Landowner Attitudes to Components of the Forest Bank as a Reason To Enroll (n = 623)

Component	Reason to Enroll +2	+1	Neutral 0	-1	Reason Not to Enroll -2
TNC is sponsoring the program	4.9	8.0	64.7	4.1	18.3
Getting a steady, reliable income	12.1	22.3	44.9	4.5	16.2
Timber would be harvested off your land	4.7	12.0	37.8	13.1	32.3
TNC assumes the risk of timber value lost due to natural disaster	14.5	23.3	46.5	2.4	13.4
Land enrolled in this program will be permanently enrolled	3.1	4.0	25.8	12.4	54.8
Timber harvested will be processed locally to promote the local economy	19.8	25.7	37.5	2.8	14.2
Land enrolled will not be able to be subdivided	9.8	10.9	30.2	12.5	36.6
TNC, not the landowner, will be responsible for keeping up with new regulations	13.9	21.5	38.3	5.1	21.2
The resale value of my land may decline	2.0	3.6	29.9	13.2	51.3

Question 28. Would you enroll in the Forest Bank (n = 745)

Response	Percent
Yes, now	7.7
Yes, in the future	15.3
No, never	77.0

Question 29. Reasons For Not Enrolling in the Forest Bank[1] (n = 586)

Reason	Percent
Don't want to give up control	55.9
Want children to decide	42.4
Will reduce resale value of property	28.2
Would like to see how it works first	19.6
Landowners already protect the environment enough	17.3
The program sounds too confusing	16.8
My trees are not valuable enough to cut	16.8
The program will prevent me from subdividing my land	16.5
My trees are too small in size	13.2
I won't make as much money from my trees under this program	7.7

[1] More than one reason could be indicated

Question 30. Age of Landowners (n = 790)

Age (years)	Percent
30 or younger	1.8
31-40	4.7
41-50	19.2
51-60	25.2
61-70	26.1
71-80	14.8
81 or older	8.2

Question 31. Gender of Landowners (n = 793)

Gender	Percent
Male	75.0
Female	25.0

Question 32. Household Income (n = 678)

Income	Percent
$0-$9,999	9.4
$10,000-19,999	15.9
$20,000-29,999	16.4
$30,000-39,999	11.8
$40,000-49,999	9.1
$50,000-59,999	8.6
$60,000-69,999	7.1
$70,000-79,999	4.9
$80,000-89,999	2.8
$90,000-99,999	2.8
$100,000 +	11.2

Question 33. Highest Level of Education Completed (n = 769)

Level of Education	Percent
Grammar school	10.1
Some high school	11.8
High school diploma	28.7
Some college	21.8
Bachelor's degree or equivalent	17.2
Master's degree	6.1
Ph.D., M.D., J.D.	4.2

Question 34. Current Employment (n = 782)

Employment	Percent
Full-time	41.2
Part-time	4.1
Unemployed	4.0
Retired	50.8

Question 35. Number of Children (n = 780)

Number of children	Percent
None	11.8
1	15.0
2	35.3
3	22.3
More than 3	15.6

Question 36. Primary Source of Income (n = 712)

Source of income	Percent
Timber harvest	0.6
Farming	4.1
Livestock	3.5
Non-land related employment	34.6
Retired	36.4
Other	20.9

Question 37. Area Grew Up In (n = 768)

Type of area	Percent
Farm	61.8
Rural, non-farm	19.0
Town (<5,000)	8.3
Town (5,000-10,000)	4.3
City (10,000-50,000)	3.4
City (50,000 +)	3.1

Question 38. Political Orientation (n = 731)

Category	Percent
Extremely liberal	0.7
Liberal	6.0
Slightly liberal	4.2
Moderate	29.8
Slightly conservative	18.5
Conservative	33.7
Extremely conservative	7.1

Question 39. Do you fish (n = 780)

Response	Percent
No	54.7
Yes, in the Clinch River	2.2
Yes, in other rivers	21.8
Yes, in both the Clinch and other rivers	21.3

VITA: JASON PAUL DEDRICK

The author was born in Cleveland, Ohio on November 16, 1973. He grew up in Wheaton, Illinois and later Medina, Ohio where he graduated from high school in 1991. After graduation, he began his undergraduate studies at The Pennsylvania State University in State College, Pennsylvania, studying for a Bachelor of Science in Meteorology. After two years he transferred to Oregon State University in Corvallis, Oregon, where he received his Bachelor of Science in Forest Recreation Resources in 1997. Shortly after graduation, he began his studies at Virginia Polytechnic Institute and State University where he graduated with a Masters of Science in Forestry with an emphasis in land use planning and policy. Jason is currently an environmental planner with EDAW Inc. in Seattle, WA, and lives with his wife, Vanessa in Fircrest, WA.